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IMPROVING EFFECTIVENESS OF MOBILE LEARNING TECHNOLOGY FOR USE IN HIGHER EDUCATION: A COMPARATIVE STUDY OF THE UK AND JORDAN

By

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in partial fulfilment of the requirements for the
degree of Doctor of Philosophy**



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Declaration

I hereby declare that the thesis submitted is my own work; is not copied or taken from any source except for those which have been properly cited and acknowledged. The work has not been presented to any other institution for seeking any degree or qualification.

Ali Yousef Jawarneh

Acknowledgment

This entire effort would not have materialised without the help and assistance of the Almighty God who bestowed me with the stamina and power to complete this immense project. Besides the thankfulness of the Almighty, the acknowledgment is incomplete without recognising the assistive and helping part of my Director of Studies and supervisors. The gratitude I would like to pay to my respected DoS and supervisors is so enormous that I am unable to explain in words as I owe them a great deal for their timely help and assistance whenever and wherever I needed it. The support of my family is one of the most important things without which this effort would not have been possible in any case. Therefore, I owe gratitude to my family that supported me throughout my study tenure.

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Abstract

This research is aimed at assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. The data was collected through three sets of activities, namely a quiz, a questionnaire survey regarding mobile learning content in Jordan and two sets of focus groups that were conducted at Aston University and the University of Jordan. The mobile learning content was modified, keeping in view the technology limitations of both the countries, enabling identification of a broader aim of determining appropriate measures for mobile learning within limited technology environments. The quantifiable data was examined by using a Wilcoxon signed rank test and Cronbach's alpha and the qualitative data was examined through thematic analysis.

The results show that the execution of learning through mobile devices in the University of Jordan lacks the availability of advanced IT infrastructure. However, the examination of the focus group data shows that the participating students from Aston University and the University of Jordan experience the same concerns regarding mobile learning. For example, the undersized display of handheld devices and restrictive battery lifespan were mentioned by the participants at both universities as the restricting factors that limit the use of learning through mobiles.

The research also found some contradictions between the extant literature and the research data obtained through three learning activities on the mobile learning content. For instance, the participants mentioned the battery life of mobile gadgets as a limitation but the literature revealed that with technological advancements in the form of availability of power bank devices, thus the issue of limited battery life is insignificant. The theoretical contribution of this research is the application of two mobile learning theories, TPACK theory and Connectivism theory for the creation of mobile learning content for this research. This research helps to examine the technology gap present in Jordan in contrast to the UK and identify the challenges and limitations of using communication devices for m-learning in Jordan; the technology gap between Aston University and the University of Jordan has been highlighted.

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List of abbreviations

Analysis, Design, Development, Implementation, and Evaluation	ADDIE model
British Educational Communications and Technology Agency	BECTA
Cathode Ray Tube	CRTs
Document	DOC
Electronic education	E- education
Electronic learning	e-learning
Electronic mailing	E-mailing
European Finance Association	EFA
Fourth generation	4G
Further education	FE
High Definition	HD
Higher Education	HE
Higher Education Funding Council for England	HEFCE
Higher education institutes	HEIs
Information and communication technologies	ICT
Information Technology	IT
Information Technology	IT
International Business Machines	IBM
iPhone Operating System	iOS
Jordan Competitiveness Program	JCP
Jordan's education initiative project	JEI
Kingdom of Saudi Arabia	KSA
Liquid-crystal-display televisions	LCD
Massive open online course	MOOC
Matrix laboratory	MATLAB
Meta-cognitive Technological Pedagogical Content Knowledge	M-TPACK
Mobile learning	m-learning
Motion Picture Experts Group Layer-3	MP3
Personal Computer	PC
Personal digital assistant	PDA
Portable Document Format	PDF
Power point	PPT
Princess Sumaya University for Technology	PSUT
Random access memory	RAM
Second generation	2G
Short Message Service	SMS
System development life cycle	SDLC
Technological Pedagogical Content Knowledge	TPACK
Third generation	3G
United Kingdom	UK
United States of America	USA
US Aid	USAID
Virtual Learning Environment	VLE
World Trade Organisation	WTO

1 Chapter 1

1.1 Chapter Overview

The concept of mobile learning (m-learning) is adopted by the learners as well as the instructors. But in order to adopt this emerging concept or mode of learning, along with the capabilities, there are various limitations. This is an introductory chapter describing the background of the research which shows how the concept of m-learning has emerged and what the significance is of employing this concept in a way to provide higher education. Moreover, the limitations in the means of adopting m-learning have also been highlighted. In line with the research background, the problem statement indicates the existing research gap. In addition to this, the research aim, objectives and questions regarding the issue of m-learning are also the core elements of this chapter, which also considers previous study of mobile learning. Moreover, the query of what this study contributes to knowledge is also answered in this section. The scope of this study is also discussed in this section.

1.2 Introduction

This research is aimed at assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. The m-learning module design was based on the theoretical work done by Siemens and Stephens (2008) on Connectivism theory and Mishra and Koehler (2006) proposed the TPACK theory. These theories suggest designs suitable for m-learning based on explanations of learning with technology.

The phenomenon of electronic learning using mobile technology or learning through mobile devices (mobile learning) is increasing in higher education (Ally, 2009). Yet, there is no similar research of the use of mobile learning in developing countries, such as Jordan. This study aims to assess the capabilities and limitations of mobile learning technology and its influence on learning in Jordanian higher education. Engel and Green (2011) argue that the swift uptake of mobile gadgets as a learning instrument will rapidly develop into an essential learning instrument in educational foundations. In today's technology-driven era mobile devices are deemed to be an essential vehicle through which learning material can be accessed, content can be generated and communication can be made (Garcia et al., 2015).

Without a doubt, mobile learning has a lot of potential in the future to become a partner for providing education together with conventional teaching techniques (Azizan, 2010). It is critical

for any industry to be successful so that they stay up to date with the latest industry trends. Mobile learning is a necessity for today's society and demand of students; therefore, it is important to facilitate these needs and do what is necessary (Alfawareh and Jusoh, 2014; Al-Harrasi and Al-Badi, 2014; White and Mills, 2014). To gain maximum benefit from mobile learning practices students need to be aware of how to access, administer and assess digital resources (Garcia et al., 2015). Iqbal and Qureshi (2012) state that the technique of having a documents application group containing files, such as DOC, PPT, PDF, etc. can be employed in developing countries to deliver lectures that are missed by students living in remote areas, while for Sharples (2013), mobile learning should be viewed as complementary support to conventional education. The perception is critical to the use and image of m-learning. This is very important as it aims to identify what the key variables are that affect learners in using and being satisfied with m-learning, such as ease of use, availability of access from anywhere and simplicity.

Hwang and Chang (2011) argue that m-learning can be deemed as a substitute to quality education especially where learners do not have the opportunity to get a university education, and this discussion is more connected to emerging countries where education bodies are not as prevalent and countryside areas do not have suitable classroom learning. According to the research of Checko et al. (2015), the growing mobile technology has reduced sizes to the extent that today a mobile phone is a mini computer, although very powerful, which results in a radical increase in the use of mobiles. However, Sharples et al. (2002) assert that the advancement of technology is no single indicator of a mobile learning opportunity; instead, factors, for example the possession of mobile devices, purchasing power of the students, network capabilities and signal strength need to be addressed to develop effective learning solutions.

According to Fuller and Joynes (2015), the application of m-learning will be essential in the coming years and it is how we develop the standards and usage requirements that will shape the future of m-learning. Conversely, Alnabhan and Jaafer (2012) state that m-learning, therefore, is not about working with advanced technologies and best available options only; in fact, it is more about adjusting to the needs of the target learner so that a better and widespread learning solution is developed. Although, Cardullo et al. (2014) write that the growing capabilities of mobile phones and handheld digital devices have paved the way for learning opportunities via mobile phones and allied devices.

A wide range of research has been done on the subject of mobile learning (Cheon et al., 2012) but the focus has been mainly either on studying mobile learning in the framework of developed states or only exploring the technological aspect of mobile learning (Mehdipour and Zerehkafi, 2013; Fernandez-Lopez et al., 2013). Therefore, unlike other studies, this particular research is done to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education.

The study is aimed at assessing the capabilities and limitations of mobile learning technology and its influence on learning in Jordanian higher education. Mobile use is penetrating every aspect of life, thus, educational institutes find this an opportunity to use mobiles for educational purposes.

The study highlights what students look for in m-learning options; the target segment or target market for the learning needs; application of m-learning and how it can be used as a tool to facilitate students and become an option for those who are not able to study in institutes and let them utilise the study options by using their mobile phones as a medium. Technology advancements have enabled mobile devices to be very powerful devices with capabilities exceeding the generics of simple calling and texting (Fuller and Joynes, 2015). Mobile learning is based on the available technology, networks, infrastructure limitations and content (Liu et al., 2010).

Thus, this research is aimed at assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. Also, internet download speeds and the use of 3G for data use on mobile phones, data security and many other factors limit the development of course material for learning; for instance, not all mobile phones support all video formats. Also, not all mobile phones are universally compatible (Shen et al., 2008). This research is critical and seeks to evaluate the core objective of m-learning. The results are expected to contribute to the subject of m-learning and enhance the effectiveness dimension of m-learning.

1.3 Background of the Study

The growing trend of development in the field of information technology has made access easier and affordable to the technological devices. Hence, the evolutionary advancement in science and technology has transformed each sector and therefore significant impact has been observed in

every walk of life (Huang and Chiu, 2015). With reference to education, as mentioned by West (2013), the progression of information technology has introduced the concept of e-learning or distance learning. As the technology becomes affordable, the trend penetration of the mobile phones has increased. Along with the other different purposes, students are using mobile phones for the purpose of learning. Hence, the concept of mobile learning has evolved. According to the study of Hwang and Wu (2014), mobile learning is considered as a notable shift from the traditional learning tools. A number of studies have performed investigations regarding the consideration of the concept of e-learning and mobile learning. Research by Naismith et al. (2004) has investigated the requirement and importance of moving the learning device from the classroom to any other place. As discussed by Jung et al. (2006), technological advancement and the concept of m-learning help the learners to learn with modern learning concepts. Sharples et al. (2002) highlighted that m-learning allows the learner to continue the learning process without restricting them to one place. Exploring the concept of m-learning from the people's perspective, the study by Mtebe and Raisamo (2014) shed light on the perception of the people regarding the adoptability of m-learning methods. The study concludes that m-learning is considered by the students. While discussing the importance of m-learning, Vyas and Nirban (2014) highlighted that the implementation of m-learning is therefore very useful for the effective learning for the students. As far as the implementation of newly developed technologies is concerned, to establish the perceptions of the people regarding this technology is essential. In the context of accepting the mobile learning concept, the research of Seyal et al. adopted the Technology Acceptance Model. The findings of the research indicate that students have given positive responses and are excited to explore further improvements in the concept of m-learning. In the context of Jordan, the study by Almarabeh (2014) highlighted the perception of students in Jordan regarding e-learning. His study concludes that the concept of e-learning is appreciated by the highly qualified students via deploying the Technology Acceptance Model. Moreover, students prefer to utilise the concept of e-learning in a more advanced manner. Therefore, the research of Alnabhan et al. (2012) indicates the need for development of m-learning in order to promote effective learning. In a similar context, the study by Kukulska-Hulme (2009) has explored that the attitude of learners towards mobile learning is positive. They even want more advanced options in their mobile phones that can be more facilitating in the way of learning. Kim et al. (2013) found the perception of research participants regarding the mobile technology in

learning. The participants are eager to adopt mobile technology as it helps them to learn outside the classroom which provides them with a broad perspective of the learning experience. Mobile learning is not only beneficial for the students in developed countries but it has opened up various avenues of learning for the students of developing nations. The research of Batchuluun (2007) pointed out the perception of students in Mongolia regarding the concept of m-learning and found positive results. Moreover, the research shows that the government of Mongolia is also interested in the implementation of m-learning in its universities. According to Motlik (2008), the penetration of mobile phones has increased in Asia in the past two decades. It is the reason for the continuous evolving concept of m-learning in Asian countries under the title of distance learning. With reference to the remote areas of developing nations, the research of Kumar et al. (2010) indicates that m-learning is the effective source of providing education. Now the higher education is not limited to the developed countries and the urban areas but it is also accessible through the remote areas. In a similar context, Viyas and Nibran (2014) pointed out that the rapid penetration of mobile phones in developing countries significantly effects the perception of the students regarding m-learning. Another research was conducted which shows that the students of rural areas of underdeveloped countries do not have access to high quality education. Mobile learning is therefore contributing a significant amount of knowledge via a variety of online free courses or massive open online courses (MOOC) from the top tier of the world's universities.

1.4 Problem Statement

To promote the learning environment, the technological advancement has played a significant role. In the context of distance learning, mobile learning is the emerging concept. In order to implement the concept of m-learning, universities are required to understand the perception of the students. Sharples (2013) is known as the father of studies on m-learning, which present a preliminary scaffold for theorising mobile learning to add to theories of informal, classroom, place of work and unofficial learning. Much research is done on the utilisation of m-learning as a distance learning tool. Research on mobile learning, such as by West and Paine (2010), considers mobile learning as a substitute to quality education; especially where learners do not have access to a university education. Very few studies have investigated the importance of m-learning and the perception of people in the context of developing countries. With reference to Jordan, the capabilities and the limitations of mobile learning technology are not focused thoroughly with

respect to the countryside areas where appropriate classrooms for learning activities are rare. Moreover, the perception of the pupils regarding the adaptation of m-learning has not yet been explored from the perspective of Jordan. Therefore, the present research aims to investigate the design and technology limitations in developing content for mobile learning for the higher education students in Jordan. Moreover, the maturity point of technology, instruments and telecommunications for aiding learning through mobile devices in Jordan are also investigated in this study. To bridge the research gap, the present research explores the perception of students regarding the concept of m-learning and the factors that enhance the acceptance level of learners to mobile learning technology. In line with this, to compare the perception of the learning experiences from m-learning between developed and developing nations, the comparative analysis has also been made between research participants of the UK and Jordan.

1.5 Research Questions

Research questions have been developed to address the requirements of the research and add to the knowledge of learning through mobile devices. The research questions, therefore, have been developed to narrow the scope and bring focus to the topic. The following study questions have been developed:

- What are the design and technology limitations in developing content for mobile learning for higher education students in Jordan?
- What are the comparative students' perceptions of effective utilisation of mobile learning by the learners in Jordan and the UK?
- Which factors enhance the acceptance level of learners of mobile learning technology?
- How to understand learner needs of technology for effective application of mobile learning using a comparison of UK and Jordanian students?

1.6 Research Aim

The aim is to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education.

1.7 Research Objectives

The following objectives in this research are developed on the basis of the notion of Tuckman and Harper (2012) that states research objectives are developed for the guidance of activities done during research:

- To critically review literature to have a profound understanding of the scope and limitation of mobile learning technology and their application for mobile learning.
- To recognise factors that influence the implementation of mobile learning in Jordanian higher education by evaluating differences between Jordan's higher education institutions and the UK's higher education institutions.
- To examine capabilities and limitations of using telecommunication technology for learning in Jordan.
- To adapt mobile learning content for Jordanian and UK students according to the capabilities and limitations of available mobile learning technology.
- To make recommendations arising from the research to the education policymakers and the teachers.

1.8 Relation Between Aims and Objectives

The aim is to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. The first objective fulfils the aim of assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education by reviewing the current literature available on mobile learning technology and its application in Jordan. The second objective is associated with the aim of assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education, as it identifies the factors affecting the implementation of mobile learning by conducting a focus group with the higher education learners of the University of Jordan and Aston University in the UK.

The third objective satisfies the aim of assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. The capabilities and limitations of mobile learning technology will be identified by conducting a questionnaire survey with the learners of the University of Jordan.

The fourth objective concerns the quiz activity after uploading mobile learning lectures and mobile learning content from the websites of the University of Jordan and Aston University. With the achievement of this objective, the aim of assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education will also be satisfied by analysing data obtained through mobile learning content activity.

The fifth objective will satisfy the research aim by proposing the improvement steps in light of the examination of obtained data through the literature review, the quiz, questionnaire survey and focus group activities for the use of mobile learning in Jordan, where technology is not as advanced as in UK universities.

1.9 Scope of Research

Mobile learning has been a rapidly advancing medium used by the higher education teachers (White and Mills, 2014). The research reviews extant literature on the current state and progress in the field of mobile learning, both technological developments and potential learning opportunities. The empirical research focuses on the University of Jordan to recognise how effectively mobile learning can be applied in Jordan by comparing it Aston University's students' experiences.

The research further narrows down the students' acceptance and perceptions of m-learning. The research developed mobile learning content that was taught to the students on their mobile devices. The mobile learning content was tested at the University of Jordan and compared through focus groups in the UK, to investigate the perception of students of the mobile learning content. In the development stage, the research aimed to identify the limitations in the areas of content.

The literature is insufficient in respect of an in-field study to examine the challenges that are being faced in developing countries, such as Jordan, with respect to mobile technology as an education tool on a systemic basis. This study fills this gap in our knowledge and understanding by conducting a questionnaire and focus group to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. This was by designing and developing mobile learning content for the learners of the University of Jordan and Aston University, which has not been done in previous research.

1.10 Contribution to Knowledge

The aim of this study is to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. The topic of mobile learning has been studied by various academics. The challenges faced by implementing mobile learning at a higher education level has been explored by scholars, for example, West and Paine (2010) established m-learning as a substitute for typical education predominantly in situations where learners are deprived of availing university learning in developed and emerging countries. Cheon et al. (2012) also conducted a study to investigate mobile learning willingness in higher education centred upon the theory of planned behaviour. More recently, Huang and Chiu (2015) conducted a study on the efficiency of an evocative learning-centred assessment model for framework-aware mobile learning. However, one common aspect in all the aforementioned research work is that they were done in the context of developed countries, which creates a gap of research work in the context of developing countries. Considering this gap, this study is carried out to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education.

The theoretical addition of this study is the application of two mobile learning theories, the TPACK theory – which has been initiated by Mishra and Koehler (2006) – and the Connectivism theory of Siemens and Downes (2008) for the creation of mobile learning content for this study. The research contributes to the application of Connectivism and TPACK theories in the mobile learning domain by extension of these theories to understand the issues faced by the learner while using mobiles for learning and how theories can facilitate to link these understandings to better mobile learning.

The theory of connectivism is highly suitable for the research topic of mobile learning because this theory is specifically designed for the digital age and incorporating technological methods into the learning process. Considering the above application of this theory and its significance in the digital world, this theory is more applicable in the context of Jordan, rather than Conversation Learning theory, Situated Learning theory, Constructive Learning theory and Behaviourist Learning theory. It is essential to note that all these theories focus more on the conceptual and psychological aspects of the learning process, instead of analysing the value of digitisation. Nevertheless, this theory can be helpful in developing mobile learning content as the

connectivist approach is expected to bring resources which are available and open to use. These resources are also often called Creative Commons Licenses which allow users to create, share and remix the information in legal ways. The theory of connectivism is not negated while applying it instead facilitates the development of mobile learning content for this study, which was developed to incorporate technology into learning.

The content was developed to interconnect students, as Hosseini (2015) states that Connectivism theory is about teaching by utilising the linked social media efficiently through models, paradigms and practices. However, the contribution of this study to knowledge is also in the form of the extension of Connectivism theory as the connectivist approach focuses on using available open media resources for sharing, generating and recombining the learning activities and this study elaborates the context of this theory by highlighting the issues faced by learners by using different open media resources.

For example, the small mobile screens and difficulty in reading and writing long documents on mobiles restrict learners in using mobile gadgets for learning activity. Conversely, the reason for applying the TPACK framework is its inclination towards the usage of mobile applications and functions that provide different ways to students to enhance their skills. Moreover, this theory can also facilitate in developing mobile learning content as it focuses on those specifications that are purposely designed for the learning environment.

The contradictions found while analysing the collected data with the literature review do not require the restating of both the theories, i.e. Connectivism and TPACK, because the contradictions found are linked to the features of mobile learning instead of the theoretical aspect of utilising mobile gadgets for the learning purpose. Moreover, the developed conceptual framework for this research is also backed by the findings of this research as the results obtained after analysing the obtained data are related to the two main components of the framework i.e. capabilities and limitations. The obtained results elucidate the capabilities and limitations of using mobile learning technologies in the higher education sector. This research is planned only to make a theoretical addition to the current knowledge and research work so it was done by using the existing methods of research.

This study is useful for policymakers, academics and teaching staff incorporating the utilisation of mobile learning to improve the learning experience by facilitating the students through mobile

devices. This research also helps to examine the technology gap present in Jordan in contrast to the UK and identify the challenges and limitations of using communication devices for m-learning in Jordan; the technology gap between Aston University and the University of Jordan have been highlighted.

One of the most well-known studies in the context of mobile learning is the work of Sharples (2013), the objective of which was to present a preliminary scaffold for theorising mobile learning to add to theories of infant, classroom, place of work and unofficial learning. On the other hand, Cheon et al. (2012) also worked on the theoretical aspect of mobile learning in their study, “To a theory of mobile learning”, and explored the growth of e-learning into handheld computing devices through a mobile learning structure. The framework developed in Cheon et al.’s (2012) study gives the conditions to create mobile learning functions that can be employed to add to classroom learning or distance learning. The contribution of Sharples et al. (2002) on the topic of mobile learning is considerably huge as he also worked on the issues related to mobile learning. However, the current research work that has been done in the framework of mobile learning is suitable in the framework of developed countries and there is a shortage of work on the application of mobile learning in emerging countries. Jordan is one of the rapidly growing countries and needs extensive study of work on the application of mobile learning in higher education institutes in Jordan. Considering this fact, the current study is a significant contribution to the literature, especially in the context of Jordan.

1.11 Dissertation Overview

This sub-section provides a guide to this dissertation for the facilitation of readers, as Creswell (2013) points out one of the qualities of a good research is that it must offer a comprehensive guideline for the readers so that the study aims and objectives are communicated to them. The first chapter describes the research scope, aims and objectives, previous works on the same topic, the contribution to the knowledge and justification to conduct this. The research revolves around the Connectivism theory and TPACK framework that are the most acknowledged and recent studies regarding mobile technology and learning dimensions. They are most appropriate for this study as they are highly relevant to the topic and provide the necessary foundation and arguments to conduct this study.

The second chapter reviews pertinent literature on the topic of increasing/improving the effectiveness of mobile learning in Jordan. It also reconsiders the work on mobile learning in the UK to attain one of the research objectives, which is to identify the challenges and limitations of using communication devices for learning in the UK and Jordan. In addition, a detailed conceptual framework for the study is developed as simply as possible to guide the readers. This chapter also discusses the rationale behind the creation of the conceptual framework.

The third chapter details the comprehensive research methodology. It explains why the mixed research approach is selected for the attainment of the research targets. It details the use of data collection and analysis tools, which were a questionnaire survey and SPSS software. The fourth chapter includes analysis of the qualitative and quantifiable data obtained through the execution of three activities: quiz conduction, questionnaire execution for mobile learning content experience in Jordan and focus group at the University of Jordan and Aston University. The fifth chapter critically reviews the results obtained through three activities – quiz conduction, questionnaire survey and focus group conduction – but also interrelates the results with the findings of the literature and the sixth chapter presents conclusions and recommendations.

Study Guide Structure

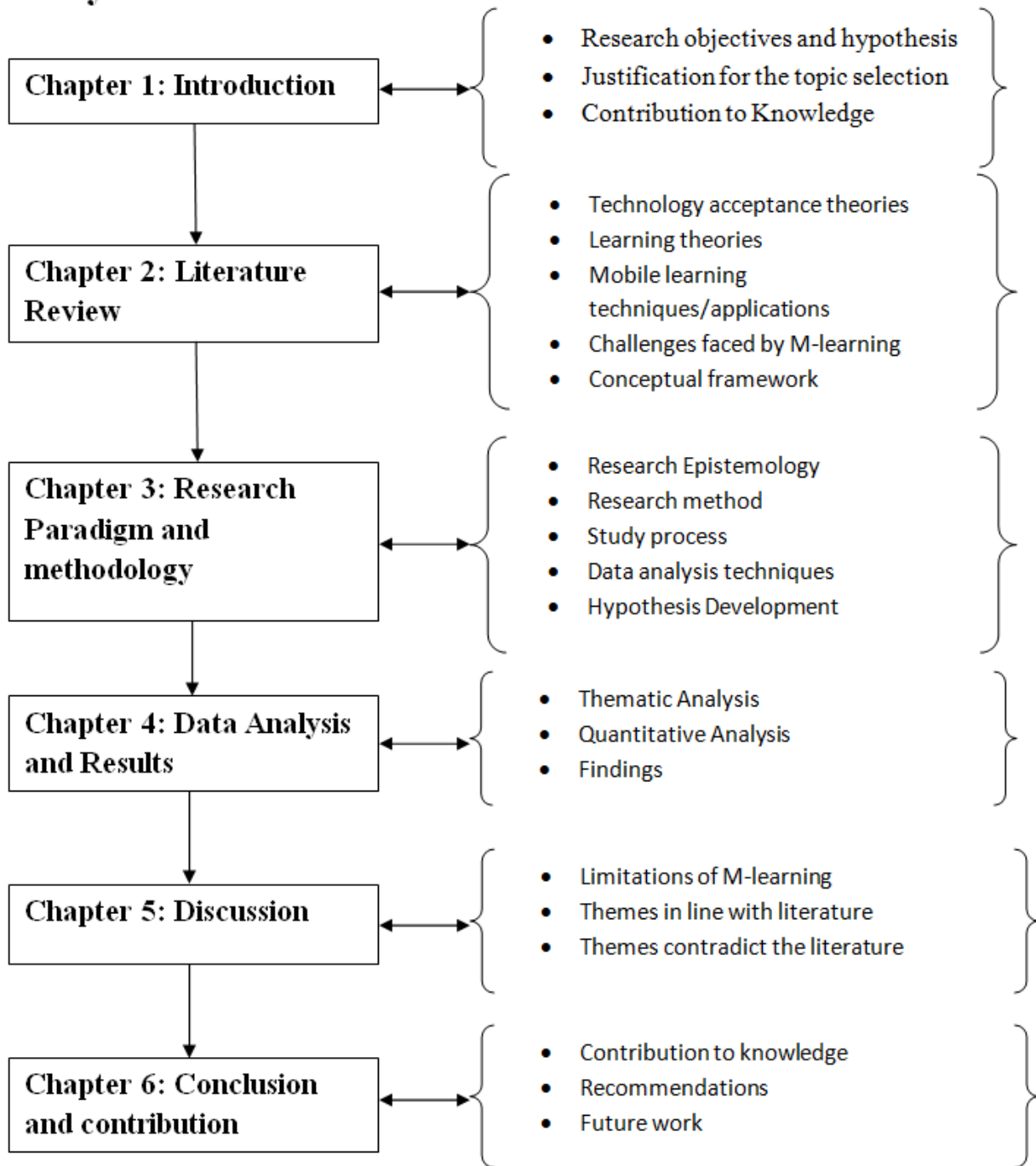


Figure 1: Study Structure

1.12 Chapter Summary

This chapter develops the foundation for the study by identifying the study background and corresponding problem statement. The problem statement leads to the formulation of the

research aims and questions. The chapter also highlights the possible contribution to knowledge from the study and identifies the outline of the entire study along with an explanation of content in each chapter. The next chapter will review the literature for the study and develop a conceptual framework for the study.

2 Chapter 2: Literature Review

2.1 Introduction

This chapter reviews the pertinent literature for the study. The research is aimed at assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. The literature review chapter is therefore based on three broad aspects of this study. The first section establishes learning theories and application of these theories to mobile learning. A range of theories has been reviewed in the light of mobile learning and two theories have been selected, notably Connectivism theory and TPACK theory. The selection of these theories and their application to mobile learning is therefore discussed in the subsequent segments. The critical focus has been how these theories and their application enables the application of the concept of mobile learning, what a modern learning application is, and how the theories facilitate the technological impact of learning. The literature further defines mobile learning and development of the concept of mobile learning and further challenges faced by the implementation of mobile learning. Moreover, the capabilities of mobile learning have also been discussed in the subsequent sections. The relevant position of both Jordan and the UK has been discussed in the context, where the technology status of both countries has been discussed. The concluding sections focus on measures to facilitate mobile learning in Jordan in comparison to the UK and how improvements can be made in Jordan to improve mobile learning acceptance.

2.2 ICT and Education

Information communication technology (ICT) is of great significance in the area of education as it facilitates access to published information and data. It is considered to be a very socially oriented activity, as particularly in education the use of ICT lends itself to a more comprehensive student-centred learning setting (Player-Koro, 2012). The trend was developed by the beginning of ICT in 1992. During this time, the concept of email had begun to be available to the general public.

According to Gold (2012), the field of education has been affected by ICT, which has resulted in having a direct effect on teaching, learning and research. Over the years, research conducted by Lowther et al.(2008) indicates that ICT has proven the benefits of the quality of education. Through the use of ICT, there is a better possibility of innovation, motivating and engaging

students and also can result in strengthening teaching and helping schools change (Martinovic and Zhang, 2012).

Today, educators have increased their interest and have become more focused on using technology to improve student learning, which is a rationale for investment. Lopez-Nicolas and Soto-Acosta (2010) detailed that in terms of education, ICT implies the creation of information and communications technology for the purpose of education and learning. On the other hand, in education, and during the teaching learning process, ICT includes the taking on of common constituents of information and communication technologies. Initially, conventional teaching practice involved written content around textbooks.

Over the years, research has been conducted which shows that information and communication technologies have played a major part in terms of improving student learning and better teaching methods. The use of ICT in education offers a more interactive learning experience as it makes use of images which improves the retentive memory of students (Rajasingham, 2011). At present, teachers are employing tactics such as interactive classes which make lessons enjoyable and interesting for students (Valk et al., 2010). As a result of these practices, students' levels of attention and concentration have also been improved (Samarji, 2015).

2.3 Technological Pedagogical Frameworks for Mobile Learning

Technological pedagogical frameworks are now fundamental to learning and teaching (Ferdig, 2006). This section critically examines different technological pedagogical frameworks that will further facilitate understanding of the challenges that mobile learning implementation has to face in developing countries.

2.3.1 Technological Pedagogical and Content Knowledge Framework

2.3.1.1 Introduction and description

The technological pedagogical and content knowledge (TPACK) framework goes beyond the three core components which include: technology, pedagogy and content (Voogt et al., 2012), the original approach for the theory appeared in the work of Mishra and Koehler (2006). Essentially, technological pedagogical content knowledge is different from knowledge of all three concepts individually. Rather, at this time, TPACK is being used by teachers around the globe to combine technology, pedagogical technology and knowledge (Koh et al., 2013; Niess,

2011). Often, study in the field of educational technology has been critiqued for a lack of theoretical grounding. The basis for the TPACK framework is the perception that education is a greatly multifaceted exercise that utilises various types of knowledge (Hosseini, 2015). Considering the challenges newer technologies present to teachers today, teaching with technology has been further complicated.

Today, teaching is a process, which involves both analogy and digital practices, including both new and old technologies. According to Cetin-Berber and Erdem (2015), in terms of practical significance, in current literature nearly all technologies under consideration are new and digital and contain certain intrinsic properties which make its application in simple methods more complicated. The TPACK framework involves three main components of teachers' knowledge including: content, pedagogy and technology. Each of these components is considered fundamental to the model and are the interactions amongst the bodies of knowledge. In terms of literary knowledge, it is the teachers' knowledge regarding the topic which is to be studied or taught.

There is a difference between the content taught in middle school and in the undergraduate programme. Therefore, for teachers, the knowledge of content is critical. Samarji (2015) noted that this area of knowledge involves theories, concepts, ideas and organisational frameworks. Conversely, the other component of TPACK is pedagogical knowledge practices or different methods of learning and teaching which have been employed. Therefore, a teacher who tends to have profound academic knowledge is familiar with how learners construct knowledge and attain skills. Hosseini (2015) has detailed that for pedagogical knowledge there is a need for a comprehension of cognitive, societal and development theories of learning. In addition, it is critical for the teachers to be aware of how these theories can be applied to the students when teaching in a classroom.

2.3.1.2 Proponents' and critics' views

Technological pedagogical and content knowledge has arisen as a useful structure for instructional technology-enhanced education. It has been argued by philosophers of science that theoretical frameworks guide observation (Evans et al., 2011). According to Pamuket et al. (2013), it has been critiqued that the TPACK structure looks to help in developing better methods for determining and recounting how technology-centred professional knowledge is executed and

practised. Therefore, it can be stated that by better describing the types of knowledge needed by teachers, it would put the educators in a better position in terms of understanding the variance in levels of technology integration. It has been instigated that in terms of promoting research in teacher education, teachers' use of technology, teachers' professional development and numerous opportunities are offered by the TPACK framework (Gold, 2012). By making use of this framework, both teachers and researchers have the ability to move away from plain techniques, which consider technology as merely an append.

Voogt et al. (2013) recently conducted a review to instigate the academic foundation and the realistic utilisation of TPACK. For the purpose of this research, articles and books published between 2005 and 2011 have been carefully reviewed. The analysis of this study revealed certain limitations related to reliability and validity properties which are essential for establishing rigorous measurements. Researchers have argued that when the three components of the TPACK framework are separated their relationships might be difficult in practice. The TPACK framework is useful for conceptualising and discussing a complex web of relationships in a more grounded and methodological manner (Hosseini, 2015). This tool is not only helpful in identifying phenomena in the educational world, but also gives one the language to talk about it. For example, more often a criticism in terms of educational technology involves that it is driven more by the imperative of technology in comparison to sound pedagogical reasons. The framework provides appropriate reasoning to understand the phenomenon more effectively.

2.3.2 Meta-Cognitive Technological and Pedagogical Content Knowledge Framework

2.3.2.1 Introduction and description

According to Archambault and Barnett (2010), teaching is described as both an art and a science. As a consequence of the complex character of education and learning, over the years, different scholars and educators have tried to identify different elements which teachers need to be aware of. The TPACK framework comprises the negotiation and synergy amongst three forms of knowledge. In terms of understanding, building and sustaining teacher integration of technology in the classroom, the meta-cognitive technological pedagogical and content knowledge (M-TPACK) framework has emerged to be an essential tool (Kazu and Erten, 2014). According to the M-TPACK teacher, knowledge is considered to be the foundation of effective learning and teaching. Keeping this perspective in view, it places meta-cognitive decision-making skills and

dispositions of a teacher at the framework's centre and front. The teachers who are disposed to a learner-centred approach to teaching are considered to be more likely to make changes to the course as per the needs of the student (Cetin-Berber and Erdem, 2015).

As a result, a meta-cognitive teacher in an e-reader classroom is deemed to be an effective teacher (Gopnik and Wellman, 2012). A teacher's subject matter knowledge here is related to their intellectual ideas, facts and information regarding a particular content (Ferdig, 2006). Conversely, pedagogical content knowledge is the association amongst content knowledge and the teaching process. In order to teach content, the teachers make use of different content-specific techniques.

2.3.3 Connectivism Theory of Downes and Siemens

2.3.3.1 Introduction and description

Downes and Siemens (2008) worked together to develop a theory for the digital age and named it the Connectivism theory. The major rationale of introducing this theory was to present an important instrument which can be used in the learning process. Generally, a theory is applied to the synthesis of a large body of information (Hosseini, 2015). It has been stated by Kivunja (2014) that through the use of Connectivism theory an educator is offered a model, or rather a mental representation, which can be used to depict something which otherwise cannot directly be observed or experienced. Connectivism theory is used to explain how new opportunities have been created by internet technologies and how people today have better opportunities to learn and share information across the Web and amongst themselves (Transue, 2013). The key feature of Connectivism theory is associated with the perspective that a lot of learning can take place across peer networks that take place online, for instance, in an attempt to support the learning and sharing of students. Also, according to the Connectivism theory, a teacher guides the students to information and provides answers to key questions.

2.3.3.2 Application

The Connectivism theory presented by Downes and Siemens (Tschofen and Mackness, 2012) is viewed by critics to be both valid and important as it is an essential tool widely used during the learning process for instruction and curriculum (Husaj, 2015). Kop (2011) has drawn attention to

three limitations of this theory which involve the constant requirement for literacy and power connections in the system.

Secondly, another important issue is the level of learner autonomy. Thirdly, Kop (2011) in his point of view, it has been concluded that in terms of connectivism, the intensity of connection is an essential element. More frequently, amongst the creation of instructional environments today, behaviourism, cognitivism and constructivism are all broad learning theories. However, these theories, for the most part, were developed during the period when the learning process had not yet been impacted by technology.

All learning models are connected to real learning procedures. During the last two decades, through increased use and advancements in technology our way of living, socialising and learning has dramatically changed. Often, cognitivism is concerned with a computer information processing framework. Therefore, learning is also considered as a procedure of contributions which is administered in one's short-term memory and it is coded for the long-term recollect.

For today's digital age, Siemens and George have proposed connectivism as a learning theory, which is a successor to behaviourism, constructivism and cognitivism (Kivunja, 2014). In terms of limitations for this learning theory, intrapersonal analysis of learning and unsuccessful attempt to deal with learning in the intrapersonal view of learning have been identified as the limitations (Kop, 2011).

2.3.4 Pask's Conversation Learning Theory

2.3.4.1 Introduction and description

During 1996 and 1997, Gordon Pask developed the Conversation theory which originates from a cybernetics framework. The main purpose of this theory was to elucidate learning equally in human beings and devices (MacNab, 2012), keeping in mind the central design of the Conversation theory, which was that learning takes place by means of conversations regarding a certain topic, which works to make knowledge clear. It has been argued by Pask that for the facilitation of learning, it is essential that a topic should be displayed in the structure of entailment arrangements.

When considered in depth, the Conversation theory is considered to offer a critical transformative challenge to educational technology. This is done by demonstrating the

conventionally understood psychology of the individual. According to Bygate et al. (2013), it has been instigated that essentially Conversation theory has been developed as a prescription for designing constructivist learning support systems.

2.3.4.2 Application

Pask's conversational model has been useful in terms of learning and teaching in science education. In addition, it may also be stated that this model is used for communication amongst scientists where theories are exchanged and evaluated. According to Baker (2005), Pask has provided a very comprehensive theoretical framework and a wealth of associated empirical studies of learning and teaching. As stated by Seedhouse (2004), what distinguishes Pask's Conversational theory apart from Maturana's and von Foerster's accounts of cognition and communication, is the fact that Pask has distinguished between the 'biological' or 'bio-mechanical' and the 'psychological' or 'conceptual'.

Considering the Conversational theory as a radical constructivist theory, having knowledge is considered to be a process of known and coming to know. The skeleton of the conversation model introduced by Pask represents the basics of interaction amongst the teacher and learner. In 1993, Diana Laurillard applied the underlying ideas of dialogue as developed by Pask and came up with the conversational framework (Laurillard, 1999). The framework introduced by Pask, as mentioned by Bygate et al. (2013), has been effective in terms of educational technology and is widely accepted and made use of in order to analyse educational technologies.

2.3.5 Situated Learning Theory by Constructivists

2.3.5.1 Introduction and description

The Situated Learning theory was put forward by Jean Lave and Etienne Wenger around two decades ago, with the focus on learning by doing, and on addressing real problems (Anderson et al., 1996). As this theory considers information technology as a powerful aid in 'doing' and to address real problems, therefore, it can be stated that information technology and situated theory work well together. It has been addressed by Efklides and Volet (2005) that constructivism and situated learning are both comparable and seem to be mutually supportive. It has also been argued by Lave that generally learning is a function of the action, framework and traditions wherein it takes place (Pitri, 2004). In terms of situated learning, communal communication is a

significant constituent where students tend to become more engaged in society's activities. More often, the process of situated learning is more unintentional rather than deliberate. Moreover, other academics have also additionally created the theory of situated learning after it was introduced by Jean Lave. For instance, this theory has been emphasised by Brown et al.(1989) considering the design of cognitive apprenticeship. However, Lave has argued that as learning is a function of action, framework and traditions wherein it takes place, thus, this tends to be in contrast with nearly all classroom learning activities which focus more on knowledge (Valk et al., 2010).

2.3.5.2 Application

Generally, the Situated Learning theory is considered to be a common theory of knowledge acquisition. In addition, up until now this theory has been applicable in the framework of technology-centred learning practices for schools which centre more on activities such as problem-solving abilities (Valk et al., 2010). Considering the Situated Learning theory, this most renowned limitation is its implementation considering the traditional schools system which exists today. As today, teachers need to meet certain learning outcomes at the end of a course, and thus, are often limited by particular constraints. In addition, the educators at present are frequently given a limited time to teach a particular course which results in making authentic learning tasks more difficult. Also, these practices are being limited by standardised testing methods. Nevertheless, situation learning, according to Efklides and Volet (2005), does make certain very strong points. However, to adopt this perspective it first requires a shift to be made in the way our schools operate. The situated learning theory asserts that knowledge is not transferred between tasks, rather it is context-specific (Pitri, 2004). Nonetheless, this statement fails to explain how students can apply knowledge to the new tasks.

2.3.6 Cognitive Learning Theory

2.3.6.1 Introduction and description

Jean Piaget introduced the Cognitive theory with the aim of explaining certain mechanisms and processes, such as an infant developing into an individual who has the ability of reasoning and thinking using a hypothesis (Olson, 2015). For Piaget, the process of cognitive development is a progressive reorganisation of mental processes which result due to biological maturation and environmental experience. Being a child, one tends to understand the world they live in and tend

to question what they already are aware of and what they discover by living in a certain environment.

The Cognitive Learning theory has been made use of in order to explain mental processes which are affected by intrinsic and extrinsic elements equally. These elements are responsible for bringing about learning in an individual. Considering the Cognitive Learning theory, it has been implied that mental processes can be used to explain the different processes concerning learning (Hwang and Tsai, 2011). Further, it has been pointed out by Torcasio and Sweller (2009), that effective cognitive processes involve the learning practice being easier so that new information can simply be stored in one's memory for a long time. On the other hand, ineffective cognitive learning occurs with one's learning difficulties that can happen anytime during one's lifetime. The three variables involved in Cognitive Learning theory include: behaviour, personal factors and environmental factors. These variables are considered to be interrelated with one another, thus learning occurs.

2.3.6.2 Application

Keeping in mind the perspective of Cognitive theory it states that new experiences are evaluated by the learner once they analyse their past experiences with the same determinants (Valk et al., 2010). As a result, learning is through evaluation of one's present experience versus the past. In terms of strengths of Cognitive theory, research has provided a lot of knowledge regarding how people think and perceive. In addition, this theory has been able to provide a lot of support. Therefore, due to the positive findings of this theory, it has been determined that it gained popularity both in professional and modern psychology areas (Harris et al., 2009). Akin to other theories, this theory is not free from criticism either. Firstly, behaviourists view this theory to be weak due to the abstract nature of thought and difficulty in defining them. Efklides and Volet (2005) have criticised the Cognitive theory for being fairly new and whilst a lot of research has been done the underlying theory of personality development is weak. Therefore, whilst there may well be positive outcomes after using this theory, it fails to provide a solid understanding of development (Torcasio and Sweller, 2009).

2.3.7 Constructive Learning Theory

2.3.7.1 Introduction and description

The term constructivism is widely applied to both learning theory and to epistemology. The idea of constructivism follows the perspective that students create knowledge for themselves. For instance, every student independently creates the connotation of something as the learning process continues. Considering the Constructivism Learning theory, it is a paradigm which believes learning to be an active and constructive process (Bideaud, 2001). Constructivism is a theory which is centred upon inspection and methodical research. This theory is useful for determining and learning how people learn. This theory follows the perspective that people tend to build their own understanding and knowledge from experiences about the world they live in (Giordan, 1995). For instance, a classroom's constructivist learning points are inclined towards different teaching practices. Generally, in order to encourage and motivate students different active techniques are employed so as to create more knowledge.

2.3.7.2 Application

Often constructivism has been misinterpreted as a learning theory as it induces learners to reinvent the wheel (Bygate et al., 2013). However, contrary to the theory's criticisms constructivism does not discharge the dynamic part of the instructor. Efklides and Volet (2005) have argued that in terms of the learning process constructivism can be used to convert the learner from being an inactive recipient of information to an active participant. During the 1980s and 1990s, constructivism emerged as the prevailing metaphor of human learning. Amongst other critics, Vygotsky criticised this theory for being too narrow, isolated and international (Giordan, 1995). Fox (2001) has detailed that the emphasis of constructive learning theory is on the learner's participation, therefore it is observed frequently that constructivism tends to easily dismiss the role of passive perception. Other researchers, including Gram et al. (2013), noted that the constructivist teaching approaches cannot at alltimes guarantee teaching effectiveness in a big classroom with more students.

2.3.8 Behaviourist Learning

2.3.8.1 Introduction and description

Principally, behaviourism is deemed to be an approach to psychology and is a form of materialism which denies any independent significance of the mind (Yadavendu, 2013). In the 20th century, the behaviourist school of thought ran simultaneously with the psychoanalysis movement in psychology. Whilst some behaviourists argue that in order to investigate psychological and mental processes, observation of behaviour is the most convenient mode, others believe that behaviour is the only appropriate subject of psychology (Giordan, 1995).

Considering the broad perspective, behaviourism assumes a learner to be passive as they have the ability to respond to environmental stimuli. B.F. Skinner developed the idea of radical behaviourism, which describes a certain school of thought that emerged during the control of behaviourism (Olson, 2015). Radical behaviourism is considered to be different from other schools of behaviourism as it differs in the role of emotions, acceptance of mediating structures and so on. In psychology, the behavioural theory is a pretty extensive field. Considering the use of behaviourism in an educational setting, it suggests the dominance of the teacher.

2.3.8.2 Application

A significant advantage of using behaviourism theory is that it can clearly define behaviour and can be used to measure changes in behaviour. Considering the humanistic psychology, it is assumed that people have autonomy and thus make their independent choices in life and are not liable to pursue the deterministic science laws (Torcasio and Sweller, 2009). In addition, humanism rejects the nomothetic approach of behaviourism for the reason that it views human beings as unique creatures and believes that humans are not comparable to animals. Keeping in view the psychodynamic approach, Freud criticised behaviourism since it does not consider one's unconscious mind influencing the behaviour (MacNab, 2012).

Rather, this theory tends to be more focused on externally observable behaviour. In addition, Freud is known for rejecting the idea that as an infant we are born with a blank slate, rather it is argued that human beings are born with instincts (Bygate et al., 2013). In terms of the application of behaviour theory, it is considered to emphasise objective measurement and is highly

applicable. However, in terms of limitations, this theory tends to ignore meditational processes and is considered to be too deterministic (Yadavendu, 2013).

2.4 Suitable Theories for Mobile Learning Content

With advancements in technology, it has become hard to ignore the significance of utilising mobile tools in the education sector. The mobile learning practices have become attractive for students in higher education as they offer convenience, flexibility, engagement and interactivity (Prasertsilp, 2013). In many developed countries around the globe, mobile learning has already become very popular. For the most part, college learners utilise their mobile tools for self-directed casual learning instead of the traditional and official educational framework.

Research conducted by Rajasingham (2011) has instigated that amongst college students the popularity of mobile devices has increased immensely as several undergraduate students often bring their own digital devices to college. At this time, a wide range of universities are making use of mobile technologies and have already created mobile-optimised versions of their websites (Khaddage and Lattenman, 2013). In addition, for the feasibility of students stand-alone mobile applications have also been developed by the universities, which can be downloaded from the applications stores. However, to successfully adopt the use of mobile technologies across universities and colleges there is a need to gather more information regarding the student population's mobile access and use. Quite a lot of research exists regarding the usage of mobile technology in higher education, however, certain factors, which influence the usage of mobile learning, still need to be explored in depth.

The selected theories are TPACK by Mishra and Koehler (2006) and the Connectivism theory of Siemens and Downes (2008). In this sub-section, it is elucidated why these two theories were selected for the development of mobile learning content and how they are suitable for this purpose in comparison to other theories reviewed in the literature chapter.

2.4.1 Connectivism Theory

This section focuses on the application of this theory in practical instances as the theory is valid and important and an essential tool widely used during the learning process for instruction and

curriculum (Bell, 2010). During the last two decades, through increased use and advancements in technology in our way of living, socialising and learning has dramatically changed. The theory of connectivism is highly suitable for the research topic of mobile learning as this theory is particularly designed for the digital age and incorporating technological ways into the learning process (Keskin and Metcalf, 2011). The selection of this theory can be justified through considering different applications.

The application of Connectivism theory can be found in many courses and learning environments. The ‘massive open online course’ (MOOC) phenomenon was introduced from the Connectivism theory (Kop, 2011). In this type of course, people can enrol by using open systems and software across the Web to improve sharing and learning, which takes place in a particular curriculum which is designed for a certain time period. The users of MOOC are highly responsible for their learning and sharing, which formulates the behaviour that generates the course content. Moreover, the theory of connectivism allows experimenters to introduce new services and tools (Tschofen and Mackness, 2012). The key benefits of experimentation are highly pragmatic as this can be identified in the usage of technology and its value. The high development of technology and usage of the internet with Web 2.0 and the development of mobile web-based content contribute to the educational structure.

Considering the above application of this theory and its significance in the digital world, this theory is more applicable in the context of Jordan, rather than the Conversation Learning theory, Situated Learning theory, Constructive Learning theory and Behaviourist Learning theory. It is essential to note that all these theories focus more on conceptual and psychological aspects of the learning process, instead of analysing the value of digitisation. Nevertheless, this theory can be helpful in developing mobile learning content as the connectivist approach is expected to bring resources which are available and open to use (Duke et al., 2013). These resources are also often called Creative Commons Licenses which allow users to create, share and remix the information in legal ways. For instance, if the student has published a photo or image by using www.flickr.com through a Creative Commons License, then later, the student can utilise it under legal boundaries in any non-commercial publication (Kim, 2007).

2.4.1.1 Theory of connectivism and m-learning

The theory of connectivism is highly associated with the modern learning resources such as the internet and mobile phones. According to Dones (2008), Connectivism theory allows people to share ideas through modern resources of learning. The Connectivism theory provided the basis to the creation of mobile learning content for this research because the notion of a network is dominant in this theory which illustrates facts as a course by means of a system of living beings and non-living objects (Hosseini, 2015). This theory is about the sharing of cognitive duties between humans and technology through nodes to handle a swift transformation in the data field and the influence of theories of systems, intricacy and confusion (Tschofen and Mackness, 2012). However, the nodes through which the duties are shared can be people, groups, structures, fields, thoughts, reserves or communities. One of the main reasons why this theory was the foundation stone for this research was its feature that it lets a commune of individuals who work with education technologies to legalise whatever they do (Kivunja, 2014).

Therefore, by using this theory as a basis of this study the teachers who are interested in expanding the utilisation of social media in their activities can filter and multiply knowledge faster by means of the sponsorship of several communities. In addition to this, the Connectivism theory was a suitable choice to provide the basis to this study because it makes the instructive resources more explicitly accessible. As Kop (2011) wrote, one of the implications of the connectivist approach is to look for resources that are open and accessible to employment, generally with Creative Commons Licenses that let learners share, generate and recombine media officially. The attractiveness and convenience of the connectivism made it an appropriate choice for this study as Tschofen and Mackness (2012) posit that it is a useful theory to create novelty by educationalists in their practical activities. Transue (2013) stated that the Connectivism theory is used to explain how new opportunities have been created by internet technologies and how people today have better opportunities to learn and share information across the Web and amongst themselves. In the context of Jordan, the theory of connectivism helps in focusing new technologies that could be helpful in developing mobile learning content for the students in the University of Jordan that they could operate in their mobile learning content.

2.4.2 TPACK Theory

This section aims to study the application of the TPACK theory on the process of learning in a practical scenario. The meta-cognitive TPACK framework comprises of four different types of knowledge, which are essential for students while using an iPad classroom, for instance. These four components of this framework include: content, pedagogical, technological and student knowledge (Niess, 2011). In this case, the term content knowledge is used to identify both teachers' pedagogical content knowledge and subject matter knowledge as well.

The theory can be applied to the classroom, i.e. a mobile device camera can be employed in a language classroom as users could use it to demonstrate speaking skills. In a similar way, the app Pic Collage could be utilised for creating collages with images and text that demonstrate learning or annotation of the articles (Falloon and Khoo, 2014). The video camera in mobile phones facilitates students to capture the events that cannot be missed. This would also allow students to repeatedly view their observations and share with their peers. The reason behind using this theory is its inclination to the usage of mobile learning content and functions that provide different ways to students for enhancing their skills. Moreover, this theory can also facilitate in developing mobile learning content as it focuses on those specifications that will be purposely designed for the learning environment.

Mobile learning theories have their own significance in understanding the learning process in the modern environment. The Jordanian education system and introduction of mobile learning in the country's education system have been facing many cultural and decision-making issues. Efklides and Volet (2005) have argued that for the learning process the constructivism can be used to change the learner from being an inactive receiver of knowledge to a dynamic applicant. Fox (2001) has detailed that the emphasis of constructive learning theory is on the learner's participation, therefore, frequently, it is observed that constructivism tends to easily dismiss the role of passive perception. This theory can be applied to the Jordanian context because students do not pay much attention to mobile learning as they do not have any encouragement to choose this option.

Considering the Cognitive Learning theory, it has been implied that mental processes can be used to explain the different processes concerning learning (Valk et al., 2010). Further, it has been pointed out by Torcasio and Sweller (2009) that effective cognitive processes make

learning practice easier so that new information can simply be stored in one's memory for a long time. In the Jordanian context, this theory can be applied as the teachers in universities and colleges need to understand the cognitive approach of students in designing mobile learning content that can guide them towards learning.

Considering the Situated Learning theory, the most renowned limitation is its implementation considering the traditional schools system which exists today. As today, teachers need to meet certain learning outcomes at the end of a course, and thus, are often limited by particular constraints. In the Jordanian context, this theory can be applied as the majority of the schools and universities are highly likely to follow the traditional schooling system.

The Conversation theory is considered to offer a critical transformative challenge to educational technology. This is done by demonstrating the conventionally understood psychology of the individual. According to Bygate et al. (2013), it has been instigated that essentially Conversation theory has been developed as a prescription for designing constructivist learning support systems. In the Jordanian context, this theory can help teachers in designing the curriculum of students as it would facilitate in building a learning system that can support students' education.

The Connectivism theory works as an educator rather than a mental representation for depicting the observed or experienced learning. The Connectivism theory is used to explain how new opportunities have been created by the internet technologies and how people today have better opportunities to learn and share information across the Web and amongst themselves (Transue, 2013). In the context of Jordan, the theory of connectivism can help in focusing new technologies that can be helpful in developing mobile learning content for the students in the University of Jordan which they can operate in their mobile learning content.

2.4.2.1 TPACK theory and m-learning

The development of the ICT sector affects positively on the arena of modern learning and teaching methods. The TPACK theory supports the concept of modern ways of learning and teaching in a quite effective manner. One of the main reasons why the TPACK theory was a suitable choice for this study is its ability to elucidate efficient implementation of learning technology, which generates the requirement to incorporate three basic kinds of instructors' knowledge, i.e. technical knowledge, substance knowledge and academic knowledge (Voogt et al., 2012).

As a result of overlapping of technical knowledge, substance knowledge and academic knowledge, the suitable context was created for learning and high levels of skill development (Bygate et al., 2013). This theory was chosen for this study because it facilitates teachers creating and using technological pedagogical and content knowledge in such a manner that it addresses specific demands of different subject areas. This is so because Efklides and Volet (2005) stated that TPACK develops understanding pertaining to different probable kinds of learning activities in a specific context of content and then gets it in line with different kinds of digital and non-digital technologies, which could be employed to back up all kinds of learning actions.

However, after deciding on the content and procedure targets for a certain lecture, assignment or unit, the instructors could subsequently choose from the wide variety of activity types in that specific content field, amalgamating the kinds chosen in ways that match with learners' standards-centred, distinguishing learning requirements and choices (Bygate et al., 2013). The selection of TPACK was suitable for this study because it is centred upon a practical postulation that appropriate and efficient education with technology is best designed in view of learners' content-related learning requirements and choices chiefly, choosing and applying technologies merely in service of that curriculum-based learning (Young et al., 2012). Moreover, the focus of the TPACK approach is on the development of instructions based on content-centred pedagogy, which is assisted by wisely chosen and executed technologies and this focus is in line with the positioned, event-centred and periodic feature of knowledge of instructors (Bygate et al., 2013). Cetin-Berber and Erdem (2015) stated that the instructors differentiate learning activities chiefly by curriculum substance, and curriculum substance is founded in educational disciplines that are epistemologically diverse.

2.5 Mobile Learning

The past few decades have experienced revolutionary progress in the field of information and technology. Almost every sector is enjoying benefits from the tremendous progress of information and technology. Likewise, as in every other field, the field of education is also passing through a phase of incredible transformation (Transue, 2013). Before the development of information technology, there was no concept of distance learning or online learning. But the revolutionary progress has allowed students to get the required knowledge from outside the class.

As explained by Hosseini (2015), revolutionary transformation in ICT allows teachers to teach those who are not present in the classrooms physically. In a similar context, the study of Ferreira et al. (2013), highlighted that it has now become easy for those students who cannot attend the classes physically due to any reason to get the required education through the evolving concept of e-learning or distance learning. The study of deWaard et al. (2011), highlighted that distance learning helped those students who do not have access to the higher education. For this, the best example is the massive open online courses (MOOC). MOOC offer the best online learning courses from the top tier universities of the world to every part of the world; the courses are free. The MOOC websites are easy to use and anyone who has a basic knowledge of computers and the internet can enjoy the benefits of learning from the best universities in the world. It is a time-saving and cost-saving strategy to also infuse modern knowledge in the masses of less developed nations, so that they can be a productive resource for their countries. The distance learning is dependent on the communication devices such as computers with good internet speeds, tablets, laptops and mobile phones.

In line with the concept of e-learning, the emerging concept of m-learning, or mobile learning, is also utilised in the education sector. The growing consumption of technology has provided more people with the access to knowledge via mobile phones and now they have become learning devices. The study of deWaard et al. (2011) explains that the consumption of mobile phones has also increased in developing countries because of their affordable prices. Therefore, students in developing nations also prefer to use mobile phones for distance learning purposes.

Horton (2011) defines mobile learning in terms of electronic learning that can take place by making use of mobile devices, smartphones and different kinds of PDAs. By the end of the 1990s, the concept of mobile learning earned complete recognition as a learning medium all over the world (Chen et al., 2003). Sharples et al. (2002) stated that various learning theories were developed and the majority of them were proposed on the basis of the assumption that the learning process takes place within schools' premises interceded by skilled teachers. However, researchers, such as Knowles et al. (1984) and Freire (1972) also worked on learning that takes place outside the classroom, yet these works failed to make a noticeable contribution in the context of learners' mobility and that could lead to the most reliable resource for mobile learning (Sharples, 2000).

Any study on mobile learning is incomplete without marking the variations between mobile learning and other kinds of learning. In this context, the research of Sharples et al. (2002) made a significant point regarding the explanation of mobile learning, which is centred upon the assumption that in mobile learning the students or learners are on the move. It is explained in the work of Sharples (2013) that mobile learning is not that distant from other different kinds of learning practices as movement of students can be examined in proper learning while they go from one area to another.

2.6 Challenges for Mobile Learning

For the existence of mobile learning, the most necessary components of mobile technology, including both hardware and networking applications, tend to play an important role (Denk et al., 2007). To avoid the challenges from hindering the students' learning process it is important for instructors and practitioners of m-learning to be fluent in the use of these technologies. With advancements in technologies and increased use of the m-learning system, there is a constant need to improve and innovate the options open to this sector.

2.6.1 Connectivity and Battery Life Challenges

With the introduction of mobile learning today, new and modern opportunities have been introduced to support learning processes. In order to do this, mobile devices, including tablets and handheld computers, mobile phones, smartphones and MP3 players, are being employed. Mobile learning can happen just about anywhere. According to Khaddage et al. (2015), within the electronic learning space mobile learning is detailed as occupying a sub-space, which in turn is a sub-part of digital learning. Whilst mobile technologies at present have become an attractive and easy means through which literacy skills can be maintained, one also has the ability to have constant access to information. However, the limitations which surround mobile learning have turned out not to be of great importance. One of the issues with respect to mobile learning is the user's mobile battery life as stated by Dhaheri and Ezziane (2015), since it is not possible for a mobile learning application to be made use of for a long time without draining the mobile

phone's battery. In most of the cases, users use their device to gain necessary information and then put their phones away.

When a mobile phone is used continuously its battery drains quickly, as compared to the battery life on stand-by mode, i.e. when the mobile phone is idle (Tarhini et al., 2014). The battery of a mobile phone may last for five or six hours straight if a person listens to songs while the mobile phone is locked and the screen is off, but when students use their mobile phones in classrooms they have to keep the screen unlocked in order to run the apps and read the course material (Shudong and Higgins, 2010). A mobile phone that has a new battery may last for the whole day, but everyone does not usually have a new battery in their mobile phone and older batteries tend to drain even more quickly than new batteries. Even a new battery will start draining quickly if it is used excessively, because the more a battery is charged the less life it has, so the more it is used, the faster it will drain (Traxler, 2014). Keengwe et al. (2012) have detailed that mobile learning modules nevertheless require long periods of viewing so mobile learning modules should be kept short, quick and accessible.

2.6.2 Screen Size and Key Size Challenges

In comparison to a traditional desktop module, when making use of a smartphone device, physical actions can result in certain limitations. When a user has a large screen, mobile learning becomes easy and desktop radical buttons can be used and the user can stay engaged through action (Terras and Ramsay, 2012). Often, connectivity and screen size become an issue during the process of mobile learning, however, such issues become a major concern merely when the instructional designer treats mobile learning in comparison with desktop learning. During training applications, both desk and mobile learning need to be treated differently as there are times and places for each of these practices (Nouri et al., 2011).

The big screen also offers better vision to students, however, the latest phones with bigger screens come at a high cost and are not easily affordable for all students. There are certain modules, which require a high level of connectivity, for instance, to stream a tutorial and such practices become more effective with larger screen sizes. Therefore, in comparison to the mobile device a desktop screen would be better. In addition, it has been stated by Soon (2011) that mobile learning is often most suitable for quick bites of learning which can easily be compressed into

less time and a smaller screen size. Although limited research has been done concerning the screen size and learning, nonetheless, Verhoeven et al. (2014) have detailed that when screen size is bigger than 2.28 inches there is a higher possibility of better understanding and learning.

In addition to this, mobile phones are easy to use when used for texting, calling, emailing or using social media apps, etc., but for using mobile phones for learning, for example making a presentation, it is very difficult because most people still use computers and laptops for studying more than mobile phones (Prasad et al., 2012). Mobile phones are handy and easier to carry than a laptop, but this characteristic of a mobile phone, i.e. smaller size, is what makes it difficult to use for learning and studying (Shudong and Higgins, 2010).

2.6.3 Content Security or Copyright, Pirating and Cybercrime Issues

Cochrane (2010) stated that realising mobile learning's potential is a complex endeavour. In the last two decades, a lot of progress has been made in this area, however, there is still a need to make many amendments and advancements in order to reap the complete benefits of mobile learning on a global scale. Presently, on mobile devices and in our social networks, cybercrime has become a major problem according to the Norton Cybercrime Report (Sarraf et al., 2012).

With increased use of mobile handheld devices today, we as consumers are also at high-risk of security issues as our devices include our personal information which can be hacked and used for other purposes. It is critical for users to start taking security measures to prevent their mobile devices from being targeted. For the most part, amongst the most common determinants of digital piracy, the price of a digital product is fundamental. In terms of digital piracy, considering the mobile learning perspective, it has been investigated that the impact of price is great. Piracy and copyright issues become ever more popular today as users are often interested in getting the cheaper version rather than paying a costly price for mobile applications.

In many developed, as well as developing, countries safeguarding is one of the major legal responsibilities where the mobile learners are under the age of 16 years. In the view of Subashini and Kavitha (2011), these securities or safeguarding challenges incorporate two major aspects, such as the strong control over the access to inappropriate web material and communication, for example, grooming, bullying or age-inappropriate content. A study conducted by Rahimi et

al.(2014) affirmed that the mobile learning approach has raised the excessive usage of mobile devices among the younger generation.

Thus, the probability that this excessive usage leads toward unethical issues in the younger generation is high. similar to this, Sarraf et al. (2012) highlight another security issue by stating that the excessive practice of mobile tools for the mobile learning procedure exposes the learners to health and safety risks. To elaborate, the researchers further stated that it is a duty of learning organisations and the teachers to ensure the security of their students from such harm.

However, Asokan et al. (2014) stated that when students are using the technical devices, including mobile devices for learning procedures, the higher authority ensures the implementation of such policies that incorporate the strict implementation of firewall policies, filtering and virus control software. However, the alarming fact is that educational institutes are not taking appropriate initiatives to overcome these issues, and as a result, the issues are increasing day by day. Dinh et al. (2013) have also taken into account the security issues in the mobile learning procedure and mentioned that the introduction of m-learning has increased the quality of education by integrating flexibility and conformability, but along with these aspects it has resulted in a list of critical issues out of which security is considered to be the most critical one. These security issues revolve around honesty, privacy and confidentiality of information. For an in-depth perspective of the sensitivity of this issue, the researcher further affirmed that the learners' records, e-portfolio data and assessment grades are the key examples that require strong protection while using the mobile devices in education.

On the other hand, Rodrigues (2011) stated that the loss and theft of mobile phones, the possibilities of unauthorised access and the attack of hackers on the mobile learning system also fall under the umbrella of security issues in mobile learning that most of the users are widely facing. However, in the view of Rahimi et al. (2014), even though all these security issues are those that all the mobile learners are struggling with, according to some of the estimates it has been analysed that in the developing countries the existence of such issues is higher when compared to the developed countries. The reason behind this increased ratio in developing countries over developed countries is contradictory. As one of the researchers exhibited that due to a lack of resources and effective legal laws, the ratio of such issues are high in developing

nations; whereas, Sarraf et al. (2012) argued with the statement and declared that the core reason for this difference is the lack of awareness and knowledge about the harm of mobile devices.

2.6.4 Mobile Network Reliability Issues

In the opinion of Qi and Gani (2012), the core goal toward the networking evolution in the mobile devices is to provide a strengthened platform for a persistent computing environment without any resistance or reluctance. Additionally, a mobile networking system can only declare to be reliable if the system enables the user to accomplish their task regarding the access of information and communication with others to transfer information from one person or place to another at anytime and anywhere.

However, it has been widely examined that the unreliable mobile networking systems affect and hinder the learning procedure of students. The study accomplished by Srivastava (2012) reported that the major trend behind the introduction of mobile networking is to facilitate the user in everyday life. The study further affirms that unreliable mobile networking is a major constraint that causes various challenges for the mobile learners. Carpenter et al. (2012) mentioned that to use the mobile electronic learning facility, the existence of a reliable and strong connection in between the mobile device and the servers is mandatory in order to receive and deliver lectures.

Another issue regarding mobile networks is that some of the learning sources are specifically designed for e-learning in the desktop PC or the wired networks, for which the mobile networks work perfectly for the transfer of relevant content, but, on the other hand, when it comes to wireless devices such as the mobile phones, the bandwidth network resistance and the limitation of mobile device specification regarding the adaptation of content becomes the key issue. In the view of Shiraz et al. (2013), the best networking devices that are reliable and trustworthy and provide the best connection are 3G and 4G.

According to Shudong and Higgins (2010), these networks are expensive for the students and the school-based programs and the entire learning environment. The researcher further indicated that regardless of the bandwidth and 4G networking issues, the networking of mobile phones are also limited at the infrastructural level where networking technology is only available in the advanced

areas. Thus, the unreliable networking system is one of the most significant constraints that influences the mobile learning procedure to a high extent.

2.6.5 Multiple Operating Systems

Often it is considered that due to the different nature and a wide range of available mobile devices, creating content for different operating systems for all students would be a challenging task. Nevertheless, this concern is being eliminated due to increased advancements in technology and an increase in smartphone ownership. The majority of students today own a smartphone, which either comes with iOS or Android operating system, therefore, the issue of multiple operating systems can be resolved.

During the process of m-learning, there are multiple technologies involved therefore it can be a challenging task to design instructional content for this medium (YawAsabere, 2013). The users need to be given equal access to the technology as it is not right to assume that all learners will have access to merely one type of operating system. Even though all students do purchase mobile devices with similar hardware, nevertheless, the models differ and their mobile devices have different capacities and features. Therefore, when designing a mobile learning setting it is significant to initially be aware of the content and format of information that is to be delivered to the students considering the limitations of their devices.

2.6.6 Limited Memory

Handheld devices are often manufactured with limited internal memory. Therefore, there is often a need for extra random access memory (RAM) in order to store additional programs and files on devices from external memory cards or memory sticks. However, it is important to mention that external memory cannot be inserted into all handheld devices. Oz(2015) also pointed out that, when trying to retrieve data from external memory, it often requires more time in comparison to retrieving data from internal memory. Depending on the mobile device of the student the amount of available memory may differ. Nevertheless, by adding on external memory additional space can be added to these mobile devices and this issue can be solved.

The challenges associated with mobile learning, in essence, are merely minor ‘bumps in the road’ which can be fixed by making certain amendments. Often we tend to have saved so many

images, applications and other sources of information on our devices that we may run out of memory. During the process of mobile learning in a classroom running out of memory may hinder the learning process.

2.6.7 Technical Issues

Gedik et al. (2012) declare mobile learning technology as the key driver for learning in the 21st century. The researcher further affirmed that learners are benefiting by accessing the latest features on mobile devices. But it cannot be denied that along with the introduction of an advanced technology there are many technical and physical challenges as well. Wu et al. (2012) shed light on the aspect that there is an extensive diversity of the features of mobile gadgets, thus this diversity in the features can be confusing for mobile learners. Additionally, these advanced technical features can create hurdles for those mobile learners who are unaware of the usage of these technical advancements.

Apart from this, the diverse mobile technology also raises numerous significant challenges for teachers. One of the researchers, while highlighting the technical challenges regarding mobile learning, stated that even though mobile learning has provided a platform through which students can feasibly study anywhere and at any time, along with this one of the technical challenges regarding mobile learning can hinder their learning process –the technical hurdle is the low battery life duration. Thus, the poor battery life of a mobile can affect the learning procedure of a student (Wong, 2012).

Apart from this, the study conducted by Lai et al. (2016) revealed that another physical characteristic that interferes is the quality of the mobile phone. A low-quality mobile phone might be poor at recording videos and therefore requires a lot of time and effort from the user in order to extract something satisfactory. This results in a negative interference in the learning process of a student through mobile phones. In addition, Lu et al. (2014) also claimed that the screen size and the key size are the two major physical aspects of mobile phones that affect the learning procedure. To further elaborate on this statement the researcher stated that the small screen size and keys create hurdles for learners in reading or transferring information. Moreover, the new technology in mobiles has enabled users to develop and save digital records of real-life experiences, class lecture notes and other important documents. Thus, in the case of damaged or

lost mobiles, the user might suffer a security issue with all the private data saved in the device. On the other hand, the study presented by Godwin-Jones (2011) affirmed that the effective usage of mobile technology entails that students must have digital literacy skills and must be able to use and manage the device; ineffective knowledge about handling of the mobile application can affect both the device as well as the user.

Currently, the industry is working on addressing the technical issues related to m-learning. At this time, the prices of devices are decreasing. In addition, with constant advancements in software applications for mobile phones and the introduction of touchscreens and gestural input, educators now have the opportunity to create content for smartphones by using Tool Book (Dhaheri and Ezziane, 2015). Using technology includes certain technical issues which only experts can take care of. Handheld devices can be divided into three different categories including, feature phones, smartphones and touchphones. The feature phones come with small monitors and numerical keypads, whilst smartphones have an A–Z keypad and smartphones' come equipped with a device-sized screen. The biggest challenge presented to mobile learning in education is diversity. There is a wide range of devices available to consumers today with different options and features. Therefore, at this time, there is no single option available through which richly interactive mobile content can be placed on every phone.

2.6.8 Download Speed and Restricted Internet Access

Regardless of the current advancements that are being made in the mobile cellular broadband sector, issues are often faced by consumers related to download speeds on mobile devices (Khaddage et al., 2015). In different regions around the world, gaining access to high speed broadband internet is either very expensive or is not available. Effective mobile learning cannot be implemented in countries where there are internet issues as with low internet speed and download speed students would lag behind. Slow internet speed is known to hinder pupils and disturbs the students' learning process.

Another challenge is to manage a server that can facilitate all the students at one time. A server can only facilitate a limited number of users at one time (Keengwe and Bhargava, 2014). It is important to have a server because there needs to be a common platform where all the material of all the courses is kept online, so that it can be accessed by students and teachers for

downloads and uploads (Wang, 2009). The students also need access to online libraries to search for course related articles, case studies and researches. The server usually gets slower as more and more users login at the same time, and sometimes it does not load any pages because so many users are accessing files at the same time (Sarrab et al., 2012).

2.6.9 Risk of Distraction

Over the years, the risk of distraction due to use of mobile devices has drastically grown in terms of higher education. Even though mobile learning has many advantages to offer, nevertheless there is an associated risk of distraction when students learn from a device that can be used for multiple purposes (Soon, 2011). The younger generation use mobile gadgets to connect with people and for communication a great deal. When using mobile gadgets for learning purposes, there is a high risk of distraction that could steer students away from effective learning.

The biggest disadvantage of utilising mobile learning in our education systems is the fear of the distractions which will be caused. Teachers are hesitant to implant m-learning practices in the classroom as they are aware of the fact that students with a shorter attention span will quickly be deterred from the learning. The downside of utilising mobile gadgets for learning is that when learners have constant access to social media, YouTube and other entertainment sources it will tempt and distract students from working on assigned activities (Verhoeven et al., 2014). At present, students tend to have shorter attention spans, therefore, there is a high possibility of getting distracted anyway.

2.6.10 Cost Issues

Along with other various challenges in the mobile learning domain of study, budget or cost is considered to be the most influential barrier. According to the findings of an empirical research done by Kearney et al. (2012), most of the selected participants demonstrated the budget constraint as a critical barrier to a high extent. Dinh et al. (2013) highlighted that the high-cost barrier to mobile learning prevents the adoption of this medium of learning. The study further affirmed that this high cost of mobile learning is associated with the equipment, connectivity and maintenance of the device.

In order to develop a clear understanding of the reason behind high-cost consumption, the researcher mentioned that the mobile device requires effective timely maintenance, additionally, without the availability of networks the functions of the device become limited, thus, to ensure the availability of reliable networking a large amount of capital is required. According to Godwin-Jones (2011), the emergence and implementation of mobile learning is beneficial for the education sector as the variety of technical tools incorporated in mobile learning provides a large number of opportunities for the personalisation of learning.

However, these facilities can only be attained if both the students as well as the teachers are well trained for the effective utilisation of this technology. Thus, this effectiveness of the usage of this technology can only be attained through appropriate training and guidance that is a high-cost-consuming process.

To overcome the connectivity problem, students can use their mobile data instead of using the internet provided by their school or college, but even mobile internet like Edge, 2G, 3G or 4G has its limitations (Tarhini et al., 2014). Mobile network providers charge their customers for the amount of data used on a monthly basis. Downloading large content from the internet using mobile internet will cost students a lot, and they also use it for pleasure (Traxler and Vosloo, 2014). This is also a problem as not all students can afford to pay such costs after paying their tuition fees as well (Shudong and Higgins, 2010).

On the other hand, Rao et al. (2012) argued that the cost problem in the mobile learning procedure varies from country to country. The researcher justified that in underdeveloped or developing countries the cost that mobile learning requires is high, while on the other hand, the countries that are ranked as developed countries are the most frequent and regular users of this mobile learning system.

The study presented by Cochrane and Bateman (2010) also supports the argument and further endorses that in the developed countries the trend of learning is rapidly shifting from the traditional practices of e-learning technology. Additionally, the ratio of people in developing countries that adopted this method of learning is low when compared to the ratio of developed countries; while indicating the reason behind this huge difference in the implementation or adoption of m-learning among developed and developing countries, Iqbal and Qureshi (2012)

claim that the high cost of mobile learning is the major reason why there are fewer users of this approach in developing countries when compared to the developed ones.

2.6.11 Social and Educational Issues

In light of the study conducted by Gikas and Grant (2013), it has been examined that the introduction of mobile learning has brought a change in the learning procedures of the student that is worth mentioning. IT has not only influenced the students but also possesses an impact on teachers or instructors as well. In contrast, Terras and Ramsay (2012) highlighted that learning is a dual process that involves the equal participation of both the teachers as well as the students. As Hwang and Tsai (2011) stated, a compatible relationship between the teacher, student and parent is essential for the educational growth and development of students. This is because it aids in developing interplay in between student effectiveness of technology and the practices regarding the formal education. However, with the introduction and the adoption of mobile learning this association has become weakened, and also affects the educational performance of students.

On the other hand, Chang et al. (2011) clearly denied the statement and discussed that the use of mobile learning has introduced a list of new social opportunities that play an important part in the embellished educational development of a student. By means of mobiles, students can interact with their teachers anywhere at any time. Thus, the hindrance due to distance and time has been reduced. Apart from this, as per the study of Sarraf et al. (2012), another key issue regarding the social and education aspect is about competency. It has been witnessed that educators are lacking in the competencies that are highly required for the establishment of mobile learning opportunities for their students. A large number of researchers claim that most of the learners are familiar with mobile devices and their future in general but are completely unaware of the learning tools. Thus, due to the poor competencies, an educator is unable to support the students who are indulged in real-life learning toward mobile learning. As a result, many of the students are unable to utilise the opportunities of the mobile learning procedure.

Moreover, Charitonos et al. (2012) depict that the frequently changing features and functionality of mobile devices also prevent the learner from learning feasibly. This is because many of the learners do not have an idea about the latest technical features. Additionally, it also takes time to

learn the functionality of the new critical features. The study further endorsed that out of all the major social challenges that mobile learning poses with it, the primary one is the lack of personal data security for any type of private information and content. In the case of loss or damage of a mobile, all the private data of the user gets affected; in addition, the probability of the recovery of that data is very low. In the opinion of Gedik et al. (2012), along with the rapid emergence of the mobile learning trend all around the globe, the usage of a mobile device has also increased.

According to psychologists, the excessive usage of such devices not only affects the social life of an individual but also reveals a negative impact on the health of the user. Mobile devices exhibit such rays that are dangerous for the eyesight of individuals. To further elaborate the social issues of mobile learning usage, the researcher reported that the extreme utilisation of this approach for learning increases the risk of distraction. There are possibilities that students might be distracted toward such applications that are not beneficial for them ethically. Furthermore, by use of the mobile learning approach, there is no restriction on the learning timetable of a student that has a negative influence on the health and social life of a mobile learning addict.

2.6.12 Usability Issues

Usability issues are another constraint that negatively impacts the effectiveness of the mobile learning procedure that further leads toward the barriers for the students who learn through using mobiles. In light of the study accomplished by Capretz et al. (2012) it has been estimated that flexible usability of mobile devices and their features is the major concern of every individual user. According to an empirical survey, the study further depicts that the core reason behind the selection of the mobile learning approach over real-time learning is its user-friendly features.

It has been widely estimated by a number of researchers that environmental aspects, such as heavy rain, positively influence the practicality of learning indoors by means of mobiles. However, unwanted noise and other interruptions badly affect the quality of learning through mobiles in public areas or while travelling. In contrast, Nayebi et al. (2012) highlighted that the unreliable and slow network connection also affects the usability of mobile learning as, without an effective network, teachers and students cannot transfer information from one place to another. Moreover, the capacity of software and the memory also limit the functionality of the

learning procedure and therefore are also ranked as one of the main usability issues of mobile learning.

The storage capacity of mobile phones is also limited, and it is also used for mobile phones' services and operating system installation. So, even if it seems enough, it is still not enough for storing everything (Sarrab et al., 2012). Students can use a storage card as well, but although they seem to be reliable, really they are not. They seem to work properly as long as they are not taken out from a mobile phone, but when they are taken out and re-inserted, sometimes they start to create problems, which means that students can lose valuable course material (Lowenthal, 2010).

2.7 Mobile Learning Technology in Higher Education in Jordan

Jordan has been considered as one of the countries where the development and improvements within the education system have been witnessed at a distinguishing level in which the major factor that has been facilitating this development and improvement is the technological advancement and adaptation observed (Handal et al., 2013). The implementation of ICT has been observed to be increasing over time and this trend has been significantly increasing within the universities of Jordan (Almaiah et al., 2016). Considering the increasing demand and complexity of the current education system there is a need for all the developing countries, like Jordan, to take these factors into consideration as this would help them in enhancing their quality of education system which is considered to be one of the critical factors when it comes to growth and development of any country (Almarabeh et al., 2014).

Further, the universities have been appreciating and adopting the latest e-learning management systems within their higher education system which would certainly help them in the development of the practices that would facilitate improvement within the education system. This has been acting as a revolution of the education system within Jordan (Althunibat, 2015). The factors that have led to an increase in the adaptation of these information and communication technologies within education is that they have been providing opportunities to the education system for the better construction of knowledge and have been contributing and facilitating the traditional method and techniques for learning in a modern manner through improved and efficient techniques (Handal et al., 2013).

It has been observed that the government within the country has also been facilitating and appreciating the execution of information and communication technology as various electronic learning initiatives are taken by King Abdullah II. These initiatives are a component of the big nationwide Information Technology Approach which focuses upon increasing the usage of the internet as King Abdullah II believes that technological advancement like information and communication technology has great potential and scope of implementation and can seriously help the country for developments in the future (Khaddage et al., 2015). The government also has the same vision for the adaptation of this technological advancement with the country that is developing the quality of its education system and adopting e-learning as a long-term goal for the country (Althunibat, 2015). And considering this vision the universities within Jordan have been adopting the usage of ICT and making it an essential component of the administration and the learning activities adopted within universities (Almarabeh et al., 2014).

Considering the example of the University of Jordan it can be stated that this adaptation has been taking place at a practical level. The University of Jordan was established in 1962 and had its main campus in Amman and about five faculties in the Aqaba branch (Alrasheedi and Capretz, 2015). The university used the Blackboard system until 2005. But later on, with further development and increase in the yearly licensing expenditures for the proprietary structure, the Blackboard structure within the university got replaced with the Open Source Moodle structure and this usage was initiated in the year 2012 when the university started using this system for LMS (Learning Management Systems) (Khaddage et al., 2015). But it seems like the usage has not been exploited to a great extent yet as teachers only use this system for uploading their course description, assignments and any other information associated with their course (Almarabeh et al., 2014). The adaptation of these learning technologies also differs on the basis of the approach that has been adopted for their implementation, as for the University of Jordan who have adopted this advancement while making its integration within a learning approach that will facilitate them equally in face to face and online learning (AlKhasawneh, 2013). There is a need for the country to work on those factors for the better integration of mobile learning (Alrasheedi and Capretz, 2015).

Among some of the major challenges and limitations, one is the fact that the universities and other education organisations are making the complete usage of resources that are already available to them (Marquez et al., 2016). They need to exploit these resources to get maximum

benefits from them. In addition, the universities need to work on the factors that will help in developing acceptance among students for the usage of these mobile technologies as developing an efficient system and framework will not be useful if it is not accepted by the people or students for which providing them with training and knowledge would be really helpful (Nassuora, 2012). There is also a need for proper and long-term integration of a mobile learning system (Alrasheedi and Capretz, 2015). Certain other typical factors that have been limiting the implementation of this technological advancement is the speed and cost of the internet within the country which would make this an agonising experience rather than being helpful (Marquez et al., 2016).

Presently, the increased involvement of technology has been implemented in just about all features of our daily routines involving learning institutions. As a result, educational institutions are now being pressurised to involve these features at the centre of their learning as well. Often, the biggest barrier to these developments is the organisational infrastructure. Without a doubt, it can be stated that in terms of higher education the implementation of mobile learning practices has facilitated a theatrical change in both instruction and learning.

According to Gupta and Koo (2010), it has been agreed that in order to transform the learning style there are certain challenges, including cultural expectations, along with the continuing development of both students' and staffs' technological skills. Therefore, in order to effectively execute mobile learning in Jordan's higher education system, it is necessary to manage and implement these aspects effectively. This would result in achieving overall enhancement of learners' and employees' learning practices. The term electronic learning implies making use of information and communication technologies in the diverse process of education so as to enhance learning (Dhaheri and Ezziane, 2015). Khaddageet al. (2015) argued that for any organisation to obtain a successful mobile learning strategy there is a need to be prepared culturally and technologically. This is critical as cultural factors are recognised to have a huge impact on one's learning.

Currently, the Education Ministry in Jordan recognises the significance of mobile learning developments in schools. Even though in terms of Jordan's higher education students are aware of the potential for mobile learning to sustain instruction and learning, nevertheless the infrastructure usually tends to limit both learner-learner and instructor-learner communication.

Over the years, the higher education structure in Jordan has swiftly grown, even though it has not, up till now, been able to produce a sufficient qualitative leap. However, in comparison to the world's university sector making a quick advancement towards mobile learning practices, higher education organisations in Jordan are also consequently reacting.

With advancements and awareness regarding mobile technology, new approaches have been provided to conventional higher education bodies in Jordan. As a result, it has encouraged them to make efforts and re-examine the way they function. Within the next few years, it is expected that demand for electronic learning in Jordan will also increase with the sharp growth of the internet and with an increase in the internet and mobile users. It has also become important for Jordan to embrace current technological advancements, thus, attempts are being made to redesign teaching trends (Alzu'Bi and Hassan, 2016).

Currently, Jordanian students have also realised that IT is the future, and thus, even students are more interested in elastic learning prospects through which they are able to extend their abilities and the learning results (Al-Zoubi et al., 2008). Hence, numerous Jordanian institutions at this time are already following e-learning and m-learning practices in an attempt to meet today's demands for improved and flexible teaching methods. The key players in mobile learning include: software developers, hardware developers, educators and students.

In order to make mobile learning a preferred mode through which information can be transmitted and acquired, there are certain challenges for all key players. Consequently, the successful measurement of mobile learning adoption mainly depends on three factors including: semantic level success, technical level success and the effectiveness level success of the information system (Blooshi and Ezziane, 2013). In order to measure the success level, different measures are adopted for each factor. In Jordan, to facilitate mobile learning in higher education certain conditions need to be taken care of including: software support, internet speed and hardware (Almasri, 2015).

During the last decade, the employment of technology in higher education has drastically changed with advancements and increased use of online media. University students today are considered to be more on the move as they work part-time, and thus, tend to spend less time on campus. Therefore, students today are demanding access to learning material and information just about anywhere and anytime. University life has greatly been impacted by increased

utilisation of mobile gadgets, as they give the students and staff the power to transform their interaction patterns and to develop their education and learning practices as well (Blooshi and Ezziane, 2013). Considering the higher education system in Jordan, the biggest barrier to mobile learning is altering employees' culture and encouraging them to make use of novel technologies in education and teaching practices.

Initially, regardless of the growth and utilisation of mobile internet gadgets in different countries around the world, Jordanian universities were resistant towards the adoption of such technology. There are certain factors, including cost of devices, safety, security and privacy of students, which hindered the transformation process. Nonetheless, at present, technology has become an important aspect of learning and therefore for Jordanian students and universities it is critical to realise the importance of executing mobile learning practices in education (Almasri, 2015). Adopting such practices will also be helpful in meeting the international standard of education. In essence, adopting mobile learning actually extends one's reach to the whole world, thus new opportunities are signified for further development in the education industry. However, at this time, there is still a shortage of necessary perceptives concerning the elements which are affecting mobile learning acceptance in Jordan.

2.7.1 Factors Influencing Mobile Learning Implementation in Jordan

2.7.1.1 Integration of e-learning in education

It is a fact that a large investment, along with a relatively substantial amount of endeavour, has been taken by Jordan's Education Ministry for successful execution of electronic learning structures in its education sector (Almarabeh, 2014). While teachers and school students in Jordan have realised the importance of electronic learning to backup education and learning, the overall infrastructure does impose a massive limit on the interactivity of student-student and tutor-student. Although Jordan has consistently extended its system of higher education, it has not generated any adequate level of qualitative advancement (Almarabeh and Mohammad, 2013).

Due to the fact that the higher education sector of the world has been making consistent growth and advancement due to e-learning, Jordan's higher education institutes have been responding in

the required manner. Apart from that, e-learning does offer an alternative approach for Jordan's higher education institutions and should also encourage them to analyse the manner in which they operate their business activities. By adopting this approach, it increases their potential for accommodating communication and new information technologies for enhancing the learning experience of students.

There is a massive possibility that the demand for e-learning across Jordan will increase in the next few decades. This sharp growth is mainly due to consistently fast growth in mobile and internet users along with high levels of literacy across the region (Mackeogh and Fox, 2009). Due to this reason, it has become extremely significant for higher education bodies in Jordan to adopt scientific expansions and emphasise re-evaluating trends for training and development for prospective researchers within the educational sector (Diabat, 2011). The increase in demand from Jordanian learners for changing teaching techniques when compared to conventional methods of lectures does place huge emphasis on educational institutions for considering the importance of e-learning and to provide online courses along with other programmes. Authorities in Jordan have certainly realised the fact that information technology is needed for the future. For this reason, they are focusing on developing highly flexible opportunities for learning and development that will allow them to harness their skills along with improvements in educational outcomes. As a result, several Jordanian entities have taken up electronic learning to satisfy high demands for better and elastic teaching schemes.

2.7.1.2 Influence of the government

The ruler of Jordan, King Abdullah II, offers the potential for positive transformation for the future system of education in Jordan, for example the introduction of Jordan's education initiative project (JEI) that was launched in 2003 is one of the main examples in this context (Almarabeh and Mohammad, 2013). The programme emphasised a partnership agreement that was created in accordance with Cisco Systems for creating a highly efficient and effective model for learning that is internet-enabled.

From the perspective of individuals in Jordan, mobile learning does offer various benefits and advantages that have advanced the process of learning and development. Mobile learning does help individual learners to improve their numeracy and literacy skills because it helps to

encourage collaborative and independent experiences of learning (Shiraz et al., 2013). Mobile learning is highly beneficial for determining significant areas where learners require consistent support and help. Moreover, mobile learning also helps to break down resistance of utilising ICT and it also helps to create a balance between ICT literacy and mobile-phone literacy (Rohrer and Pashler, 2010). With respect to teaching and learning, mobile technologies tend to offer features of mobility for individuals because they allow them to share their ideas and also access pivotal information from anywhere across the world by using devices that are portable. The government of Jordan believes that using mobile technologies in the education sector could have a massive contribution to economic development.

2.7.1.3 Student readiness

An extremely important factor that has influenced mobile learning implementation in Jordan is student readiness. From a theoretical perspective, student readiness could be defined as the perception of a student for being highly capable of achieving the important tasks related to learning and development. Within the educational sector of Jordan, student readiness is directly integrated with mobile self-efficacy (Almarabeh and Mohammad, 2013). Mobile self-efficacy could be defined as judgement of individuals of their personal capabilities for organising and executing different courses of action that are essential for the attainment of different types of performances. It also proposes the fact that various measures of self-efficacy have to be adapted for analysing the behavioural and psychological functioning of students. Educational authorities in Jordan have also focused on creating a computerised system of self-efficacy. The creation of computerised self-efficacy could be defined as a person's insight of his/her capability for using a computer to accomplish a particular important task (Majadlawi et al., 2014). The Ministry of Education is focusing on developing a suitable and consistent gadget that could be employed for measuring a digital system of self-efficacy.

2.7.1.4 Social and cultural factors

An organisation that places emphasis on obtaining a successful approach for mobile learning should be prepared culturally and socially. Within the context of Jordan, social and cultural

factors have certainly made a massive impact on how students learn. This comprises of style of communication, interaction and understanding of students (Majadlawi et al., 2014). These factors are pivotal for integrating the core foundations for mobile learning and have strongly affected some of the pivotal components of mobile learning such as system usability and acceptance and system development and design. It is important to note that cultural orientation has consistently been considered as an important component of environments that emphasise the promotion and design of a successful system of learning.

This fact has also been agreed upon by Mackeogh and Fox (2009) as they have stressed the fact that one of the core characteristics of creating a thriving system of mobile/electronic learning is the participation of cultural features of users in the creation of its plan. Within the context of Jordan, cultural orientation is an extremely important motivating factor for prospective partakers and also leads towards the quickening of an implementation procedure of learning. However, cultural and socio factors have also posed some significant barriers for the execution of mobile learning in Jordan.

According to Diabat (2011), the approach of virtual learning can have different consequences in different countries and cultural factors can certainly play an imperative part in this regard. Therefore, the interface of a virtual learning system must be taken into consideration for communicating the benefits of a specific technology to its end users. For example, in all Arab countries across the world, eye-to-eye contact between unmarried or unrelated females and males is prohibited due to the teachings of Islam (Majadlawi et al., 2014). Such factors have certainly played a momentous part in the adaption of advanced technological learning in Muslim countries such as Jordan.

2.8 Mobile Learning Technologies in the UK

The developed countries include the countries that have advanced in every aspect and have a stable economy which is providing them with a better and improved living standard throughout. Similarly, these countries have developed their education system with the development and adaptation of the latest technologies and tools that have completely transformed their systems from the traditional ones (Khan et al., 2015). And this is not where it ends; these countries have been further developing and enhancing their systems. This is being done to promote national

competitiveness where the developed nations have been striving for the highest level for e-learning (Fitzgerald et al., 2013). Take for example, Taiwan, whose government developed a National Science and Technology Program in 2002 for electronic learning. The trends associated with mobile learning adaptation are quite different in developed countries compared to developing countries (Khan et al., 2015). This might be due to the fact that these countries would be better able to deal with the challenges that would limit the implementation of mobile learning technology. Within developed countries the adaptation of mobile learning is not just restricted to the higher education sector but it has been emerging at school and college levels as well (Fozdar and Kumar, 2007). It has been observed that the developing countries were adopting ICT for their higher education sector and similarly developed countries have also adopted ICT for enhancing their delivery system (Fozdar and Kumar, 2007). But this adaptation of ICT within developed countries like Canada, the UK, the USA and Australia is more and better compared to the underdeveloped or developing countries (Park et al., 2012).

This is also due to the fact that these countries have developed in other aspects as well which has been making this implementation rather easier for them like considering the issue that was highlighted in developing countries about the cost and speed of the internet; this would not be the case within developed countries. For instance, considering the example of the USA where about 68.6 percent of households had internet access in the year 2006, similarly the majority of the computer systems also had an internet system (Fozdar and Kumar, 2007). Hence, it can be stated that the adaptation of mobile learning within developed countries is also due to the fact that people there can afford it (Fitzgerald et al., 2013). However, the competition and pace at which this development has been taking place within developed countries have been making it a bit more complex for the developed countries as well (Park et al., 2012).

Differences within the extent of mobile learning adaptation differ within developed countries as well which is also on the basis of approach that they adopt for implementation, like considering the example of North America where Short Message Service are considered to be a part of the learning medium (Khan et al., 2015). It has been examined that the acceptance of mobile learning has been higher in developed regions and also, comparatively, as within developed countries, this is taken rather as a fashion statement by the students to have such mobile learning devices (Plaza et al., 2011).

The United Kingdom is regarded as one of the most developed countries globally that has developed and maintained a stable economy for a considerably long time and has been further improving with the passing of time. The country has been able to maintain a standard of living for its people as well (Aldrick, 2013). It has also been estimated that the economy of the UK has been growing at the fastest rate compared to all other developed countries (Park et al., 2012). Considering it can be estimated that the country must have adopted technological advancement throughout to a great extent, which also includes their education system, it has been observed that various universities within the UK have been facilitating and promoting the use and adaptation of mobile learning within the UK.

Hence, it can be stated that the institutions within the UK are empowered to some extent in this regard. It has been observed that in the case of mobile learning in the UK, the education institutions enjoy autonomy and have decision-making powers. But there are certain other stakeholders as well who can influence decisions regarding any type of innovation and technological advancement that would also include mobile learning. Another interesting fact is that the institutions within the UK are well equipped with ICT which is also due to the supporting policies and investment that were made by the country's government. But still, there are certain areas where the implementation of technological advancement has not been done till now, as in the fact that the students are examined using traditional methods (gsma.com, 2012). According to the Office for National Statistics (2014), the frequency of using the internet has been massively increased from 2006 to 2014 as can be seen in the graph below:

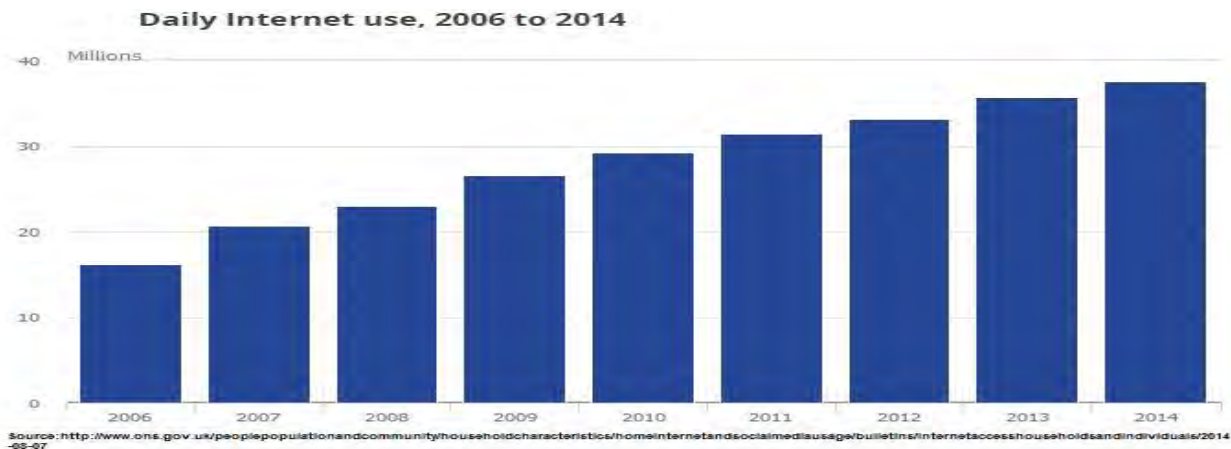


Figure 2: Daily internet use in the UK

Source: (Office for National Statistics, 2014)

The use of mobile technology is also rapidly increasing as according to the Office for National Statistics (2014), about 68 percent of adults in the UK were utilising mobile gadgets to get access to the mobile internet in 2014. The adaptation of mobile learning technology within the UK is greatly affected by the approach and the way policies are developed and shaped in the UK in which the universities and educational institutes play a significant role.

The responsibility of developing policies is passed to the education departments of constituent UK countries. A common decentralised system is adopted within the UK which facilitates the autonomous decision making at an institutional level. The extent to which this autonomy is adopted by the educational institutions also differs when considering the example of schools within England where this autonomy is the highest and this is further expected to increase over time in other regions as well (GSM, 2012).

Similarly, the decisions associated with IT strategies and policies and investments over them are also developed from the schools, colleges and universities while the Local Authorities can make some purchasing decisions in such services for the schools within their respective areas. As stated earlier that this adaptation of mobile learning within developed countries is not just limited to the higher education level, similarly the adaptation of this mobile learning technology within the UK has been observed at all levels that include the small-scale innovation pilots to all the schools in London along with an ultrafast broadband unit (BBC, 2014). This means that regions are surely not suffering from issues such as the speed of the internet that was found to be limiting the implementation of mobile learning in underdeveloped states. Classrooms do have white boards but there is also a good ratio of desktop PCs for learners (gsma.com, 2012).

In fact, this has emerged as a commercial sector within the UK with some of the good profile companies who have been working, like Pearson and RM, leading the way. Similarly, certain other well-developed technology companies like Apple, Sony and Microsoft have also become a part of e-education within the UK (The Telegraph, 2014). These companies have been working toward enhancing and improving the implementation of mobile learning within the education system through manufacturing devices that are meant for this purpose and facilitates students very well.

Considering the example of RM's slate that is a tablet PC designed especially for the education sector for school-use purpose with the features suitable for it like handwriting recognition (BBC, 2014). While on the other hand there have been certain events that might have affected this technological implementation like the abolishment of BECTA, which was a government agency dealing with the ICT implementation within schools, while some of the policies associated with ICT have been sidelined as well (gsma.com, 2012).

Basically, the IT infrastructure of the UK is quite strong at all levels, including schools, colleges and universities where they have well developed IT practices and e-learning systems and another major factor that has been facilitating this adaptation is the wide acceptance from students and staff (BBC, 2015). While, on the other hand, there are certain challenges and limitations as well within this system which include one of the limitations stated above, that is abolition of BECTA, which would further limit the involvement of government within the system (gsma.com, 2012).

This might also lead to a lack of strategic leadership and central guidance support. Another factor that has been limiting further improvement within the system would be the tight funding system that provides only a limited amount of money in this regard for the investment (Almasri, 2015). Other than that, another factor that might be affecting full integration within the system is that schools are tied to the Regional Broadband Consortium contracts and the bandwidth within secondary schools is quite poor.

Currently, amongst students, smartphones and tablets have turned out to be the most preferred choice for web access. Therefore, to satisfy the expectations of learners regarding the learning environment it has become critical for educational systems to consider the importance of mobile devices (Cochrane, 2014). In today's technology-driven era, mobile devices are deemed to be an essential vehicle through which learning material can be accessed, are a means for content generation and a useful platform for communication (Garcia et al., 2015). Without a doubt, mobile learning does have a lot of future potential to become a partner to give education together with the customary teaching techniques. It is critical for the success of any industry that they stay up to date with the latest industry trends. Mobile learning is a necessity for today's society and demand of students, therefore, it is important to facilitate these needs and do what is necessary (Ally and Prieto-Blazquez, 2014).

For the most part, smartphone ownership rates have been highest amongst students. In 2013, a survey was conducted by The London School of Economics and results of the study report 94 percent of smartphone ownership amongst students (Garcia et al., 2015). The key to effectual employment of mobile technology is less regarding devices and more concerned with the literacy abilities of the students (Baran, 2014). To gain maximum benefit of mobile learning practices students need to be aware of how to access, manage and evaluate digital resources (Garcia et al., 2015).

Primarily, in the United Kingdom, students are making use of mobile devices for social media and communication. In addition, mobile devices turn out to be helpful for document sharing as well (Cochrane, 2014). With universities implementing mobile learning strategies into their systems, they are expected to satisfy the expectations of students who will also extend their use of mobiles into their learning environment (Steinberg, 2004). In different colleges, mobile technology has proven to be useful as a means of bringing new learning prospects for learners who otherwise would not have gained access to college. In the United Kingdom, technology has certainly changed the delivery of higher education. As a result, more opportunities are now available for higher education institutions (HEIs) to improve flexible learning practices (Peters et al., 2008). To remain competitive in the global market, this trend has proven to be challenging for HEIs where potential students are more interested in advanced learning practices.

At present, the UK education institutions have been well equipped with ICT practices, therefore, use of digital resources and e-education is well-established (Driscoll, 2010). In particular, universities in the United Kingdom are increasingly expected to compete for students. Therefore, use of ICT and mobile education is the key to success. Increasingly, universities are expected to offer students access to their central learning systems through the employment of mobile gadgets (Ally and Prieto-Blazquez, 2014). Currently, this field is facing certain changes, therefore, ICT and mobile education might not be at the top of the list at this time. In terms of mobile education, the market still needs to be fully shaped.

Implementation of mobile education in the UK is limited due to certain challenges (Ciampa, 2014). First of all, in the United Kingdom, a tight funding regime is in place, where there is little money that can be used to invest in new equipment (Prasertsilp, 2013). Additionally, both schools and local authorities have been tied into Regional Broadband Consortium contracts for

gaining internet access and other resources and services. Often, teachers are even reluctant to have mobile phones used in the classroom and there are concerns over the digital divide given that learners are using their own personal mobile devices (Driscoll, 2010). The United Kingdom follows a decentralised system, and education policy and strategy are in a state of flux. In particular, higher education (HE) and further education (FE) are undergoing stalled investment plans and budget cuts (Steinberg, 2004). However, considering the use of mobile education in UK schools it is considered to be an exciting and innovative activity. Although the use of mobile devices is growing and the benefits reaped by mobile education have become even clearer, nevertheless it is yet to be fully embraced (BBC, 2015). For many teachers, the employment of mobiles in the classroom is a hurdle, which is considered to be disruptive, and a distraction for students.

Conversely, in terms of higher education, there has been significant progress in terms of delivering e-education. For quite some time now, the United Kingdom has been aware of the usefulness of technology so as to develop the teaching and learning for learners taking vocational and practical courses (Rajasingham, 2011). JISC, formerly known as the Joint Information Systems Committee, is one of the key facilitators of mobile education in the higher education segment. Over time, JISC has been examining the possible use of mobile technologies and their influence on learning and teaching practices (Khaddage et al., 2015).

The higher education system in the United Kingdom is funded publicly for the most part, even though the universities are highly dependent on the revenue earned and tuition fees from students. Since universities are considered to be independent bodies, therefore, they have full control over their spending decisions (Cochrane, 2014). Certain universities are already making the utilisation of mobile phones to access the Virtual Learning Environment (VLE) structures. As of now, in the United Kingdom, mobile education is an expanding market which has a lot of potential. Mobile manufacturers even see the UK as a potential market and are increasingly penetrating their devices with product developments and classroom oriented projects (Prasertsilp, 2013).

The government of the United Kingdom is keen to tap into the advantages offered by the mobile education sector and at this time have guaranteed exceptional amounts of funds to this end as well (Sad and Goktas, 2014). Garcia et al. (2015) have detailed that in an attempt to have

institutions strategically adopt the use of mobile learning and technology, the Higher Education Funding Council for England (HEFCE) has also sponsored ‘Changing the Learning Landscape’ (Garcia et al., 2015). Lastly, it is important to mention that with internet access and learning practices through mobile gadgets, the learning practices for learners have certainly expanded. Together with traditional methods, mobile learning has the opportunity to be an efficient partner in giving education.

2.8.1 Factors Influencing Mobile Learning Implementation in the UK

2.8.1.1 Scaffolding

Within the perspective of educational research, the concept of scaffolding may refer to the interactive support that some skilful peers and educational instructors tend to provide learners for eliminating the gap between skillsets that is desired and the current skillset that is currently available. By having a learning partner that is extremely capable and highly knowledgeable could certainly support the potential learner and can also help to share their cognitive load (Sad and Goktas, 2014). However, the provided support can also be eliminated because the potential learners become highly proficient and they are able to finish the tasks on their own.

From an educational perspective, the scaffolding technique has certainly drawn a significant deal of interest from researchers in educational technology as it provides a highly realistic environment of learning and development along with varied and rich support that allows potential learners to indulge themselves within activities that are outofreach (Raes et al., 2012). The method of scaffolding integrated with mobile technology-enhanced is extremely capable of creating a rich, interactive, media-supported and well-focused environment of student learning and development (Cochrane, 2014).

2.8.1.2 Perceived mobility value

According to Motiwalla (2005), the notion of perceived mobility value illustrates the awareness of end-users for mobility in their concept of mobile learning. From a theoretical perspective, the perceived mobility value comprises of immediacy, portability and convenience. It is also a fact that mobility value allows potential users to view any data or essential information required

anywhere through the help of mobile devices (Njenga and Fourie, 2010). Another major benefit of perceived mobility value is that it helps to deal with various disabilities and also allows potential users within a learning situation to gauge their limitations (Looi et al., 2009). Due to this reason, mobility value has been recognised as an essential concern in developed countries across the world.

2.8.1.3 Social influence

Social influence has an extremely important impact for an individual to adopt any new technology. Various researchers have also defined the importance of societal influence as the degree to which a person is able to perceive various important ideas because of which he/she must be using the specific system. Lee et al. (2003) suggested that social influence can also be defined as an extremely important attribute for user acceptance regarding technology and information systems. This could also be due to adherence to behaviour acceptance that leads to social influence that can also affect individual intention (Ally and Prieto-Blazquez, 2014). Social influence could be extremely strong during the initial stages of using technology and its utilisation decreases with the passage of time.

2.8.1.4 Collaborative learning

The theoretical notion of collaborative learning emphasises the fact that learning can be promoted by the means of social interaction. Within the process of learning and development, the notion of collaborative learning has arisen by the means of digitally supported work of collaborative learning (Motiwalla, 2005). Within the context of the UK, portable devices such as mobile phones and smartphones have helped towards supporting and enhancing collaborative learning through the means of communication and coordination that would help towards replacing human interactions (Rekkedal and Dye, 2007). They may comprise of small group and collaborative tasks, networked micro-blogging and also co-creation for learners' artefacts.

Research done by Park et al. (2012) depicted that the utilisation of wireless technologies may result in improvement of communication, coordination, negotiation, mobility and interactivity that was not possible without technology. The UK government believes that implementation of

mobile computing across a collaborative environment of learning and development within a classroom allows potential instructors to develop learning models that would respond towards fulfilment of potential needs of all instructors and learners (Fuller and Joynes, 2015). Moreover, in every mobile learning project trial that has been evaluated, learners tend to engage the most with learning that they are able to undertake in a collective manner. Another research was carried out by Reynolds et al. (2010) that stated that employment of wireless technologies would help towards increasing the notion of collaborative communication and learning. It also comprises of independent learning across those individuals that are engaged across education.

2.8.1.5 Situated learning

The concept of situated learning is connected to the creation of meaning from daily life activities where learning takes place in pro-societal but casual surroundings, which means learning occurs through communal connections, within a cultural setting, and by linking previous knowledge to new situations (Hou, 2015).

The notion of situated learning is widely applied in the framework of mobile learning, which is owed primarily to the location-aware function that has been built across several mobile devices. Within the context of situated learning, learning activities emphasise the promotion of learning by the means of an authentic culture and context (Sad and Goktas, 2014). It is a fact that mobile devices are very well suited for an omnipresent environment of learning and development as they are widely present across various contexts. Moreover, they can also draw upon those contexts for improving student learning.

Research conducted by Hwang and Tsai (2011) has portrayed the fact that situated learning that has been supported through handheld devices and mobile technologies can help towards eliminating the vacuum between practical problem solving and formal school setting. This also helps potential learners to interact along with the real environment. Iqbal and Qureshi (2013) addressed that theoretical frameworks of mobile learning have to be designed in a manner that can help by integrating important technologies along with learning scenarios. A dialectic approach for mobile learning was proposed by Wu et al. (2012) that portrays how learning and technology are integrated with each other. Within situated learning, mobile technologies serve as

a tool for mediation and for transferring contextualised knowledge along with real-life experiences for learners that support the overall process of learning.

2.8.1.6 Flexibility

From an educational approach, mobile learning has a significant role in the United Kingdom. On a larger scale, students have been making consistent employment of mobile gadgets to fulfil the purpose of learning, communication and social media (Liu et al., 2010). For this reason, mobile devices have turned out to be extremely helpful from various perspectives. Over the last few years, universities have focused on implementing the strategy of mobile learning for their system. It is expected that this system of learning would help towards satisfying student expectations and would certainly improve their utilisation of mobile technology within their learning environment (Cochrane, 2014).

Being a relatively advanced system of learning and development in countries across the world, mobile learning is considered to be an enhanced version of traditional teaching. However, it has a comparatively stronger demand for having better contents and a learner-centred process of instructions (Wu et al., 2012). In various universities across the UK, the utilisation of mobile technology has helped to bring a wide variety of learning and development opportunities for students that have very limited resources and are unable to gain access to college education (Cheon et al., 2012). In the United Kingdom, technology has certainly changed the delivery of higher education.

2.8.1.7 Digital literacy

Digital literacy could be defined as the extent of the ability of an individual for using different communication tools, digital technology, managing and integrating digital resources. The perceived digital literacy of a user could be stated in a specific research as having a directly positive relationship with technological adoption (Abu-al-aish and Love, 2013). Due to this reason, it can be stated that a lecturer that has access to high levels of digital literacy would certainly be much more confident towards integration of technology into a classroom and will also be highly likely to adopt a technology such as mobile learning.

Over the last few years, the UK government has invested heavily in improving digital literacy. Digital literacy could be stated as the measure of the ability of an individual for using different tools of communication, digital technology and for managing technical resources. For this reason, the relative measure for an individual's literacy towards technology emphasises their skill for using a different range of technologies (Adedoja et al., 2013). Within the UK education sector, it has become extremely important for teachers as well as students to become literate from a digital perspective.

For improving the quality of education on a wider scale, lecturers are required to be digitally literate. By having access to digital literacy, teachers are able to implant the required knowledge and skills into their students as they are essential for them to thrive in a technologically dominated society (Sad and Goktas, 2014). It is a fact that technology has become directly integrated into different workplaces. As a consequence, digital education should be designed in a manner that could support learners to survive in an interconnected society (Tyner, 2014). To achieve this core motive, lecturers should be highly confident and should also be able to utilise the different range of technologies that are provided in their classrooms. There are various concerns and restrictions of using communication gadgets such as mobile phones, for learning in developing countries like Jordan. Challenges may include setting up a network in higher education institutes that would facilitate all the students on the campus, without providing weak internet signals that would disrupt the concentration of the students.

2.9 Challenges in Jordan

The most crucial challenge is to provide connectivity to the students, even when they are in the classrooms (Keengwe and Bhargava, 2014). The problem arises when too many students connect to one router. The router cannot connect too many devices at once, so there must be enough routers to connect every student (Alzaza and Yaakub, 2011). Apart from the router there is also the problem of bandwidth. If the bandwidth is low then, even if there are enough routers, the students will not be able to get the bandwidth to properly work on the internet. They will either have to wait longer than usual for a document to download or a website to open up. This can be very frustrating in classrooms as there is limited time for every subject in which students have to do their work (Bryan, 2008).

Another problem is the size of the mobile phones, which are too small to read anything for too long. Students can strain their eyes after reading continuously and for longer periods of time (Geddes, 2006). The small screen size also becomes a challenge because only a limited amount of information can be viewed at one time, so it can be a lot of information in a small font size or much less because of increased font size (Goh and Kinshuk, 2006). The small size of mobile phones is also an inconvenience for the students as they have to hunch over their mobile phone screens which can also give them back pain.

It is also a challenge to manage multiple communication devices like mobile phones in a classroom. All the devices need access to the internet and the teachers have to make sure that the students do not use the bandwidth to do anything other than learning (Ally and Prieto-Blazquez, 2014). It is almost impossible for teachers or anyone to keep a check on all the students so one just has to trust them to do the right thing. The teacher cannot go over to the screens of every student's mobile phone and see what they are watching or reading (Huang, 2008).

The students are bound to get distracted if they receive a message from anyone via text message or online on one of their social media accounts (Prasad et al., 2012). Mobile phones that are connected to the internet will send and receive all the data and most of the social media applications work in the background of a mobile phone, which, if connected to the internet, automatically starts sending and receiving data from the internet. This means that the students cannot ignore any messages that they receive on social media (Liaw, 2010). Even if the students do not view these messages in the classroom while they are studying, which is highly unlikely, it will still prove to be a distraction and they will think about it even if they do not want to. So, as long as the students are using mobile phones for learning in classrooms, they will be distracted by other facilities provided by their mobile phones (Lowenthal, 2010).

Another significant challenge is to secure students from online threats. No one is safe from threats online; if a communications device is connected to the internet, it is vulnerable to online threats. It is a fact that when a mobile device is connected to the internet, it is vulnerable to online threats (Ally, 2009). No matter how many precautions a person takes, they just simply cannot protect their devices from online threats.

It can be said that a person can protect him/herself from online threats but only to a limit, which means that if someone is trying to get into a communications device, they can get on to it online

even if it takes them sometime, but sooner or later they will get through the security protocols of a mobile phone and get what they want from it (Park, 2012). This can also be a problem for the teacher if they have important exam questions saved on their phones, as students or anyone can try to get into the mobile phone of their teachers.

Another challenge is keeping track of students and how much they have actually learned while using their mobile phones. The teachers cannot stand on top of every student to check if they are reading the course material in their mobile phones or if they are doing something else (Tarhini et al., 2014). Such a problem does not arise with books because even if students are not reading from the book, they are still listening to the discussion in class, but with mobile phones in their hands they might not pay attention to the discussion in class and may learn nothing at all (Roschelle and Sharples, 2010).

Developing countries have technology but only to some extent. They do not have technology like the countries in the United Kingdom. Developing countries have limited technology with which they have to work. Technology has its limitations as well that cannot be ignored if it is to be used in learning (Shudong and Higgins, 2010).

Another limitation is teaching all the teachers how to use smartphones to teach in the classes and to use the related apps to facilitate the process of learning for the students. Not all the teachers can easily use smartphones (Tarhini et al., 2014). Some of them still use simple mobile phones and do not have the knowledge to use a smartphone. It will be very difficult to make the teachers efficient at using smartphones for teaching because otherwise the students will be teaching the teachers and students can get into the personal files of the teachers without the teachers knowing about it. This is why it is very important to make sure that all the teachers are efficient at using smartphones to teach in the classrooms (Wang, 2009).

Apart from teachers learning to use smartphones, students will even have difficulty in working with course material on their mobile phones without a keyboard and mouse. Mobile phones are easy to use when a person is using it for texting, calling, emailing or using social media apps, etc., but when it comes to using mobile phones for learning, for example making a presentation, it is very difficult because most people still use computers and laptops for studying more than mobile phones (Prasad et al., 2012).

The storage capacity of mobile phones is also limited, and it is also used for mobile phones' services and operating system installation. So, even if it seems enough, it is still not enough for storing everything (Sarrab et al., 2012). Students can use a storage card as well, but although they seem to be reliable, really they are not (Lowenthal, 2010).

In the context of Jordan, things are not too different because it too is a developing country. The country is still struggling to provide the best technology available to the people, but it still has a long way to go. The progress in education of Jordan is very rapid and the teaching style is changing with the changing world (Almarabeh, 2014). The learning method is also changing step by step (Keengwe and Bhargava, 2014). The universities and high schools have conducted studies and experiments to see how mobile phones can help with the learning process and make it easier for both the teachers and the students.

One of the most important challenges in implementing mobile phone learning in Jordan's classrooms is to make sure that all the students can understand and know how to use the internet for learning. One study conducted by the University of Jordan shows that students say that they are not comfortable with using the internet for learning because they do not properly know how to use it in the first place (Almasri, 2010). The students in Jordan need to be educated in the world of the internet and they must be taught how they can use it for learning as well as pleasure. It is very important for these students to learn to use the internet for all of their work because they are going to have to use the internet when they find work after studying. Using the internet is one of the most essential things in today's world (Almasri, 2010). For example, phone books have almost become obsolete today, whenever someone wants to find the number of some public place they can just Google it with the name of the city they want information from, and they get all the information they could ever need, not just the phone number. Students commented in the study that they lack confidence in working with the internet and also experience discomfort in even using computers (Almasri, 2010).

For some reason, some of these students do not even know how to properly use a computer, let alone the internet. Implementing mobile phone learning in a country like this will be very challenging not just for anyone implementing it but also for the teachers who will have to train the students and need to get training themselves first (Liaw, 2010).

Apart from experience and confidence in using computers they also have problems in using commonly used applications and programs. These applications and programs are essential for learning because they are directly used in learning (Alzaza and Yaakub, 2011). Some applications are helpful in making calculations while others are useful for writing and keeping things that a person needs to remember for a course. If someone is not skilled at this then they might not be able to save the things that they want to and at the end of a class they might lose all the work that they have done (Almarabeh, 2014). It will also be a challenge because most people know how to use computers and such applications so no one really thinks about teaching these to others (Bryan, 2008).

Another challenge is to motivate the students and to teach them time management. When a person starts something new they experience problems in the beginning and they work slowly before they get used to it. The students in Jordan are also facing such problems and they cannot use their mobile phones for learning with efficiency, i.e. they take too much time to do something very simple (Orr, 2010). The students will not be able to learn the course material until they become efficient at using their mobile phones for learning in classrooms. This is the same reason why they might not be motivated to use such devices for learning, because they do not properly know how to use them. The students never showed any resistance to change or have any language problems while using such devices (Almasri, 2010), which means that the students are willing to learn and adapt to new ways of learning but all they need is a little bit of a push and guidance from their teachers and the researchers to try to simplify the use of mobile phones for learning. These challenges can be overcome if proper systems are put in place that will look after these challenges and work with students to help them overcome these problems (Traxler, 2014).

Screen size is a limitation that cannot be ignored or overcome easily because, even though mobile companies have started making mobile phones with larger and larger screens, they cannot increase the size of the screen too much otherwise it will lose its characteristic of portability that makes a mobile phone easier to carry around (Shudong and Higgins, 2010). The screen of a mobile phone is big enough to see messages, or anything that is written, for a short period of time, for example for five or seven minutes, but if it is viewed for learning purposes then the time will increase drastically and looking at the screen of a mobile phone for too long will strain the eyes (Almarabeh, 2014). Decreasing the brightness for less strain on eyes will also be

damaging as reading in low light is something that is not encouraged by doctors (Shudong and Higgins, 2010). One can increase the font size but because the screen of a mobile phone is smaller than that of a computer, not many words will be visible on the screen, and one has to keep on scrolling down to read just one sentence and sometimes it would not make any sense because people need to see the complete sentence while reading it to make sense out of it (Huang, 2008).

Screen resolution is also a limitation that has been overcome by the mobile companies by providing full HD screens in mobile phones, but even better resolution will strain the eyes if one keeps on looking at it for hours (Jaradat, 2012). Students, while learning, will have to keep on looking at the screens of their mobile phones while they are at school and in class. It might help but it will also damage the health of the students (Geddes, 2006).

Another limitation in using mobile phones for learning is the input, i.e. the way a person communicates with a mobile and tells it what to do. Although a person sees the whole keyboard on the screen on the mobile, it still does not have all the buttons on one screen (Almarabeh, 2014). If a person has to insert a special symbol or even numbers, they have to switch the keyboard to numbers or symbols and select from them, then return to the alphabet keypad to type what they want. It will also be difficult if one is solving or doing a mathematical problem on a mobile phone, even if there are easy to use applications for such calculations, the students will still have to put in complicated equations and symbols that are not commonly used (Jaradat, 2012). Students will have to keep on switching from one screen to another to use the alphabet or numbers. This can be very frustrating as the timetables of classes in schools and colleges are very limited in which the teachers have to teach and the students have to understand and copy down the lecture as well (Park, 2012).

Another limitation that cannot be ignored is the problem of the networks, when educational institutes provide an internet facility to their students they use it for learning and for their personal reasons as well, which also takes up bandwidth and when the internet starts working slowly, the main platform that is used by that institute for communicating with students and faculty members, will not work properly and the pages might not open or might take a lot more time than usual to load (Prasad et al., 2012). This becomes frustrating because everyone is in a hurry and has to do something important for their coursework. Students need to download

instructions for assignments and have to upload the assignments which they have completed, and if the internet is not working properly they might not be able to properly upload their assignment and it can be lost as well and after it is lost there will be no way for the student to recover it if he/she deletes it from their mobile phones (Sarrab et al., 2012). People usually delete things from their mobile phones if they no longer have a purpose for them and an assignment after completion has no other purpose but to reach the teacher (Wang , 2009).

There is no doubting the fact that communication and information technologies have certainly changed the approach regarding the learning and development materials that could be delivered to students studying in different higher education institutions (Fozdarand Kumar, 2007). The notion of ICT offers relatively consistent improvements in education as it provides smooth online learning, cost efficiency, greater communication and greater access to information. Within Jordan, having a detailed infrastructure and framework for the development of ICT is considered a massive challenge for the execution of electronic learning in various higher education institutions across the country (Almarabeh and Mohammad, 2013).

An electronic learning setting should give teachers as well as students an adequate degree of accessibility and reliability (Gedik et al., 2012). The technological hindrance involved within an e-learning environment arises in three fundamental constituents: software, hardware and bandwidth. This has certainly made a significant impact on the e-learning process across Jordan (Chuang, 2009). Very few educational institutions across Jordan are able to provide wired and wireless networks that have a high bandwidth. Moreover, institutes in the higher education zone are obligatory to develop an adequate ICT infrastructure that would allow teachers and students to access the most modern and advanced hardware that would be used in an advanced system of technical support.

A massive issue with the adoption of e-learning across higher education institutes is strategic and financial challenges. Financial issues have certainly pushed institutions to find enough resources that would maintain and develop strong and advanced equipment (Cavusand Ibrahim, 2009). This would help in providing inert technical support and can also help to finance training and development courses. Within Jordan, many educational institutions have undermined the costs related to administrating and designing online courses (Anderson et al., 2006).

Institutions are required to propel academic staff to familiarisethemselves with a strong and cohesive system and accept the utilisation of technology for their teaching. Some professionals within the academic sector possess strong connections with the conventional model of teaching (Prasad et al., 2012). This has certainly been supported by lots of scepticism that surrounds the growth and success of e-learning, specifically for issues that include loss of quality and control.

Implementation and adoption of an e-learning environment certainly require organisational changes across institutions that may include new teaching concepts, flexible delivery for students and staff integration (Anderson, 2013). Some of these kinds of changes do increase massive issues that are connected to different techniques of functioning, specifically for IT professionals. Institutions are often faced with the challenge of recruiting skilled staff for developing high-quality materials for e-learning.

A massive challenge for academic professionals is the time needed to fulfil the e-learning requirements. According to Sarraf et al. (2012), instructors are required to restructure and develop their courses in a manner that would be suitable to fulfil their personal and professional requirements. Such activities require sufficient workload and time. Apart from that, there is the potential that tutors would respond to their comments whenever it is possible.

Academic professionals in Jordan suffer from different technical limitations (Plaza et al., 2011). There are instructors that often suffer due to lack of training and knowledge for using technology that could help them in designing specialised online courses. On the contrary, other academic professionals and instructors donot possess the confidence to use technology as part of their education. Another problem is within the context of resistance to change. Some instructors are highly unconvinced of interlinking technology with their personal learning (Prasad et al., 2012).

2.10 Technology Limitations for Mobile Learning

2.10.1 Challenges to Students

There are several challenges that are encountered by students while performing mobilelearning activities. One of the major challenges is inadequate access to the necessary hardware. To perform mobile learning activities, students require relevant hardware that would allow them to access to online information in an adequate manner (Liu and Carlsson, 2010). Students may not

have sufficient confidence and experience in using mobile learning tools. Moreover, not all students possess the skills that are essential for being successful in mobile learning. Within the context of mobile learning, some instructors also tend to add complicated websites and multimedia constituents for their potential programs that demand access to the proper network to be viewed appropriately (Wu et al., 2012). Students would find it extremely hard to understand if they have been articulated in a complicated language. To grasp the core contents of mobile learning, students are required to be highly accountable and independent as they do not have any direct communication with other students and instructors (Park et al., 2012). Such independence needs learners to transform their learning and judgement techniques. Many students may not be concerned in employing the latest skill and would certainly feel very relaxed if they are able to learn directly.

2.10.2 Scarcity of Localised Initiatives

While access to mobile learning is high in developed countries, the different types of devices that have been used, along with the infrastructure that surrounds such devices, tend to be different, as are the educational gaps and needs that have to be analysed with science and technology (Prasad et al., 2012). It is a fact that addressing the issue of mobile learning from a global perspective can certainly be detrimental to different communities and regions and requires interference that may account for a diversified level of idiosyncrasy (Majadlawi et al., 2014). Moreover, mobile learning relies heavily on accessibility to the best quality of content. Although significant improvements are expected for translating the notion of technology, the scarcity of mobile applications and video will certainly be a massive issue.

2.10.3 Concerns about Privacy and Censorship

A massive limitation for the implementation of mobile learning is privacy and censorship. The prospect of mobile learning mainly depends on a globally inter-connected world in which information is available to all users relatively freely (El-Hussein et al., 2010). There have been various instances of different governments across the world that have restricted access to information through mobile and other technological tools and have also suppressed their

discussion with citizens. As a result, censorship creates a massive hindrance for improving the potential of mobile learning opportunities (Traxler and Vosloo, 2014). In contrast, mobile learning developments that comprise of learning analytics and a lot of data have certainly raised some massive issues that surround ownership, privacy and data access (Yestisen et al., 2006). To capitalise on the various opportunities that are offered by mobile learning, it would certainly require an adequate balance between having the right to knowledge and right to privacy.

2.10.4 Negative Perception of Mobile Learning

Although the notion of mobile learning is not as enhanced as it previously was, researchers around the world are not satisfied that mobile devices have any potential for developing and transforming learning (Ozdamli and Cavus, 2011). It is because of the fact that the majority of the initiatives for mobile learning have been done on a short-term basis. Moreover, many researchers or academic professionals have not even experienced the relative benefits associated with mobile learning. It is a fact that various teachers and educational professionals did have negative experiences related to mobile learning (Sarrab et al., 2012).

Although these experiences arise from a lack of preparation there have been several instances in which the notion of mobile learning can be directly integrated into their educational curriculum (Hwang and Tsai, 2011). Often initiatives have been taken to make the best use of mobile phones in order to encourage the learning among students. Such inadequate planning and development have certainly resulted in well-documented failures that would have perceptions for mobile learning in educators along with policymakers (Sarrab et al., 2012). Such failures portray a massive danger for the potential and growth of mobile learning. Mobile technology along with pedagogy has also embraced prospective teachers. As a result, mobile learning would certainly not thrive within a formal scenario.

2.10.5 Lack of Synergies and Partnerships

One of the biggest limitations of mobile learning projects is that they are small-scale and the results are based specifically on localised pilots. Implementation of projects that go across the initial stage would require effort from educational researchers, teacher trainers, practitioners,

web developers, ministries and telecom companies (Sharp, 2007). For this reason, education stakeholders have become essential for the overall system of mobile learning. A particular sector would not be able to achieve fulfilment of its core objectives by its own efforts. It is important that governmental and non-governmental organisations play their part to promote synergies and alliances that would interlink the scientific efforts, promote innovation and would also ensure completion of successful business projects (Plaza et al., 2011). Moreover, strong partnerships are required to be intact before pilot projects have been effectively designed.

2.11 Effects of Limited Mobile Technology on Student Learning

2.11.1 Integrating Mobile Learning Analytics and Learning Theory

From a technical perspective, learning analytics could well refer to collection, measurement, reporting and analysis of data regarding potential learners. It focuses on the optimising and understanding of learning and the environments wherein the process of learning happens. From the point of view of Jordan, mobile learning analytics can be explained as how potential learners utilise mobile technologies and how they have received very little attention in the last few years. But it is a fact that it becomes easier for collecting information for potential learners by the means of mobile devices (Iqbal and Qureshi, 2012). Across Jordan, it is significant to note that mobile learning analytics have to be employed for improving the development of theories and how individuals learn through them (Jaradat, 2012). Through mobile devices, it is possible to automatically record data through the usage pattern. This helps to provide learners with consistent feedback for their progress. It also provides policymakers and educators with an adequate level of diagnostic information. Due to the fact that technological innovations have made it easier to collect more diverse data sets, a massive challenge in this regard would be towards development of innovative methods for analysing certain powerful data sets and integrating them with learning theory and learning practices (Almarabeh, 2014). Certain policymakers have also made sure that the protocols have been kept in place for collecting data and work in an ethical manner with this data. This would make an improvement for educational research and would also protect the rights of the learners for digital ownership.

2.11.2 Training Teachers for Mobile Learning and Design

It is a fact that realising the prospects for mobile learning would certainly require new roles for potential teachers and would also require a highly superior capacity for fulfilling the purpose of teacher training. One of the most significant components for the development of mobile learning could be the training of teachers and practitioners as they can help to incorporate mobile technologies into their classroom practice (Njenga and Fourie, 2010). Across Jordan, teachers and other individuals that have been entering this profession need professional development and training for the creative design of mobile learning interventions (Iqbal and Qureshi, 2012).

Educational policymakers in Jordan are required to develop certain strategies for supporting their teachers and deepening their personal understandings regarding the complicated relationships that exist between design, pedagogy, mobile technology and implementation. Several developed countries across the world have taken important steps in this direction along with different teacher development and mobile technologies projects (Almarabeh, 2014). Such processes help to investigate how mobile technologies could be interlinked with different teacher training systems through methods that could help to improve the overall quality of teaching systems to a large extent. Some important development projects are required in future if potential educators want to clinch mobile technologies for student learning and development (Jaradat, 2012).

2.12 Improving the Use of Mobile Learning in Jordan

To tackle educational challenges, the integration of an ICT system has provided an opportunity to bring about improvements in learning and teaching quality along with providing a wider range of learning opportunities (Almarabeh, 2014). In developing nations, the usage of mobile learning has highly improved in modern times as their achievements of school completion and attendance are highly influenced by gender, location and poverty in such countries (EFA, 2011). Nevertheless, mobile-based solutions facilitates in the areas where there is lack of infrastructure. According to Ally (2009), the concept of mobile learning in developing countries is brought for providing them potential reach to individuals who reside in distant sites where there are no

libraries, educators and schools. Nevertheless, this is not only the concept behind introducing mobile learning but also providing convenience to its people. In various developing countries, mobile learning has gained huge significance and improved its journey of spreading this concept among various universities and colleges (Jaradat, 2012).

The usage of mobile phones for learning purposes in Asian countries increased a few years back. As per the study of Entwistle (2013), mobile learning has gained huge value in defining the wireless-enabled processes and strategies across the whole instructional delivery. In addition to this, Entwistle (2013) surveyed graduate students of North Bangkok in which participants were tested by using mobile phone applications and up to 90 percent of participants owned mobile phones. The scoring of students among mobile phone users was similar to those whose test was conducted in a traditional format. In a similar manner, the study of Garrison (2011) presented that usage of the mobile phone in Japan is employed for teaching 'English as a second language' (ESL). As per this report, almost 43 percent of Japanese students use the computer for sending emails while the rest use smartphones for sending emails. Garrison's study (2011) summed up that there is a need to provide additional curricular opportunities for learning.

In addition to this, the study of Garrison (2011) presents the advanced idea of web-based course material which must be decomposed into small-sized pages that can allow the reader to read it on small mobile screens. Nevertheless, the English vocabulary lessons were set up by employing the function of email on mobile phones. This study presented that 71 percent of learners liked getting lectures on their mobile phones rather than on their personal computers. Garrison (2011) mentioned that 93 percent of students saw the value of mobile phones and 89 percent liked to carry on while utilising mobiles for the purpose of educational learning.

Moreover, the learning results were highly positive along with an average 6.5 words of English learned by utilising the method of SMS, in comparison to three words learned by utilising a PC. In recent times, the study of Hsu (2013) presented that the usage of mobile phones for the educational purpose has highly improved and increased in the Philippines. Hsu (2013) mentioned that almost every student has a mobile phone so it is easier to incline students towards mobile learning. The Open University of the Philippines has already introduced a formal SMS-based mobile course for teaching science, maths and English. This study further reported that 80 percent of students said that they embrace the concept of learning via SMS.

There is no doubt that usage of mobile phones for educational purposes has to gain high momentum in the African region. In addition to this, Berge and Muilenburg (2013) mentioned the usage of the mobile phone at Pretoria University in South Africa (SA) that mobile learning has become a keypart in the spread of electronic learning in SA. Moreover, the high rate of mobile phone usage has also brought e-learning to traditional or rural parts of Africa where e-learning could not even be imagined few decades back.

Parr (2013) presents that the head of e-learning at the University of Pretoria in South Africa mentions that the ratio of adults employing mobile phones rapidly increased from 17 percent in the year 2000 to 76 percent in the year 2010. Nevertheless, mobiles phones have become essential technology for African students who use the internet a lot for information regarding their course material or material related to exams. Nevertheless, it is also expected that mobile technology will also become affordable which will allow easy communication with students and their assessment.

Berge and Muilenburg (2013) further observed that responses to learning spread with the help of SMS messages have become very famous among students. This study also presented the benefits as a mass number of SMS messages can result in saving on postal service costs that was previously used for spreading or exchanging information to learners. The usage of mobile phones for SMS mailing is greatly utilised in Kenya, particularly for teacher training (Traxler and Vosloo, 2014). The Republic of Kenya has a poor physical infrastructure and in contrast, Kenya has introduced many vigorous mobile phone networks. This has eventually allowed them to introduce an e-learning concept among schools and colleges, so the capacity of learning can be extended.

The key reason behind the improvement of mobile learning usage in developing countries is its cost. Nevertheless, the cost of handsets holds significant capacities at an affordable rate. Moreover, smartphones have also become very affordable so that parents of students can easily afford them (Almarabeh, 2014). A decade before, internet facility, mobile phones and personal computers used to cost a lot and a middle-income person could not afford these facilities at that time. However, the trend has drastically changed in modern times as every middle income and even low-income group have smartphones that allow them to participate in such activities and

become part of e-learning for accessing information (Jaradat, 2012). In addition to this, internet capacity has highly dominated in developing nations due to the penetration of smartphones.

In Jordan, the ratio of internet and phone connections has been constantly increasing and is great to be a crucial feature in the promotion and development of mobile learning (Jaradat, 2012). Moreover, novel wireless communication services are highly accessible, for example, WiMax that joins the means of digital communication. Moreover, the development of technology in mobile semiconductors, such as the introduction of flash memory, makes gadgets smaller, powered and voluminous.

The content of mobiles would also be widely available as internet services have become highly popular. The study of Alzu'Bi and Hassan (2016) presents examples of two universities in Jordan which reveals the execution of environments, representations and content of mobile learning and constant technological innovation in the area of education. This study presents the example of Princess Sumaya University for Technology, 'PSUT', in Jordan where a course of Electromagnetic Engineering was formulated for deliverance standards upon the standard ADDIE model. The models include a list of generic processes that is used by training developers and instructional designers. It constitutes a descriptive guideline for managing with performance support and effective training tools in five phases that include analysis, implementation, design, development and evaluation. The course was delivered through mobile learning as the figure below shows:

Secondly, the Arab Academy for Banking and Financial Sciences designed a mobile quiz system. This structure was distributed on a PDA to enable the teachers to create interactive web-centred quizzes. These quizzes could be done on an internet-related computer provided with the help of an internet browser. Students of the Arab Academy can easily perform and access quizzes anytime and anywhere by using a PDA as depicted in the figure below:



Figure 3: Smartphone emulator from NI LabView

The aim of this structure was to provide learners with the advantages offered by mobile learning on its usual features such as individualisation, portability and mobility (Almarabeh, 2014). This also includes the benefits of interactivity of learning process, the urgency of learning requirements and incorporations of instructional content.

At PSUT, the mobile virtual laboratory is developed for facilitating students in performing virtual experiments by employing mobile devices as depicted in the picture below.



Figure 4: Various channels for conducting virtual experiments

This project was executed by sharing equipment and resources that could be incorporated in an environment developed by employing mobile devices by the help of GPRS telecommunication and internet networks. In the design of this virtual laboratory, Java wireless communication technologies were employed and executed by using Lab VIEW software (Deshmukh, 2012). All the implementation of the mobile learning setting in Jordan indicates that the content of mobiles was developed and designed for certain bandwidth connections that can be provided through the networks of wireless communication. This virtual laboratory offers suitable proof that mobile

learning could be greatly employed with the incorporation of learning material, real-time data and wireless networking capacity of the control system and acquisition (Iqbal and Qureshi, 2012).

Jordan universities have vastly improved their system of mobile learning by combining various mobile networks, interfacing technology, handheld devices, distance control and development time for pupils to authenticate the codes of the experimental program (Almarabeh, 2014). In addition to this, the Wi-Fi connections also facilitate access to the internet that helps in attaining learning material more efficiently and less costly. Nevertheless, the technology of web cameras is designed to monitor the implementation of an experiment in the remote laboratory.

The study of Abu-Shanab and Ala'a (2014) discovered the usage and ownership of mobile phones among the students of the University of Jordan. This also focused on revealing certain statistical differences among the usage and ownership of statistical differences that might be credited to age, gender, type of college, university type and standard of academic program. Abu-Shanab and Ala'a (2014) randomly selected 993 students from nine private and public universities operating in Jordan from the year 2006 to 2007. The study of Al-Qudah used a questionnaire which showed that 87.2 percent of the learners have mobile phones.

There are certain differences that are highlighted among students' ownership which are attributed to variables like gender, age and type of institute. In gender, mostly male students had their own mobile phones. In age, students between 24–26 were more likely to have their own mobile phones. In addition to this, Master's level and students of medical colleges had their own mobile phones. In a similar aspect, the usage of mobile phones for educational purposes also showed distinctions in terms of sex, age and type of institution. This showed the results in favour of both private and public universities.

The studies conducted by Lin and Chang (2011) and Tennant (2008) focused on the effectiveness of mobile services in the educational atmosphere and learners' preference in the procedure of learning. The research revealed that mobile learning technology vastly encourages students to study in a dramatic environment through the exchange of experiences and information. The study of Kook (2007) carried a sample of 91 students who focused on management courses. Kook employed a questionnaire for measuring the impact of the mobile phone in giving encouragement towards learning. The responses of students showed that their motivation

enhanced towards learning as they employed mobile phones for learning purposes and also showed preferences to the usage of the mobile phone in the learning environment.

In addition, the study of Pachler (2010) discovered that usage of the mobile phone in facilitating education is considered as a remarkable innovation. The activities of students helped a lot in completing this research. In the education system of Jordan, the mobile phone has started playing a flexible and interactive role of communication between student and teacher. Moreover, the study of Valk et al. (2010) identified the role of the mobile phone and PDAs in educational learning and its influence on learners. The result of the potential outcomes of the research was not accepted by the authors as the learners came across many difficulties in dealing with the exchanges and sent data through such devices. Some students could not develop notes comfortably as they found problems in employing paper materials in the learning environment.

In the growing age of advanced technology, the majority of governments in the world have paid huge consideration to dealing with information technology for increasing the performance and spreading education. The Jordanian government supports technological advancement in their country for implementing IT projects in its public institutions. In the USAID JCP, 'Jordan Competitiveness Program' and Intel Corporation have initiated a three-year public-private partnership for supporting entrepreneurship and education in the technology and science sectors of Jordan (Amman, 2015). These projects were very much aimed at boosting the economic growth of Jordan, increasing the competitiveness of Jordan and creating jobs in the marketplace by providing training to information generation and graduates of communications technology.

In Jordan, the ICT Ministry has decided to implement this initiative for developing the means by which the graduates of ICT can enhance their skills while focusing on start-ups to maintain product competition. The ICT Minister, Majd Shweikeh, stated that they aim to develop a new talent pool in the electronic field that would enable the knowledge of Jordan in the area of IT jobs (Amman, 2015). In addition to this, A. Wells, the US Ambassador, shed light on the significance of partnership for Jordan. For achieving sustainable growth of the economy, firms like Intel should lead the way for other firms related to the private sector.

He further mentioned that when Intel Corporation has joined the famous technical institutions of Jordan, successful outcomes can be easily gained for the economy. Intel Corporation facilitates the program by offering 1,500 hardware kits for technical institutions and universities of Jordan

in preparing technology for careers (Iqbal and Qureshi, 2012). By USAID JCP, the support network would allow Jordanian students to find employment and execute their new capabilities and skills after graduating. The Vice President of Intel Corporation says that they are highly committed to boosting economic growth in the knowledge-based economy and local innovation (Amman, 2015). Intel would eventually help in transforming the education system of Jordan's universities and empower their youth with entrepreneurial and employability skills.

The role of government is highly significant as it reflects political value in offering digital hardware to people that indicates modernity and induces support to improve education levels. Conversely, the private zone might enhance the use of digital technologies that are an essential source of profit, in terms of hardware (Almarabeh, 2014). Through network usage, this will offer them revenue generation. Nevertheless, these two points of interest rely a lot on the educational impact of technologies. Mobile learning certainly has potential impacts on education, and this also drives focus on initiating mobile learning in Jordan (Jaradat, 2012). In launching mobile learning and other technologies in the education sector, the government must advocate new technologies and innovations.

In Jordan, mobile services technology connects 70 percent of its population. Nevertheless, mobile technology has delivered economic, social and educational benefits (Iqbal and Qureshi, 2012). The government of Jordan is highly focused on investing mobile technologies that have the potential for growth, like 3G and 4G, that also allow Jordanians to enjoy the advantages of internet connectivity and evaluate digital services (INTAJ and MoICT Statistics, 2013). Nevertheless, the mobile sector provides a large contribution to educational, social and economic development in Jordan. The improved knowledge of Jordanians, indirectly and directly, contributes to over 100,000 full-time jobs that centre on the sustainable mobile operators in network infrastructure, digital services and next generation technology (Almarabeh, 2014). Mobile operators and consumers in Jordan are highly taxed. Nevertheless, the supporting policies by the government can help in sustaining the investment and growth in Jordan's economy.

Jordan's policymakers are looking forward to focusing on mobile networks taxes. It has been estimated by Deloitte and GSMA that mobile phone taxes in Jordan are accounted as being the second largest in the world. This adds multiple taxes that include special tax and value added tax which contributes 43.8 percent to the actual retail price in Jordan for the usage of

mobiles(Almarabeh, 2014). The taxes are high on mobile consumption that would negatively impact on operators' revenues which are subjected to an almost 10 percent share with the government. In addition, this also reduces mobile usage, affordability and revenues that could allow mobile operators to make the required investment to increase the infrastructure of the broadband network (Jaradat, 2012). In the year 2020, it is expected that the special tax on mobile services will be reduced to 12 percent and mobile connections will be increased by 570,000 (INTAJ and MoICT Statistics, 2013). Through the period of 2015–2020, the change in taxes can increase the turnover of \$3 million to further connections (Bekhet et al., 2014). In 2020, the spillover impacts of such growth can enhance GDP by US 660 million dollars (Khader and Badran, 2014).

In 2020, the rise in employment could be up to 5,000 jobs and 17,000 in a cumulative manner (Mryyan, 2014). As a matter of fact, Jordan's government can attain neutral revenue within three years and increase up to US 100 million dollars in terms of additional revenues in the year 2020 (INTAJ and MoICT Statistics, 2013). In addition, decreasing the Special Tax on mobile broadband packages can improve the usage and bring incentives for taking up the mobile internet and enabling further broadband connections by 400,000 in 2020 (Shihab et al., 2014). During the time period of 2015–2020, mobile connections can rise by 2 million. This brings enhancement in mobile penetration that can add around 2,000 new jobs and bring in an additional contribution of US 310 million dollars in the year 2020 in GDP (INTAJ and MoICT Statistics, 2013). Nevertheless, this is noticeably equal to a cumulative rise over the period of \$1.2 billion in Jordan's GDP and 7,000 in further jobs (Khader and Badran, 2014). Fee payments and recurring tax established by Jordanian mobile operators reflect over 50 percent of market revenues (Shihab et al., 2014). Thus, it can be said that digital inclusion and technology has become the key focus of Jordan's government.

2.13 Conceptual Framework

The notion of the conceptual framework is differently defined and explained by academics. For some, it refers to a merely illustrative demonstration of a research's construction or chief academic tenets, which is generally incorporated into one's literature review commonly as a separate outline. Contrarily et al.(1995) explained the conceptual framework as the combined

demonstration of presented theories and individual explanation of conceptions and theories. However, another perspective also prevails in this context that takes framework as a mode of connecting all of the constituents of the research study including researcher character, concern, perspective, techniques for literature and theory, and this view regarding conceptual framework is closest to the conceptual framework developed for this piece of research (Kerin et al., 1992).

The employment of conceptual frameworks is comparatively vague in the literature but despite that, it is an important ingredient of research. Ankley et al. (2010) note that very little explanation of conceptual frameworks is present either in published research works or in textbooks; especially in textbooks the minimum amount of material is available in a glossary only to define the term of the conceptual framework. In addition to this, there is no manual available to guide the researcher for the development of the conceptual framework (Den Hertog et al., 2010).

Though the conceptual framework is considered to be an important part of the research as it guides the researchers, in a certain research approach, namely grounded theory, the conceptual framework is not developed because theory creation is taken from the collected data (Muradian et al., 2010). Flynn and Graham (2010) wrote that it is an approach that infringes the notion that a research should contain an explicit theory prior to initiation. According to Collins et al. (2010), it is an instance of a procedural approach that is centred upon a particular epistemology, and Corbin and Strauss (2008) talked about the epistemology of grounded theory research approach in detail. Conversely, Hall et al. (2013) wrote that as this methodology has developed, the epistemology has also been devised with the development of methodology. According to Den Hertog et al. (2010), the conceptual framework should not be considered as one of the parts of research design but considered as a result of the research.

Handal et al. (2013) wrote that the conceptual framework is used in research in two different ways. One way of using the conceptual framework is to use it in research design where it is kept explicit and the structure is usually used as a part of the literature review chapter. However, Muradian et al. (2010) stated that researchers usually do not keep the conceptual frameworks of a study clear, compared with the way the framework leads their research work. However, this does not imply that such research work has no conceptual framework but that the framework may be implanted in the literature review.

The conceptual framework for this research occupied the space in the research after the literature review and before the methodology chapter. This was so because the development of the conceptual framework guides the researcher to display the obtained results of the literature review in a systematic manner by ordering his thoughts.

Corbin and Strauss (2008) wrote that the theoretical framework is developed in the beginning in the majority of research work done on the topics of social sciences, which further leads to data analysis before the development of new theories as results. However, Muradian et al. (2010) argue that in modern research works the development of the conceptual modal, which is a pictorial form of a conceptual framework, is considered useful, which is further refined with the beginning of data gathering and then examination. According to LoBiondo-Wood (2010), the coordination between the theoretical scaffold and other parts of the study not only strengthens the research design but also makes the researcher confident about the results obtained through data analysis.

Goddard et al. (2013) in their research made use of the theoretical framework while designing their unsystematic but controlled examination, whereas Smith et al. (2012) employ it ahead of investigating the knowledge foundation of screening instruments. On the other hand, the second way of using conceptual frameworks in research work is while developing a theory, as Den Hertog et al. (2010) wrote that the main target of the majority of qualitative studies is theory generation. No matter what is the right place of the conceptual framework in the research, Ankley et al. (2010) wrote that the main target of the conceptual framework is to produce evocative results and this connection makes the results more logical and thus more understandable to the audience.

Collins et al.(2010) assert the presence of the conceptual framework throughout the research project as it assists outlining the study objectives and design as well. Sueur et al. (2011) explain that, with different types of conceptual framework, the same information can be gathered but one thing that is necessary is that the same data should be displayed differently. Flynn and Graham (2010) stated that in a PhD research project, the conceptual framework is employed as an intellectual exercise to meet the demands and expectations of a supervisor. For Hall et al. (2013), the conceptual framework helps to make research effectively communicative to readers as it organises every part of the research project.

The key foundation for the development of the conceptual framework was to depict how the research problem was addressed by reviewing the pertinent literature. The re-examination of the literature helped in identifying prospects of mobile learning in higher education in Jordan by examining capabilities and limitations of mobile technology. Thus, the research problem, which is to assess the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education, was addressed under the factors determined by technology acceptance theories. The conceptual framework developed for this study only facilitated readers to understand how the research problem was addressed by reviewing the extant literature, but it also assisted the researcher to interlink findings from the reconsideration of the literature with the on-ground findings.

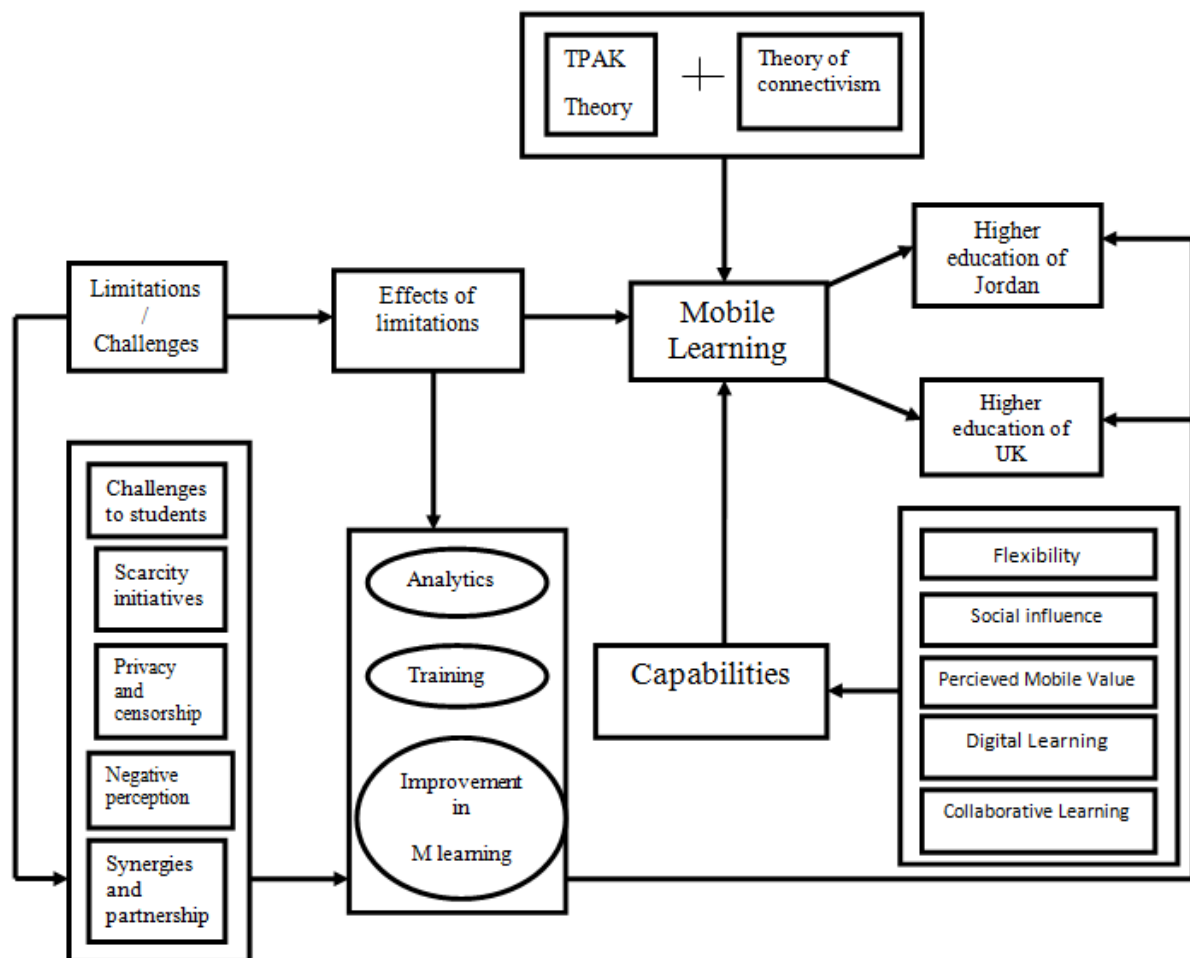


Figure 5: Conceptual framework for the effectiveness of m-learning on higher education

The conceptual framework for the present research portrays the integration of the dependent and the independent variables. Mobile learning, being an emerging concept in the modern ways of learning, is affected by various challenges and the limitations. Moreover, the learning process from the mobile phones is highly affected by the capabilities. The growing emergence of m-learning and its impact on the quality of the education, the present research strive to explore the effects of the limitations and capabilities of m-learning for the higher education of Jordan and the UK.

2.14 Theories of M-Learning (TPACK and Connectivism)

Theoretically, the concept of m-learning is derived for the present research from the amalgamation of two theories – TPACK theory and the theory of Connectivism. TPACK was presented by Mishra and Koehler (2006). The theory consists of three key elements of the knowledge of the teacher: technology, way of teaching and the content. According to Gold (2012), knowledge of the teacher regarding the emerging technology, content and pedagogy is significantly affected in the learning process. On the other side, the theory of Connectivism was presented by Downes in 2008. According to Downes and Seimens (2008), the growing use of the internet has allowed people to grab learning opportunities from various websites. In line with this, he further mentioned that people can easily share the in-hand information through the internet so that other people can get the benefits. The conceptual framework of this study shows that m-learning in Jordan and the UK is affected from (TPACK theory) the teachers' knowledge (technology, way of teaching and the content) and the opportunities of learning through the internet (theory of Connectivism).

2.15 Limitations Faced by M-Learning

The developed framework shows that m-learning is affected by the limitations and challenges. The implementation of mobile learning in the universities of developing countries is quite a challenging task because of certain limitations and challenges. The challenges in the way of m-learning are pretty phenomenal. The study of El-Hussein et al.(2010) concludes that rigorous challenges are the bottlenecks in the growth of m-learning, especially in the developing nations.

During m-learning students face multiple challenges, such as inadequate access to the necessary hardware. According to Liu and Carlsson (2010), students require relevant hardware that would allow them to access online information in an adequate manner. The other challenge that is faced by the students is not having the required skill to use the tool of m-learning. In line with this, students face difficulties understanding the content that is provided by the teacher through m-learning. According to Park et al. (2012), students have to be highly accountable and independent as they do not have any direct communication with other students and instructors.

The other limitation that is a hurdle in the way of effective implementation of m-learning is a scarcity of localised initiatives. According to Parasad et al. (2012), to have the required technology for m-learning requires the attention from the local interventions for significant improvement. In addition, privacy concerns and the issue of censorship are two of the core hindrances. The restricted websites containing important content discourage the learners from utilising m-learning (El-Hussein et al., 2010).

Furthermore, the negative perceptions of m-learning adversely affect the implementation of the m-learning. The study of Sarraf et al. (2012) highlights that many researchers or academic professionals have not even experienced the relative benefits associated with mobile learning. Moreover, inadequate planning and development have certainly resulted in well-documented failures that would have implications for mobile learning in educators along with policymakers. As highlighted by Sharp (2007), lack of synergies and partnerships are the main hurdles in the way of m-learning. The successful implementation of m-learning requires effective coordination and partnerships of the different relevant sectors. The lack of alliances between government and intergovernmental organisations for the projects related to m-learning is considered as a core limitation standing in the way of effective implementation of m-learning.

2.16 Effects of Limitations on M-learning

The effects of the above mentioned limitations adversely hit m-learning. M-learning is affected through learning analytics. Learning analytics focuses on the optimising and understanding of learning and the environments wherein the process of learning happens (Iqbal and Qureshi, 2012). According to Jaradat (2012), through mobile devices, it is possible to automatically record data through the usage pattern. This helps to provide learners with consistent feedback for their

progress. It also provides policymakers and educators with an adequate level of diagnostic information. Moreover, the training of teachers regarding m-learning is significantly affected by the certain limitations. As mentioned by Njenga and Fourie (2010), one of the most significant components for the development of mobile learning could be the training of teachers and practitioners as they can help to incorporate mobile technologies into their classroom practice. But the limitations, such as the negative perception of m-learning, lack of synergies and partnerships, play a negative role standing in the way of successful implementation of m-learning.

2.17 Capabilities of M-Learning

In addition to the limitations, the capabilities of m-learning also affect the performance of higher education. In the view of Hashemi et al. (2011), the conventional learning practices are not reinstated by mobile learning, but mobile learning is merely a different learning technique by making use of a novel technology, which is rapidly developing from simple mobile phones to smartphones that are capable of serving as a mini-computer, data transfer device and telephony. The work of El-Hussein and Cronje (2010) also threw light on the capability of mobile learning technology as they disassemble the fundamental constituents of mobile learning and give an examination of the notion of mobile learning in higher education. They set up mobile learning constituents into three conceptions: the first constituent was connected to the technology mobility, the second centred on greater learner mobility, whereas the third examined the mobility and drive of the learning procedures and information flow. Njenga and Fourie (2010) discussed the perceived mobility value which comprises of immediacy, portability and convenience. Mobility value allows the users to view the required information anywhere through the help of mobile devices. In line with this, the study of Ally and Prieto-Blazquez (2014) concludes that social influence affects the intentions of the individuals regarding the utilisation of m-learning.

Mobile learning offers flexibility in the manner of learning – the students can record lectures and learn from them whenever they find it feasible. The devices are portable and easy to carry from one place to another. The concept of collaborative learning was discussed by Rekkedal and Dye (2007), who highlighted that mobile phones and smartphones are those devices that encourage collaborative learning. Due to collaborative learning, people can easily interact with each other

and exchange knowledge. As far as the concept of digital learning as a capability of m-learning is concerned, the study of Abu-al-aish and Love (2013) indicates that the relationship between digital learning and the technological adaptation is positive. It allows the individual to gain knowledge from the remote areas where he/she cannot manage to go.

2.18 Summary

This is one of the most important chapters of this research study as it connects different parts of this study with each other by facilitating the readers as well as the researcher himself. The chapter explained the relationship between capabilities and limitations of mobile learning technology and its impact on learners. It also interconnected the theories of TPACK and connectivism with the mobile learning.

3 Chapter 3: Research Paradigm and Methodology

3.1 Introduction

This chapter details the research methodology selected to conduct this research and presents the reason why a mixture of positivism and interpretivist paradigm was appropriate after arguing diverse concepts accessible for the study. This part consists of an explanation for the choice of an exploratory plan with an interpretivist concept plus the employment of a close-ended questionnaire review. It also presents a thorough explanation of sampling and the moral concerns that were pursued throughout this study. The development of the methodology for the study on any particular theme is the centre of the whole research as it explains how this study was done in a systematic way by making use of appropriate research means, activities and ways. And the success of employing the research devices, exercises and means are only based on the targets for which the study is being done. The method details the specific tests and calculations of how it was applied in practice. Alongside this, the research methodology also elucidates the relevance of the selected techniques by viewing the research dilemma.

3.2 Research Epistemology

Research is a methodical search or investigation where pertinent data are gathered, examined and interpreted in a certain manner either to comprehend, explain, foresee or manage a learning or psychosomatic phenomenon or to empower entities in such frameworks (Agerfalk, 2013). A research paradigm is a method that directs how to carry out activities by formally ascertaining a set of practices, which range from the blueprint of thoughts to actions (Woodside, 2013). Different definitions of paradigm show that a paradigm is not merely the elucidation of certain methods and techniques employed for specific research work but it, in fact, reveals what a researcher believes (Kerstetter, 2012). This shows that a selected study theory reveals a principle structure that directs a researcher to keep a specific general outlook that should be shown in the entire study procedure.

Paradigms, positivism, interpretivism and critical theory are three principal philosophical theories for a social research. The classification of paradigms is based upon their attributes, ontology, epistemology and methodology, which generate a comprehensive viewpoint of how information is considered and how a researcher positions himself with respect to this data,

together with the procedural systems researchers make use of to establish it (Shepherd and Challenger, 2013). Epistemology is directly linked to ontology and method as ontology includes the design of realism, epistemology addresses the means to identify and recognise that realism, while methodology distinguishes particular practices utilised to attain knowledge regarding it (Henderson, 2011). Ontology is explained as the research on people and is centred upon postulations that are connected with the foundation of realism (Lincoln and Guba, 2013). Consequently, the researchers need to take a particular viewpoint regarding their inspections, the technique that are necessary for gathering the data. Conversely, epistemology concerns the features and constitutions of knowledge and is centred upon postulations that are connected to the means by which information can be produced, acquired and carried (Allen et al., 2011).

The queries asked by epistemology are with respect to the features of the association between what can be recognised and what, probably is a known. The ontological and epistemological postulations fluctuate from theory to theory (Kestetter, 2012). On the other hand, there is no experiential justification of the academic groundwork of all paradigms as all postulations are conjecturing (Agerfalk, 2013). Paradigms, fundamentally, have conflicting ontological and epistemological perceptions, so, each theory has different postulations of pragmatism and information which maintain their particular study approach. Shepherd and Challenger (2013) state that ontology and epistemology are balancing to one another and delineate the selected theory by a researcher and due to this it is relevant for a researcher to disclose his principles with respect to knowledge before the theory selection as the researcher's principles regarding knowledge offer a foundation to his principles with respect to ontology and epistemology.

The ontological and epistemological arrangement of a research leads to what method will be appropriate for the study, as Henderson (2011) wrote that diverse postulations of each theory are mirrored in its methods. The methodology is explained as the system or plan of actions which function following the collection and utilisation of particular systems, which implies methodology is connected to the query, for example what information is collected (Lincoln and Guba, 2013)? What sort of information is obtained and from where is it to be obtained and in what manner is it to be evaluated? On the contrary, systems are the overt exercises and procedures utilised to build up and scrutinise information (Agerfalk, 2013). In this chapter, only three, namely positivists, interpretive and critical paradigm were considered and elucidated as they provide a basis to other paradigms, i.e. post-positivism, feminism, etc.

3.2.1 Positivism Paradigm

Realism, which states that things are based on the reality of being known regarding the particular subject, is one of the ontological standpoints of the positivism paradigm (Allen et al., 2011). Kerstetter (2013) stated that a discoverable reality in the positivism paradigm survives irrespective of the researcher as the positivists make the assumption that realism is not intervened by the logic. According to Henderson (2011), figurative part as they are related to the world by a certain designative purpose; as a result, they owe their connotation to the entities which are named after them. On the other hand, the epistemological position of positivism paradigm is on objectivism as positivists venture out into the globe neutrally, ascertaining supreme knowledge regarding an objective realism.

The investigator and the phenomenon to be researched are free entities in the positivist paradigm and implication and meaning only dwells in entities, instead of the conscience of the investigator, who aims to get this meaning (Shepherd and Challenger, 2013). Lincoln and Guba (2013) stated that the statements in a positivism paradigm are evocative and realistic, unlike other paradigms. Beverland and Lindgreen (2010) conducted a study on business-to-business marketing by using a positivist perspective. Likewise, Dwivedi et al. (2010) conducted a study by using the positivist paradigm, empirical and quantitative research. However, Mass (1994) also carried out a study on the requirement for a paradigm change in social work by employing a positivist perspective. Bogdanovic et al. (2012) also studied by using a positivist paradigm to give details on and assess focus groups and confidentiality interview techniques employed in a qualitative research of online confidentiality.

3.2.2 Interpretive Paradigm

This is centred upon an ontological standpoint called relativism, which states that realism is subjective and varies from individual to individual (Allen et al., 2011). Interpretivists believe that the realities are intervened by the logic and the world becomes meaningless without consciousness. Reality appears when awareness connects with entities which are charged with

meaning and sense beforehand (Shepherd and Challenger, 2013). Unlike positivism, the reality in an interpretive paradigm is independently built and there can be various realities. However, words do not inertly label entities but dynamically form and shape reality (Agerfalk, 2013).

This is the reason why reality is built by means of the contact between words and features of a sovereign world. The epistemological standpoint of the interpretive paradigm is based on subjectivism which is about real-world happenings. The interpretive paradigm has been employed by various academics to carry out their research, for example Mlitwa and Van Belle (2010) conducted a study on the acceptance of learning management structures in universities by using an interpretivist framework. However, Modell (2010) conducted a study by using a mixture of interpretive and critical processes and the use of mixed paradigms allowed the research to be able to organise the study as a fraction of an approach of meta-triangulation to prompt inter-paradigmatic commitment. In addition to this, Vaivio and Siren (2010) also carried out a study by using the triangulation method. However, Petty et al. (2012) conducted a study on doing research by using different qualitative methods, such as narrative study, case study and others and also explained the analysis method, namely thematic analysis to examine qualitative data.

3.2.3 Critical Paradigm

Historical realism is the ontological standpoint of this paradigm, which is based on the notion that societal, political, economic and national values formed the reality that was previously considered artificial and has crystallised (Agerfalk, 2013). In a critical paradigm, words do not inertly tag entities but dynamically form and shape reality, which is built by means of the contact between words and features of a self-regulating world (Lincoln and Guba, 2013). However, Allen et al. (2011) state that the critical paradigm is based on the notion that words have power which is the reason why they are used to empower or fade. The epistemology of critical paradigm is subjectivism, which depends on phenomena in the real world, and so is connected with societal philosophy as knowledge is equally communally formed and affected by power connections from the society (Kerstetter, 2013).

3.2.4 The Selected Multiple Paradigm Approach

This research was done by employing the mixed methods approach, which is the simultaneous utilisation of two or more than two methods for the study project yielding equally qualitative as well as quantitative data. The mixed research method is a third methodological progress from the last 20 years, balancing the current practices of quantitative and qualitative factions. Ioannidis et al. (2014) stated that this development of a third methodological progress has resulted from an exploration for a suitable paradigm to give justification for the employment of mixed research methods in contrast to the paradigms that have been broadly known as explaining the employment of quantitative as well as qualitative research methods independently.

The selection of the paradigm issue for mixed methods emerges due to supposed ‘paradigm conflicts’ whereby social scientists criticised the positivist paradigm of quantitative study by suggesting constructivism as a substitute paradigm between 70s and 80s. However, Shepherd and Challenger (2013) posit that there is no possibility of mixing different methods for the research project because of the incongruity of the paradigms supporting them. Turner and Laird (2012) wrote that quite a number of substitute approaches have been proposed to handle this issue with respect to mixed research methods and these approaches are divided into three main groups, namely, multiple paradigm approach, a paradigmatic approach and the single paradigm approach. The a-paradigmatic approach ignores the paradigm problem as it assumes that methodology is sovereign to the epistemological stance that gave birth to it. Unlike the a-paradigmatic approach, in the multiple paradigm approach the examiners can take on more than one paradigm for their study purpose whereas in the case of the single paradigm approach, mixed methods are adopted with the particular paradigm approach.

For this study, the mixed research method was used with the multiple paradigm approach because in the multiple paradigm thesis the mixed-methods design determined which paradigm choice was suitable for the particular research. Considering the mixed method design, the mixed paradigm of positivists and interpretivism was used as the choice of focus group for the data collection was derived from the interpretive paradigm whereas the use of questionnaire survey was taken from the positivists paradigm. The primary reason for the selection of the multiple paradigm approach was its suitability for the attainment of research objectives. As different research methods were employed for the accomplishment of objectives so the mixed paradigm of

positivists and interpretive supported the choice of mixed research methods for the completion of this study.

For example, positivists perspective support the questionnaire survey that was done with the learners of the University of Jordan for attaining the research objective of examining capabilities and limitations of using telecommunication technology for learning in Jordan. On the other hand, the focus group was supported by the interpretive paradigm in order to obtain the objective of identifying variables that influence the execution of mobile learning in Jordanian higher education by evaluating differences between Jordan's higher education institutions and the UK's higher education institutions.

The selection of the a-paradigmatic approach was not suitable for this study because it contradicts the choice of paradigm with the mixed research method, which does not satisfy the requirement of this study as the basis of positivist and interpretivist paradigm provides a basis to the multiple data gathering ways utilised in this study. Likewise, the choice of the single paradigm approach was also not appropriate for this study as the multiplicity of data collection methods cannot be possible with the single paradigm choice.

3.2.5 Mixed Method Research

According to Bryman (2012), qualitative research is used when the research is based on conducting interviews and when the nature of the research is exploratory. When the researcher wants to comprehend opinions and reasons regarding particular phenomena, the use of qualitative research is made. In contrast to this, the quantitative research is used when the researcher intends to gather numeric data that is gathered with the help of a survey and which is not possible only by the qualitative research. This research helps in the accumulation of data from a large number of respondents. Similarly, the amalgamation of these two approaches is known to be the mixed design of the research.

This includes the use of both types of research, including qualitative and quantitative, so that an in-depth study can be conducted for the accomplishment of the research objective. The focus group approach is used, which falls into the category of qualitative research, whereas the survey is part of the quantitative approach. Thus, the choice of a mixture of qualitative and quantitative

approaches helped to achieve the objectives of its study by utilising equally qualitative and quantifiable data-gathering channels. As stated by Kimmel (2009), the main aspect to be considered in the mixed method is that the research questions can be dealt with from any angle and every type of data can be collected. Thomas (2011) stated that every study, whether it is qualitative or quantitative, has some of the strengths and weaknesses as they are being used in their respective manner.

In addition, it can be said that with the help of the mixed method approach, contextualisation, in-depth study and more natural aspects of the particular phenomena can be examined. For example, the data was collected from students studying in the University of Jordan through a quiz, questionnaire survey and focus group. These activities were done in two different contexts, i.e. in the University of Jordan and Aston University. Thus, in this way, the mixed method approach supported the selected data collection techniques.

As averred by Thomas (2011), the mixed method is used due to various reasons, some of which include the explanation and the interpretation of the gathered data, exploring the phenomenon, serving a theoretical perspective, easy to describe, helps in generalising etc. For the current study, in which the comparison of the UK and Jordan was considered, the mixed method approach was used.

The objectives of the current study include reviewing the present position of mobile learning technologies and their application in Jordan and the UK alongside identifying factors that influence the implementation of mobile learning in the University of Jordan by evaluating differences between the University of Jordan in Jordan and Aston University in the UK and also the challenges pertaining to it. That was why the mixed method approach was used because the survey and focus group were both contemplated. The accomplishment of the aforementioned objectives is only possible with the use of the mixed approach as detailed analysis and gathering views of a large number of respondents was necessary.

In addition to this, one of the objectives was also to adapt higher education mobile learning content that was taught to the students in the University of Jordan and compared with the experiences of Aston University's students. To attain these objectives, the use of a mixed method approach was contemplated. As the researcher wanted to gather the data with the help of a survey and by considering focus groups, it will not be feasible to make the use of one approach

that is qualitative or quantitative research. The best option for attaining the desired results was the use of a mixed approach, so that the detailed analysis can be done.

Similarly, in the view of Kimmel (2009), the mixed method approach is used when the researcher intends to cover qualitative and quantitative methods with the help of open and close-ended questionnaires. With the help of the mixed method, the researcher can consider multiple forms of data drawing procedures which include the analysis via text analysis or statistical tools. As mentioned by Seidman (2013), the mixed method is often used by the researcher in order to base the knowledge claims on the pragmatic grounds, which for instance include pluralistic, consequence oriented and problem-centred pertaining to the current study, as the research objective is to highlight the challenges and limitations of using communication devices, this can only be done by surveying a large number of respondents. In Panneerselvam's study (2014), there is a vast scope of the mixed method approach as it helps in resolving the issue under consideration with full depth. It helped in collecting, analysing and integrating the data that can be used for attaining the research objectives.

3.3 Justification for the Selection of the Mixed Method Research

For the current study, the mixed method was used; the choice by the researcher of this approach can be justified by highlighting the point that this helped in gathering both types of data including qualitative and quantitative data. However, one point which also supports this aspect was that the researcher sought to conduct an in-depth study. The use of qualitative data helped the researcher in gaining the detailed views of the respondents, with the help of interviews, case study, focus groups etc. Similarly, for the current study, the use of focus group was made, so that the detailed responses and one-to-one discussion could be contemplated. It is also highlighted that the mixed method is used to evaluate the research topic from all the aspects.

However, pertaining to objectives, the first objective is to understand the scope and limitation of mobile learning technology and their application for mobile learning as published in literature and the second objective is to identify the factors that affect the implementation of mobile learning in Jordanian higher education by evaluating the differences between Jordan's Higher Education Institute and the UK's Higher Education Institute. To understand these factors, it is necessary to have a detailed discussion with the teachers and the staff that have the know-how

about these aspects. To gather the responses regarding the use of a mobile learning module, it was integral to gain the views of a larger number of people so that mixed views could be gathered which would shed light on the pros and cons of the use of mobile learning. In contrast to this, one of the objectives is to adapt mobile learning content for the Jordanian and UK students according to the capabilities and limitations of available mobile learning technology; this was accomplished by obtaining qualitative and quantitative data – both types of data are considered in the study.

As mentioned by Seidman (2013), the mixed method is one of the best approaches to use as it helps in gaining a proper or better understanding about the research problem. In addition, it is also discussed that for analysing the quantitative data, statistical software is being used; often, MS Office was also used. These were considered so that the responses gathered via the survey can be described and compared, as well as could be found related to the variables of the study. In contrast to this, the qualitative data could be analysed with the help of coding, content analysis, analysing by relating the questions with the questions being made part of the study, theme development etc.

These are some of the ways used for analysis of the results. For the current study, the data gathered through the focus group was analysed by preparing the transcripts which includes all the relevant responses to be used for the study purposes. Venkatesh et al. (2013) stated that there are five steps when it comes to analysing the qualitative data, which include data grouping, information labels, knowledge, theory and, lastly, implications. With the help of focus groups, a large amount of data is generated as compared to that of a survey, in which the responses are restricted to being answered by being in a particular interval.

From all the aforementioned aspects, it is highlighted that for the study to be conducted on Improving Effectiveness of Mobile Learning Technology for use in Higher Education, for the UK and Jordan, it was considered that the mixed method was suitable. The use of this approach sought to increase the reliability of the data and the topic under consideration. This would also increase the validity of the research for generalising the data that was used in the study. This helped in exploring, describing and discovering the aspect being made part of the study.

3.4 Study Processes

This section gives comprehensive detail of all the processes through which the research was done.

3.4.1 Step 1: Designing Mobile Content

In this stage, the content was selected for mobile learning activity. A total of five lectures were selected based on the relevance of course material for the first year students of the information technology course. Consideration was made that the content was suitable for students of both countries so that comparison would be made on the research. Mobile learning content was developed based on five lectures on five different topics. The mobile learning content was developed for the first year students of IT studying in the second semester at Aston University and the University of Jordan. The same mobile learning content was made available on the websites of both the universities but the only difference was the quality of the mobile learning content, which was high in the case of Aston University, compared to the University of Jordan. The reason behind the low quality of mobile learning content at the University of Jordan was the IT infrastructure at the University of Jordan, which was not as advanced as it was at Aston University.

Five lectures were developed as PowerPoint documents to be uploaded on the website of the University of Jordan and Aston University. The topic and material developed for the lectures was taken from the teachers' lectures given to the first year students of IT studying in their second semester in the University of Jordan and the Aston University. No material other than the material taught to the IT students in their classes was part of the PowerPoint lectures.

This was done for the students' convenience as the quiz attempts were easier for the participants if they easily understood the PowerPoint lectures. The topics of the five lectures were cybercrime, business and technology, green IT, system development and knowledge management. Each lecture began with a brief description about the learning objectives, after which the lecture material was displayed concisely and quickly in the slides. The lecture slides were made interactive by using more images and less written material as Liu et al. (2010) stated that detailed written material with no or minimum use of relevant images makes PowerPoint lectures less attractive and interactive for students. Therefore, considering the available time and

significance of images the lecture slides were developed with a minimum amount of text and a maximum but appropriate amount of images.

3.4.2 Step 2: Lecture Uploading on the Universities' Websites

Lectures and five quizzes were uploaded to the websites of the University of Jordan and Aston University. The lectures and the quizzes were uploaded for the first year IT students in the second semester. The lectures and quizzes were based on the IT course taught in each university. The lectures uploaded were on cybercrime, business and technology, green IT, system development and knowledge management. This phase of 'prior execution' was followed by the next phase called the 'execution phase', which revolves around the focus group in the University of Jordan and at Aston University.

3.4.3 Step 3: Student Participation in Activity

The execution phase was composed of three dependent activities to examine students' experiences and opinions about the mobile learning content and its related activities. The first activity was administering a quiz to the students of both the selected universities. The students were asked to attempt the quiz after going through the five available lectures on their university's website. The students were free to make as many attempts as they liked at the quiz but the participating students only made one or two attempts. However, a large majority of students made only one attempt which shows the students were not taking things seriously with respect to the quiz exercise.

The second activity was conducted only at the University of Jordan, which was the questionnaire survey with the students who participated in the activity by uploading mobile learning content on their mobile devices. This survey was not conducted at Aston University because the technological support for running mobile learning content was highly sophisticated in contrast to the technological support at the University of Jordan.

3.4.4 Step 4: Focus Group Conduction

The last activity was the focus group at both universities. In the second phase of analysis, two sets of focus groups were conducted in the Jordanian and Aston universities separately with the second semester first year IT students. The question development for the focus group was based on the results obtained from the five quizzes done at Aston University and the University of Jordan.

3.5 Data Collection Methods

The combined quantifiable and qualitative techniques have been employed in this research because combined methods produce data from varied channels, which verify the creditability of the results. The methods used involve a lecture and questionnaire-based quiz uploaded to the website of the University of Jordan and Aston University for the first year IT students. The five uploaded lectures were based on the lectures of their teachers in the second semester whereas the questionnaire for the five quizzes was based on the five lectures uploaded on each university's website.

3.5.1 Questionnaire

For using the questionnaire, there are various advantages linked with it, some of which include timely and accurate information. The results accumulated by the questionnaire can be quantifiable and presented in graphs and tables to illustrate the responses. In addition to this, the data can be scientifically analysed and objectively as well, in comparison to other types of research instruments (Lietz, 2010). In opposition to this, Creswell and Clark (2007) even mentioned that the data calculated by the researcher with the help of a questionnaire lacks validity.

It is not feasible to say that the collected data was authentic and the respondents were true while sharing their responses. However, it was still one of the best instruments that is widely used (Rubin et al., 2010); despite it being an open-ended questionnaire or close-ended, both are useful depending on the context of the study. Data can be collected quite quickly and every respondent can be offered an opportunity to offer feedback. The data gathered can even be processed with the

help of different packages such as SPSS or Excel. Two questionnaires were developed, one was the questionnaire quiz and the second was for the mobile learning content experience.

3.5.2 Questionnaire Quiz Development

The one key reason for the development of the questionnaire quiz was to identify factors that affect the implementation of mobile learning in Jordan by evaluating differences between a developing country (Jordan) and a more developed country (UK). Each questionnaire quiz was developed by deriving questions from the five lectures uploaded to the website of each university. The participating students were asked to answer the quiz questions after reading the uploaded lectures. For this study, close-ended questions were given preference over open-ended as close-ended provide stable feedback in comparison with the outcomes attained from the open-ended questionnaire. The first quiz was based on the lecture of cybercrime and was comprised of 25 questions.

The second quiz was composed of 21 questions and based on a lecture on business and technology. The next quiz was on system development and comprised of 21 questions. The total number of questions in the fourth quiz was 19 and based on the knowledge management lecture. The last quiz was designed on green IT by containing 17 questions.

3.5.3 Questionnaire Development for Mobile Learning Content Experience

Alongside five lecture-based quizzes, one questionnaire was developed about the mobile learning content experience, which was a mixture of close-ended and open-ended questions by using the Likert scale. The purpose of the questionnaire on mobile learning content experience was to find out the students' experiences regarding the mobile learning activity/mobile learning content. There were ten questions in the survey, out of which five were open-ended and the rest were close-ended. The focus of the questions was on knowing the experience of the mobile learning content, for instance, one of the questions was: "Did you find any problem in using the application? If yes can you please identify?" This activity is dependent on the mobile learning content. The detailed questionnaire is attached in the appendix.

The questionnaire survey with the students of the University of Jordan is connected with one of the main components of the conceptual framework, which is limitations, and through this questionnaire survey the limitations of mobile learning technology were highlighted by the students with the help of the questions developed in this survey. For example, the responses obtained against the question, “What do you think are the key problems for the execution of mobile learning?” are helpful in finding out the limitations for the execution of mobile learning in Jordan.

Likewise, the question, “Can you list the factors that relate to better application of mobile learning?” helps to obtain data regarding the capabilities of mobile learning technology, which is the second main component of the conceptual framework. In the same way, the objective of examining the capabilities and limitations of using telecommunication technology for learning in Jordan is achieved by conducting this questionnaire survey. For example, the questions, such as “Did you find any problem in using the mobile learning content? If yes can you please identify?”, “What do you think are the key problems for the implementation of mobile learning?” and “Can you list down factors that relate to better application of mobile learning?” help when gathering data about the capabilities and limitations of mobile technologies that can facilitate or hinder the learning process.

3.5.4 Focus Group

One of the principal instruments of this study for data collection was the focus group, which is a type of comprehensive interview carried out in a group, whose meetings show features defined with regard to the plan, range, composition and interview processes (Martin and Ertzberger, 2013). One of the reasons for the focus group at Aston University and the University of Jordan was to interact inside the focus group in order to develop a higher education learning module using mobile learning application web-based content that was taught to students in the UK and Jordan for comparative analysis of limitations of technology. In addition to this, the selection of a focus group for the data collection was made as each participant has the power to influence the discussion through his answers, as the result of which there were more chances of obtaining pertinent and thorough data that is required for the study.

Two sets of focus groups were conducted with the first year students of IT studying in a second semester at Aston University and two at the University of Jordan. The role of mediator during a discussion with the focus group was played by the teacher, according to Sandelowski (2010), who stated that the mediator excites conversation with remarks or subjects. The elemental data gained by this method were the transcriptions of the group debates together with the suggestions and explanations of the teacher.

Besides other reasons, one significant reason for the selection of a focus group as a data collection instrument was the involvement of a certain group of people so that their experience and ideas regarding the mobile learning could be examined. As Henwood (2014) stated, the choice of focus group is especially suitable when the target is to know and recognise thoroughly how a selected group of people takes an experience, proposal or incident, for the reason that the debate in the focus group meetings is useful in providing data regarding what a certain group of people considers, or how they undergo, or in which way they perform.

The collection of pertinent data in the qualitative form was another reason for the selection of this tool. Though qualitative data could also be obtained through interviews, interviews were not selected because they are not characterised with discussion or involvement of the participants' experience and ideas are not as influential as they are in the case of a focus group. Therefore, a focus group was preferred over interviews for the collection of pertinent data.

The focus group was conducted to obtain the objective of identifying factors that influence the execution of mobile learning in Jordanian higher education by evaluating differences between Jordan's higher education institutions and the UK's higher education institutions. For instance, the question such as "Do you think mobile learning will become successful if implemented in Jordan?" provides data about the factors influencing the mobile learning execution. Another question which is discussed was regarding whether mobile features matter or not, which also provides factors for the effective implantation of mobile learning.

The focus group questions were also related to the conceptual framework as through the questions the capabilities of mobile learning technology were explored. Alongside, the limitations of the mobile learning technology were also highlighted through the questions asked to the selected students. Likewise, the question, such as "What have been the challenges that

might be connected with the mobile learning in the region of Jordan?” which provide data with respect to the limitations of mobile learning technologies in Jordan.

3.5.5 Sampling

The sample size was composed of the university students in Jordan and Aston University. It was expected that almost 150–200 students from the University of Jordan would participate but in reality the number of students who attempted the quiz did not reach the expected limit, which shows low interest and a lack of taking things seriously among students regarding taking part in the uploaded quiz and lectures on the university website.

The expected amount of participants in the case of Aston University was 180 but the received response was more than the expectation i.e. more than the limit of 300 for the quiz on knowledge management. The sampling was done on a convenience sampling technique as the participants were selected considering the convenience of access, which is used by various researchers for sampling. For example, Gile and Handcock (2010) conducted their study by using the convenience sampling technique. I was able to access the University of Jordan as I used to study there and good students have a close relationship with the IT faculty staff who helped me get permission to upload lectures and the questionnaire on the university website for the sake of obtaining data for my research.

Likewise, I obtained permission for the uploading of lectures and the quiz at Aston University through my university supervisor. The students were free to make as many attempts as they wanted but the majority of participating students made only two attempts (details on attempts by participants are given in the analysis chapter).

3.6 Data Analysis Techniques

The data obtained through three activities were analysed by different techniques. For the analysis of data obtained through the quiz, a simple descriptive statistics percentage method along with the use of inbuilt Word doc tools, tables and graphs were used. Conversely, for the examination of data obtained through the questionnaire survey regarding mobile learning content experience, IBM SPSS 22.0 was used. The test for the data analysis was one sample Wilcoxon test and

median values, whereas for the analysis of data obtained through the focus group, a thematic analysis method was employed as the data obtained was qualitative. The responses of the focus group participants were divided into themes after collecting and examining the raw data. Under each theme the responses of the participants were examined in light of pertinent literature.

3.6.1 Analysis Techniques for the Questionnaire Survey

The analysis of data attained through the questionnaire study was done by using IBM SPSS 22.0 and the following tests were run: Wilcoxon test, reliability test and Cronbach's alpha.

3.6.1.1 The Wilcoxon test

This is a non-parametric numerical hypothesis test used in order to contrast two connected samples, corresponding samples or recurring measurements on a distinct sample to evaluate if their population mean ranks diverge or not. This test was run because the nature of the collected data is non-parametric due to the use of a Likert scale. However, a t-test can also be used but it is not as suitable as the Wilcoxon test because by using a t-test the normality of the distribution of the obtained data cannot be guaranteed. This is the reason why the Wilcoxon test was preferred over a t-test.

The nature of different responses obtained from the participants is another main reason why the Wilcoxon test was run. As Fay and Proschan (2010) wrote, Wilcoxon is employed when contrasting two sets of responses from similar respondents. The Wilcoxon test has been employed by various academics for their research, for example, Simsek (2016) conducted a study by using the Wilcoxon test. Likewise, De Winter and Dodou (2010) posit that this test is suitable when the objective is to examine any change in responses from one individual to another individual, which are subjected to different conditions. Therefore, considering this, the Wilcoxon test was employed to examine the changes of responses of the participants in the questionnaire survey that was done with the students of the University of Jordan.

3.6.1.2 Procedure of one sample Wilcoxon signed rank test

The one sample Wilcoxon signed rank test was developed in 1945 by the statistician Frank Wilcoxon (Litchfield and Wilcoxon, 1949). This rank test was one of its kind and the first ‘nonparametric’ procedure developed. It is considered a nonparametric procedure, because the distribution of data is assumed to be unknown. The assumption, which is made while applying this test, is that the probability density function of the random variable is symmetric.

This test is used to test the median value of a sample by comparing it to the parameter value of θ . Then, upon taking a random sample X_1, X_2, \dots, X_n , we are interested in testing the null hypothesis.

The null and alternative hypotheses are given as follows:

H_0 : median (X) = θ where θ represents the value specified by user

Against any of the possible alternative hypotheses:

H_1 : median (X) $> \theta$ or H_1 : median (X) $< \theta$ or H_1 : median (X) $\neq \theta$

3.6.1.3 Mathematical calculations for computing the test statistics

Let $di = xi - \theta$, $D = \{di : |di| \neq 0\}$. The test statistic is the sum of positive ranks incorporating the frequency weights:

$$T = \sum_{i \in D} fi \text{ rank } (|di|; D, f) I(\text{sgn}(di) > 0)$$

The standardised test statistic is:

$$T_* = \frac{T - \mu_T}{\sigma_T}$$

Where:

$$\mu_T = \frac{1}{4} n_f (n_f + 1)$$

$$\sigma_T^2 = \frac{1}{24} n_f (n_f + 1) (2n_f + 1) - \frac{1}{48} \sum_{j=1}^M (t_{j,f}^3 - t_{j,f})$$

$$n_f = \sum_{i \in D} fi$$

Where M is the total number of distinct rank values of $|di| > 0$ and $t_{j,f}$ is the number of records tied at the j th distinct value, incorporating the frequency weights.

The asymptotic one-sided and two-sided p -values are:

$$P_1 = \Pr(Z \geq |T^*|) = 1 - \Phi(|T^*|)$$

$$P = 2P_1$$

$P_1 < \alpha$ rejects the null hypothesis in favour of median $(X) > \theta$ if $T^* > 0$ and in favour of median $(X) < \theta$ if $T^* < 0$.

3.6.1.4 Reliability test and Cronbach's alpha

For the data collected through the questionnaire survey, the internal consistency reliability test was run, which is one of the most generally employed reliability measures in applied situations. With the intention of running the interior constancy reliability test, Cronbach's alpha was used. One of the reasons for using the internal consistency reliability test was its ease in computation. One of the main reasons for using Cronbach's alpha was flexibility of adding a number of questions in the questionnaire survey. As Tavakol and Dennick (2011) state, the more the data collection instrument would be reliable when the number of items is increased. Therefore, to boost inner consistency reliability, the researcher included points in the questionnaire. Another reason for the use of Cronbach's alpha is the small sample size in the questionnaire survey, so the choice of the interior constancy dependability test by employing Cronbach's alpha was a suitable choice as Lund et al. (2010) wrote that internal reliability is appropriate with a small amount of data. The alpha coefficient calculated for ten items (questions measured multiple factors) is 0.706, showing the relatively high internal consistency of items. Hence, for the current research study, the data gathered was authentic; each question had strong internal consistency, which led the researcher in performing other statistical tests.

A coefficient alpha can create wrongly discarded or untrustworthiness for calculated results. In order to avoid this problem, the researchers initiated building an understanding with associated concepts of each question's homogeneity, internal consistency and uni-dimensionality. These factors help in the improvement of alpha (Tavakol and Dennick, 2011; Nunnally, 1978) (see table 7 in chapter 5).

3.7 Thematic Analysis to Analyse Data from Focus Group

To analyse the data obtained through the focus group, the technique of thematic analysis was employed, which is the most widely used flexible method to examine qualitative data swiftly and simply. There are various reasons for using a thematic technique but simplicity and ease were one of the main reasons why thematic analysis was used for analysing qualitative data obtained through the focus groups. Another reason for using thematic technique is the conversational nature of the data. As Vaismoradi et al. (2013) state, the thematic method is the most suitable technique to be used when examining the conversations of different participants as it reduces the time that is consumed to analyse different and detailed responses.

One of the principal reasons why this technique was preferred is the use of no particular resources as data obtained is examined easily by using a tally technique. Easy understanding of readers was also one main reason why the focus group data is examined through thematic analysis as Conaway and Wardrope (2010) stated that the results of thematic analysis can easily be understood by any kind of readers. The following steps constitute the thematic analysis for the data of the focus group.

The first step is coding, which includes the identification and categorisation of significant ideas in the responses obtained through the focus group. After categorisation of ideas, the tally technique was used to examine how many times each idea or concept was repeated as Vaismoradi et al. (2013) wrote that a tally is about counting the number of times each code appeared in a conversation. The second step is theme finding, which includes grouping of the selected ideas in common themes. After theme finding, each theme was reviewed twice to ensure that all are pertinent. The last step is writing up in which each theme was elucidated in light of responses and the review of the pertinent literature.

3.8 Hypothesis Development

Four hypotheses were developed from the research objectives. The first hypothesis was:

H1: Students in Jordan are keen on using mobile learning for higher education.

This hypothesis was derived from the third objective, which is to examine capabilities and limitations of telecommunication technology for learning in Jordan. For the attainment of this

target, a questionnaire survey was done with the learners of the University of Jordan. The responses received through this survey were then examined to accept or reject this hypothesis.

The second hypothesis is:

H2: Mobile learning technology is positively associated with higher education.

This was developed from the objective, which is to understand the scope and limitation of mobile learning technology and their application for mobile learning as published in the literature. The pertinent literature is gathered and reviewed in order to achieve this objective and in light of this the literature examination of the second hypothesis was developed to determine whether mobile learning technology is positively associated with higher education or not.

The third hypothesis is:

H3: Using mobile learning for higher education does not require considerable technology limitations.

This hypothesis was derived from the objective, which is to identify factors that affect the implementation of mobile learning in Jordanian higher education by evaluating differences between Jordan's higher education institutes and the UK's higher education institutes. This objective was attained by conducting a focus group in Aston University and the University of Jordan, and the analysis of focus group results provided material for the acceptance or rejection of this hypothesis.

The last hypothesis is:

H4: There are no barriers to mobile learning in Jordan for higher education.

This hypothesis was derived from the objective, which is to adapt mobile learning content for the Jordanian and UK students according to the capabilities and limitations of available mobile learning technology and to achieve this objective data is obtained through mobile learning content activity. This analysis also helped in accepting or rejecting the aforementioned hypothesis.

3.9 Implicit Constructs in Hypothesis

H01: Students in Jordan are not keen on using mobile learning for higher education.

H1: Students in Jordan are keen on using mobile learning for higher education.

The interest of the students of the University of Jordan in mobile learning is an implicit construct in the alternative hypothesis, which was tested by collecting data through the questionnaire survey with the learners of the University of Jordan. The reason for the execution of this survey was to discover the students' experience regarding the mobile learning content. This survey was not conducted at Aston University due to the presence of advanced technology for the high-quality mobile learning content.

H02: Mobile learning technology is not positively associated with higher education.

H2: Mobile learning technology is positively associated with higher education.

The benefits of mobile technology to higher education students are an implicit construct in this hypothesis and the data for this was collected through the questionnaire survey.

H03: Using mobile learning for higher education does not require considerable technology limitations.

H3: Using mobile learning for higher education requires considerable technology limitations.

A technology limitation for the employment of mobile learning in higher education is an implicit construct in this hypothesis and the data to test this hypothesis was gathered through the focus group.

H04: There are barriers to mobile learning in Jordan for higher education.

H4: There are no barriers to mobile learning in Jordan for higher education.

Challenges with respect to mobile learning are an implicit construct. The data for this was collected through the focus group. The distraction element of mobile devices can be one of the main challenges for the use of mobile learning in higher studies. In addition, lack of installation facilities alongside limited battery issues might also appear to be main challenges in this context.

3.10 Relation of Data Collection Methods with the Research Objectives

In this sub-section, the selected data collection methods were elucidated with each research objective, which revealed the appropriateness of the selected method for the research objectives. One of the research objectives is “to identify factors that affect the implementation of mobile learning in Jordanian higher education by evaluating the differences between Jordan’s higher education institutes and the UK’s higher education institutes”. The data about the variables influencing the implementation of mobile learning in the University of Jordan was obtained by conducting two sets of focus groups in each university, Aston University and the University of Jordan. The responses enabled the researcher to identify the factors affecting the execution of mobile learning.

Another research objective is to examine the capabilities and limitations of using telecommunication technology for learning in Jordan. The data for this objective was obtained by conducting a questionnaire survey with the students in the University of Jordan. Close-ended questions were asked about the restriction associated with the communication devices for learning purposes so that the students do not get distracted and focused data would be attained.

The third objective of adapting mobile learning content for the Jordanian and UK students, according to the capabilities and limitations of available mobile learning technology, was attained by conducting five quizzes on the designed lectures constituting the developed module. These quizzes also helped the researcher to modify the mobile learning content in the University of Jordan by examining the data on the technology restrictions in the University of Jordan. The fourth objective of understanding the scope and limitation of mobile learning technology and their application for mobile learning as published in literature was achieved by reviewing the pertinent literature obtained from online resources, such as journals, books and newspapers. Likewise, in order to achieve the last objective, which is to make recommendations resulting from the research to the relevant stakeholders, the data obtained through three activities, focus group, questionnaire survey and quiz, was analysed.

3.11 Percentage Analysis of Quiz Questionnaire

The data collected through the questionnaire quizzes was examined through the simple percentage analysis technique. One main reason for the selection of this technique was inconsistent responses of the participants and for this kind of inconsistent quantitative data, the simple percentage method is one of the most commonly and simply used techniques. Another

key reason for this choice was ease and swiftness in analysing accumulated data through different quizzes and simple percentage analysis is one of the most time saving and easy analysing techniques for the examination of a quantitative data. Likewise, the percentage analysis technique is also suitable for analysing the different responses of the participants against multiple queries or topics, as Rupert (2012) wrote that when the aim of the analyst is to discover different behaviours then simple percentages are made use of.

3.12 Ethical Considerations

Ethical considerations should be kept in mind in developing and designing the research including questionnaire design and survey conduction. A detailed research plan was sent to the university ethics committee for review, approval and guidance. The objective was to develop a methodology, which is consistent with the ethical requirements of the university, as the research requires a greater level of primary data. All the research was carried out according to the standards and requirements of the university guidelines. All the methods and processes, including the mobile learning content developed, was first formally approved by the university before students were approached. No steps or actions were taken until all the processes and steps had been reviewed by the ethical committee of the university. The students who participated in the learning exercise and who were part of the groups were briefed about the session and all efforts were made so that there was no risk or uncomfortable environment for the students. The students were asked for their consent considering the information used was in a third party research that did not directly associate itself with their views and was credited with optimal importance. Also, the students' names remain anonymous and only their contribution and views were subjected to the study.

The result made sure that the identities of all the participants were kept hidden and were not disclosed to anybody. The researcher made all possible arrangements so that the participants were provided with a safe and conducive environment. Similarly, the participation was voluntary and it was not forced onto anyone. The collected questionnaires were checked to make sure participants had filled them out properly and fully. Incomplete questionnaires were not selected for the analysis. Besides the above-mentioned issues, another main ethical issue was confidentiality of the responses of the respondents, which was handled by assigning codes to the

respondents. Moreover, no personal questions or identities were asked, either in the questionnaire survey or in the focus group. The second issue faced with respect to ethics is care while assessing the responses of the participants. This issue was dealt with by including all the responses of the participants without deleting or adding any extra information. The examiner did not add anything from his perspective and instead great care has been taken while assessing the responses.

3.13 Summary

This chapter critically reviewed theoretical elements for selecting and developing appropriate research approach for the study followed by research design. Various perspectives and approaches for the research were reviewed and accordingly a mixed approach was selected as it was the most suitable approach for the study in consideration of existing literature and in consideration of the research questions. The chapter also highlighted the hypotheses for the study and research design was developed which included mobile content development, questionnaire conduction and focus group. Based on data collection instruments, the Wilcoxon ranked test and thematic analysis were considered to be the most suitable approaches for analysis of the study. The next chapter will include analysis of the findings of the study.

4 Chapter 4: Data Analysis and Results

4.1 Introduction

The following chapter highlights how the data was to be collected from the respondents (IT students of the first year, second semester studying at Aston University and the University of Jordan). There are three data collection activities through which the required data was gathered and analysed. Online quiz activity was conducted for the students by uploading five lectures on the website with a quiz for the lecture with unlimited attempts. Questionnaires were distributed among the students of the University of Jordan. Moreover, the third section highlights the focus group discussion that was arranged in order to get the viewpoints of the respondents. In the subsequent sections, the data from Jordan and Aston is analysed by employing a reliability test and statistical results.

The chapter is divided into three main sections; findings pertaining to analysis activity for Jordan is discussed in the first section, followed by a section on Aston University, after that comparative analysis of findings of both Aston and Jordan have been presented to identify key themes that have been derived from the analysis activity for discussion in the next chapter.

4.1.1 Methods of Data Collection

The description of data collection and analysis is presented phase-wise below:

4.1.1.1 Online quiz activity

The activity was composed of uploading five lectures, namely cybercrime, business and technology, green IT, system development and knowledge management on the system for second semester IT students of the first year at Aston and Jordan universities separately. The data collected from the quizzes was analysed through percentage analysis. The simple percentage analysis was selected due to inconsistent responses of the participants as Rupert (2012) states that percentage analysis is used to examine different attitudes of the participants in the questionnaires. Along with lectures, five quizzes about the lectures were also uploaded to the systems of the respected universities. Five lectures were developed on the basis of material taught to the IT students regarding mobile learning. The students who were ready to attempt the

quizzes were required to read lectures and then in light of these lectures solve the quizzes. The students were permitted to make as many attempts as they wanted to solve the quiz, however, the students mostly made only one or two attempts.

4.1.1.2 Questionnaire for mobile learning experience in Jordan

Together with five quizzes, one questionnaire survey on experience regarding mobile learning content was conducted with the second semester first year IT students of the University of Jordan. The questionnaire was developed to review and understand student experience of mobile learning content. The questionnaire survey was conducted with the students of the University of Jordan. The reason for this survey was to find out about the students' experience regarding the mobile learning content activity. This survey was not conducted at Aston University due to the presence of advanced technology for the high-quality mobile learning content experience. The examination of data attained by means of the questionnaire survey was done through SPSS.

4.1.1.3 Focus group

Two sets of focus groups were setup with the second semester IT students of the first year at Aston University, as well as the University of Jordan. Focus group discussion is an effective way of observing the points of those people who have experienced something similar (Krueger and Casey, 2014). The focus group discussion was arranged for the present research in order to get the insights from the students' learning experience regarding limitations and capabilities of mobile learning. In order to conclude the findings, thematic analysis was carried out. Thematic analysis allows the researcher to emphasise and point out the important themes that were carried out through the focus group discussion. Clarke and Braun (2013) explained that the themes are those patterns that are important to explain the description of the research, and Saldana (2015) explained it as the coding done by skimming through the transcription of the focus group three times. The coding process included a careful reading of the transcript and making a tally of the most recurring themes. After reading the transcript for a considerable amount of time, codes have been developed and further reading would enable to fine-tuning and the making of meaningful themes of these codes. Later a tally sheet has been prepared that enables identification of

the frequencies of the relevant appearance of themes within the transcript. The selection of the finalised theme from the focus group is based on the maximum meaningful occurrence of the theme within the transcript. Therefore, themes have been selected with a maximum number of occurrences from the tally sheet, in line with the approach suggested by Saldana (2015).

The coding analysis highlights that in the case of Jordan, the screen resolution was the main problem. On the other hand, in the context of Aston, the quality of audio, video and picture was the main issue. Therefore, the focus group discussion revolved around these issues. The questions for the focus group were centred upon the consequences attained from the quizzes' data examination. The analysis of data obtained through the focus group was done by using the thematic analysis technique, which is one of the most commonly used methods to analyse qualitative data obtained through the interviews and focus groups. The findings conclude that the Jordanian students are facing a lack of technological resources, therefore, the performance of the mobile devices is one of the dominant hindrances in m-learning. On the other hand, the students are enjoying the modern technology but they still face issues in the quality of audio and video during m-learning.

4.2 Findings from Jordan

4.2.1 Quiz Conduction

Quizzes were uploaded on Jordan University's website based on five lectures that the teacher taught during the course. Before critically evaluating the results obtained against each quiz, the brief summary of a number of students and their attempts against each quiz is elucidated in the table below:

S No	Cybercrime	Business and technology	Green IT	System development	Knowledge management
Number of participants	124	143	118	135	134

Table 1: Number of students who attempted quiz at the University of Jordan

The number of attempts each participant made varied from student to student. To show the number of attempts made by each participating student, the graphical tool is employed below:

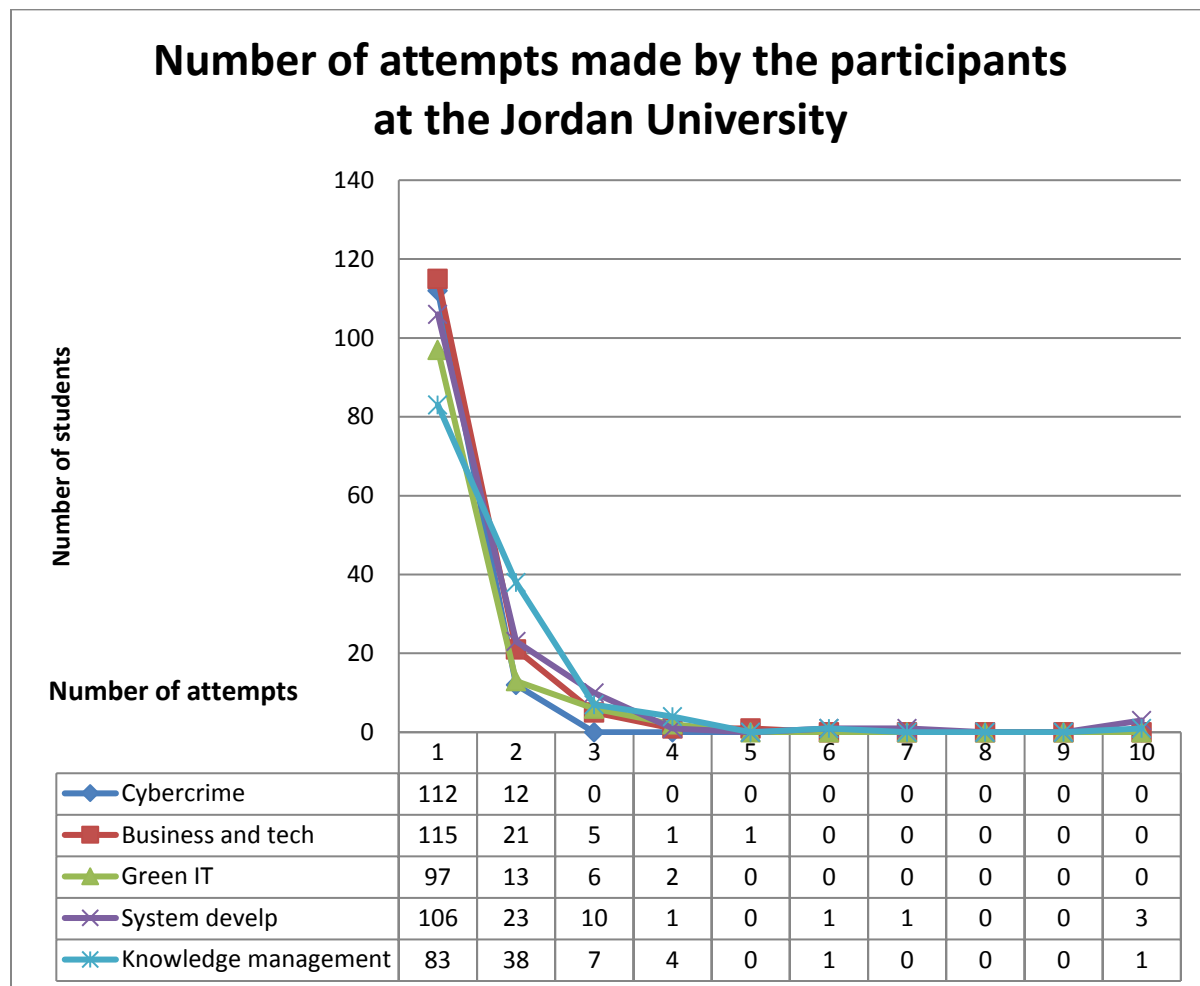


Figure 6: Number of attempts by students at University of Jordan

The table and graph clearly indicate that the maximum number of attempts made by the participants were ten times. Only three students made ten attempts while attempting the quiz on system development whereas only one student attempted the quiz of knowledge management ten times.

The majority of students attempted each quiz only once, for example, 115 students attempted the quiz on business and technology, whereas 106 students attempted the quiz on system development. Similarly, the maximum number of students who made attempts twice was 38 while attempting the quiz on knowledge management.

4.2.1.1 Cybercrime lecture

At the University of Jordan the first quiz was based on the cybercrime lecture and was comprised of 25 questions. The answers of 40 participants were completely correct but 25 participants gave an incomplete quiz submission, which means they submitted the quiz without attempting the open-ended questions. On the other hand, 59 participants submitted the partially filled quiz, which means they attempted open-ended questions but not correctly.

Cybercrime quiz	Completely correct submission	Partially filled quiz submission	Incomplete quiz submission
124	40	59	25
In %	32%	48%	4%

Table 2: Number of quizzes submitted at University of Jordan

The quiz was designed by the following elements, namely understanding of cybercrime, its elements, issues pertaining to safety and design, and information security approach. The number of close-ended and open-ended questions in the quiz on cybercrime is shown in the graph below:

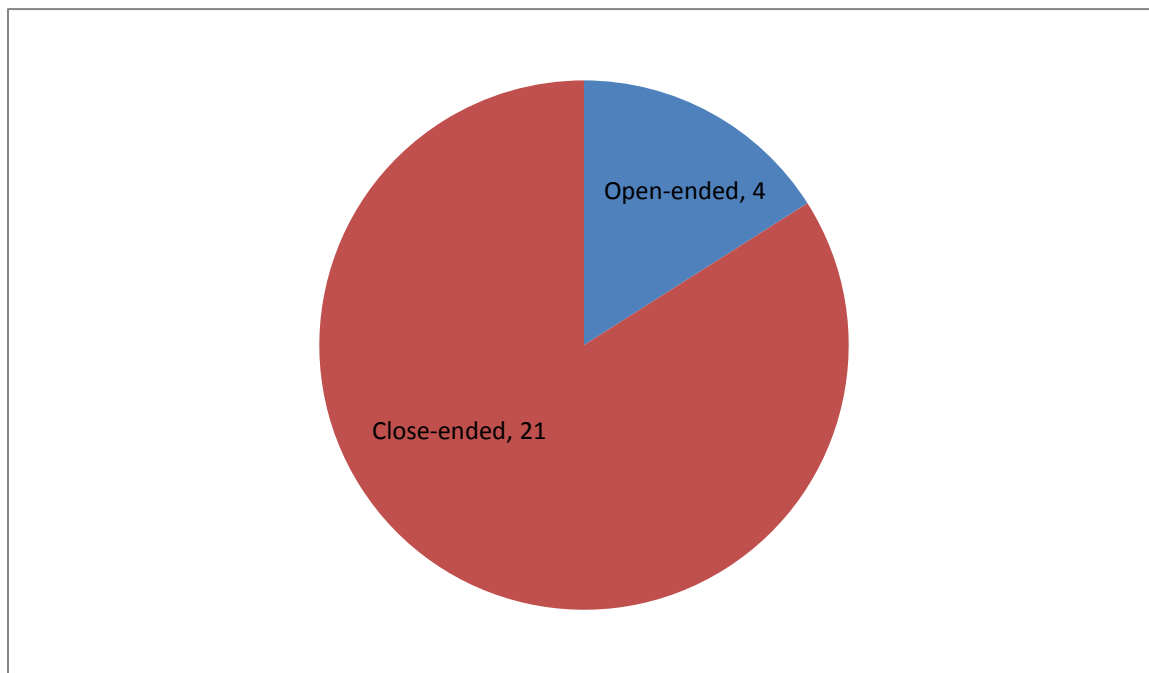


Figure 7: Distribution of questions on cybercrime at University of Jordan

Considering the convenience of students and in order to be as non-timeconsuming as possible, the number of close-ended questions was more than the open-ended questions. The results obtained revealed that only 45 participants were aware of the concept of cybercrime and its elements as they defined cybercrime as an act of making use of the internet and computers for stealing the data of programs – as Moore (2011) stated, cybercrimes are damaging activities carried out through a computer or the internet. However, the 45 participants who gave correct answers regarding cybercrime clearly mentioned the tools i.e. computer or the internet through which cybercrimes are committed, which speaks of a clear understanding of these participants regarding the cybercrime concept.

The results showed that 40 participants were aware of the information security concept as they define it as an exercise for shielding data from illegal access. However, no participant mentioned the name of any institution using information security application or practices, which explains lack of knowledge of participants about real-life examples of information security. No participant clearly stated that the bottom-down approach is a grass roots security effort for system safety made with the support of technical personnel, as Lagazio et al. (2014) referred to the bottom-down approach in their book that it is that kind of approach, which is adopted by system administrators at small level for making developments in their system.

Regarding the experience of this activity of online quiz and lecture, 50 participants mentioned their experience about this activity of online quiz and lecture as good, whereas 50 participants stated no idea, whilst the rest of the participants (24) stated that they did not attend all the lectures.

4.2.1.2 Business and technology

The number of students who attempted the quiz on business and technology was 143, out of which 40 gave completely correct answers, whereas 84 gave a combination of incorrect and correct answers as shown in the table below:

Business and technology quiz	Completely correct submission	Partially filled quiz submission	Incomplete quiz submission
------------------------------	-------------------------------	----------------------------------	----------------------------

143	35	73	35
In %	24%	51%	24%

Table 3: The number of submissions at University of Jordan

The number of students attempting this quiz was 143, which was more than the participants attempting the previous quiz on cybercrime (124). However, the number of completely correct submissions was 35, which was less than the number of the previous quiz (40), whilst on the other side, the number of partially filled submissions was 73, which was more than the previous quiz (59). In the same vein, incomplete quiz submissions in this quiz were 35, which was more than the previous quiz (25). The number of close-ended and open-ended questions in the second quiz is displayed below:

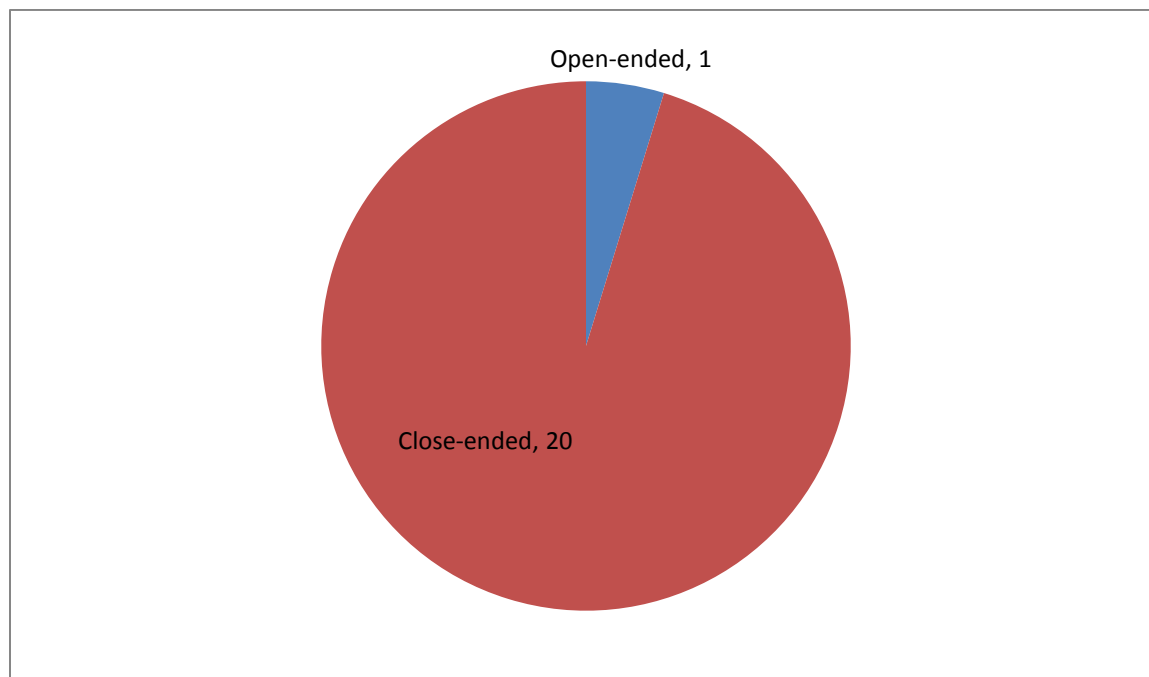


Figure 8: The distribution of questions

The quiz questions were developed to evaluate the participants' understanding of use and usefulness of technology in the business arena. The results obtained through this quiz clearly indicated that the students were fully aware of the significance of technology for business activities as all participants mentioned that the use of technology is essential in the business arena for increased productivity levels. This was quite in line with the literature as Melville

(2010) stated that advancements in information and technology have changed the business activities and are done by facilitating the employment of information systems as instruments of doing work instead of merely investigatory and monitoring tools.

The participants' responses upon asking about their experience with respect to this quiz is displayed in the bar chart below:

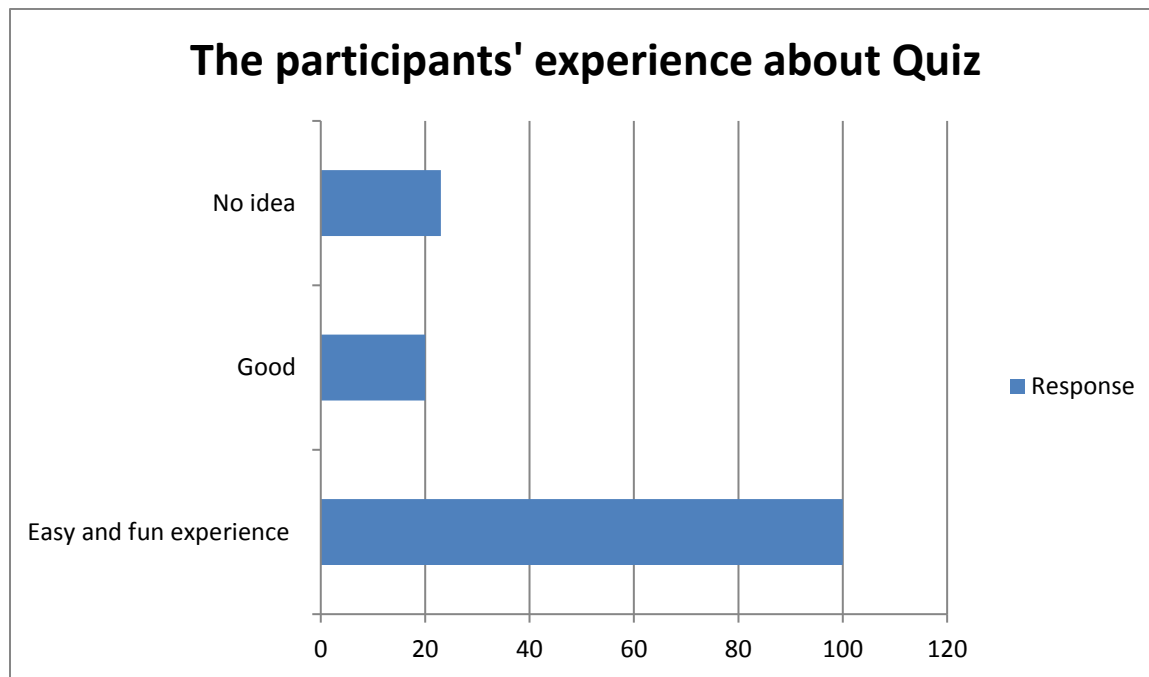


Figure 9: The Jordanian students' experiences regarding business and technology quiz

Fifty-five percent of participants opined that the idea of a virtual value chain can improve the efficiency of value chain activities, which is also supported by the literature as Fawcett and Waller (2014) stated that quite a great number of companies, for instance, Dell, has attained considerable success by connecting their distribution and retail activities with the virtual value chain technologies.

4.2.1.3 System development quiz

The number of participants who attempted the third quiz was more than the quiz on cybercrime but less than the participants who attempted the second quiz on business and technology. Conversely, the number of completely correct submissions was 30, which was less than the correct submissions of the first and second quizzes (40 and 35 respectively) whilst the number of

partially filled quiz submissions was 85, which was more than the quizzes on cybercrime and business and IT (59 and 73 respectively). But the number of incomplete quiz submissions was 20, which was less than the quiz on cybercrime (25) and the quiz on business and IT (35).

System development quiz	Completely correct submission	Partially filled quiz submission	Incomplete quiz submission
135	30	85	20
In %	22%	63%	15%

Table 4: The number of submissions at University of Jordan

The quiz was developed to examine the understanding of participating students regarding business requirements for information technology and their application to the business activities. The results obtained indicated that the majority of 120 participant students clearly mentioned that business efficiency is improved and accelerated with the use of a good and efficient information design system. The participants were aware of the system development life cycle as 100 participating students correctly answered the 13th question, which was regarding the abbreviation of the system development life cycle (SDLC) but only 30 students correctly answered the 14th question, which was regarding the number of steps involved in the system development life cycle, which indicated that the students did not read the given lecture carefully. However, the majority of participating students understood the significance and meaning of the planning phase in the system development life cycle as 75 students mentioned that planning includes the development of a sophisticated plan of the future project together with the determination of targets of the projects. This was supported by the pertinent literature review as Heijungs et al. (2010) stated that the planning phase of the system development life cycle includes the determination of the project feasibility, which means whether the project is capable of proceeding or not.

The response of the participants with regard to the quiz experience is displayed below:

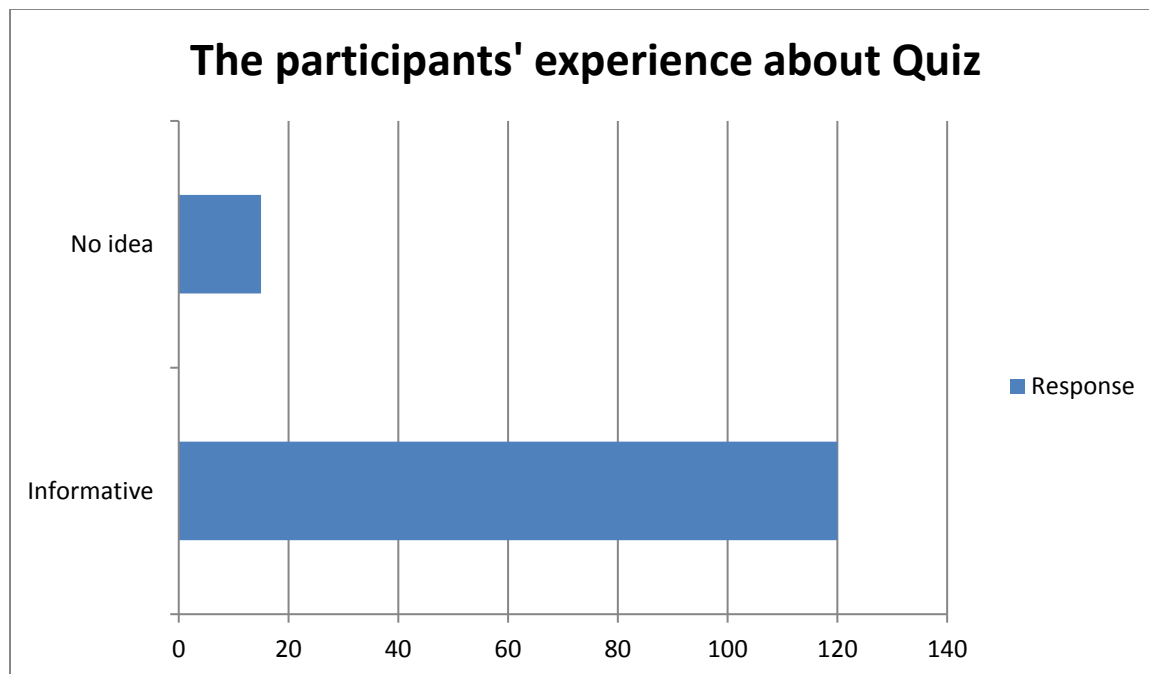


Figure 10: The participants' experience at University of Jordan

The results indicated that the students who attempted the quiz found this exercise useful.

The number of open-ended and close-ended questions in the third quiz is displayed in the pie chart below:

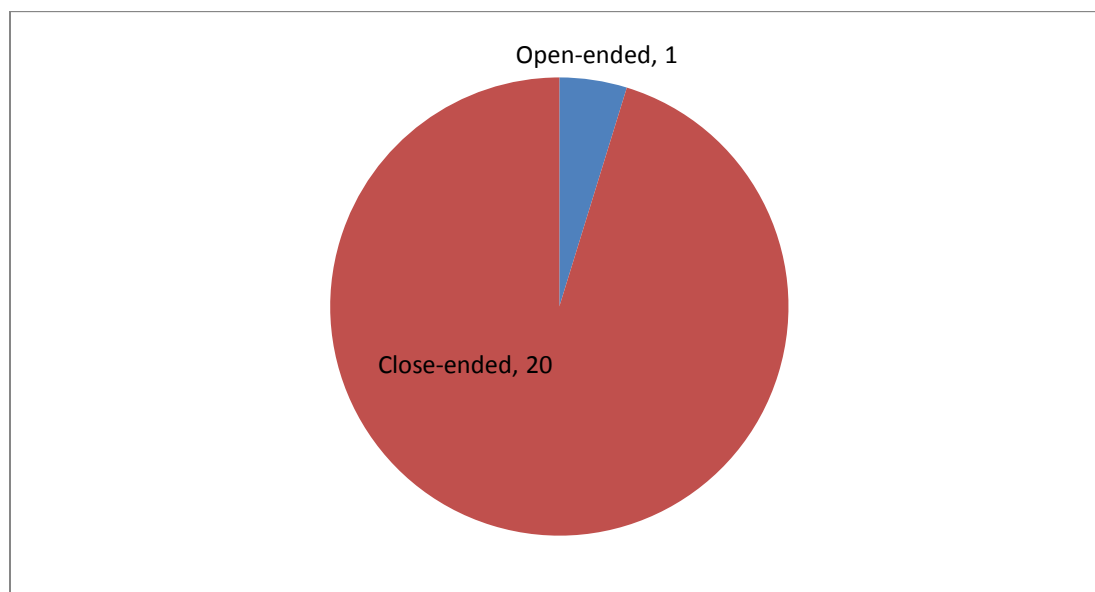


Figure 11: The distribution of questions

4.2.1.4 Knowledge management

The total number of the University of Jordan students who attempted the fourth quiz on knowledge management was 134, which was more than the students who attempted the quiz on cybercrime but less than the students who attempted the quiz on business and technology and system development (143 and 135 respectively).

Knowledge management quiz	Completely correct submission	Partially filled quiz submission	Incomplete quiz submission
134	35	67	32
In %	26%	50%	24%

Table 5: The number of submissions at the University of Jordan

From the responses received, it was found the participants were aware of the significance of knowledge management in business activities as the majority of 60 participants mentioned that knowledge management not only provides prospects for the employees to exchange knowledge but also to brainstorm ideas and develop new methods. Moreover, the responses also showed that the participants recognised the significance of management for knowledge development in companies as 57 participating students clearly mentioned the necessity of managerial support for the development of a knowledge management culture in organisations. This is backed up by the literature where Liebowitz and Frank (2010) wrote that the concept of a knowledge crew was introduced by Nonaka and Takeuchi (1995) in order to refer to the managerial personnel in charge of the classification, promotion and development of knowledge inside business organisations. The participants also recognise the significance of training and socialisation at the workplace for knowledge transferring in the organisation as 55 participants stated that both training and socialising is important in this respect whilst 40 participants recognised only the significance of training in this connection. This is supported by the literature as Serenko et al. (2010) wrote that knowledge management places emphasis on recruiting, retaining and training of intellectual organisational assets, which is composed of knowledge personnel.

The response of the participants regarding the quiz experience is displayed below:

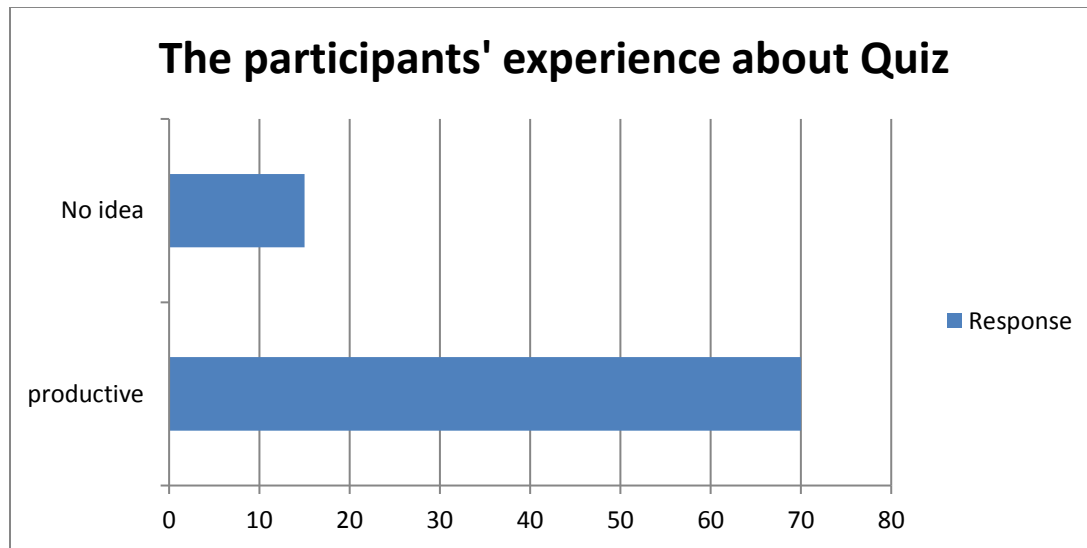


Figure 12: The University of Jordan participants' experience

The results show that the majority found the quiz informative.

4.2.1.5 Green IT

The pattern of the quiz was exactly the same as the previous quizzes but the number of participants who attempted this quiz at the University of Jordan was far less (118) than the participants who attempted the previous quizzes. Out of 118, 25 were completely correct submissions whereas 35 were incomplete quiz submissions and 58 were partially filled. The quiz was developed to examine the participants' understanding regarding recycling needs, green IT and e-waste together with identification of the limitations of IT waste.

Green IT quiz	Completely correct submission	Partially filled quiz submission	Incomplete quiz submission
118	25	58	35
In %	21%	49%	30%

Table 6: The number of submissions at the University of Jordan

The results obtained showed that most of the participants (30) were aware of the concept of IT waste as they described e-waste as surplus electrical or electronic tools. However, the results also

indicated the fact that students filled in the quizzes carelessly and without reading the lecture in depth as only 25 students were able to answer the fifth question correctly, which was to choose the option that was not a function of Green IT. One of the findings from this quiz was participants' awareness regarding the power efficiency of computing devices as 40 participants mentioned that LCDs are more power efficient than CRTs. This question could be answered correctly even by those participants who did not attend the lecture but have knowledge about devices of information and technology.

The participants' responses to this quiz are displayed in the graph below:

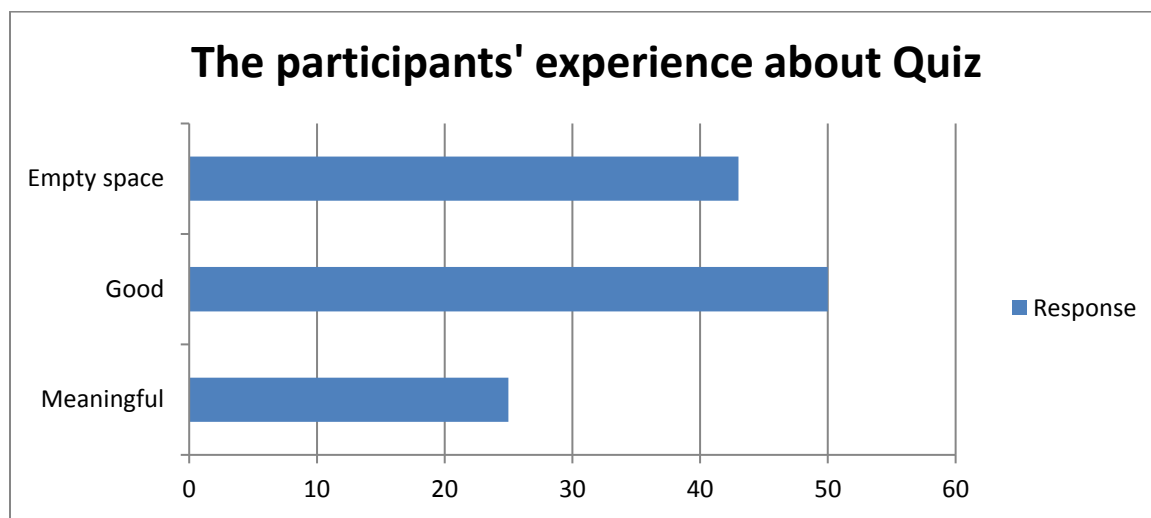


Figure 13: The participants' experiences at the University of Jordan

The results revealed that the participants found the experience healthy, concisely stating the overall experience of conducting this exercise remained positive as the participation rate in all five quizzes was more than 100, which is, although not equal to the expectation (as the expectation was of 200 or more), quite reasonable and acceptable.

4.2.2 Questionnaire Survey with Jordanian Students

As mentioned by Aron et al. (2013), there are two types of data: inferential statistics and the descriptive statistic. The inferential statistics refer to predicting the result of the population based on the sample that is taken from the population. On the other hand, in the view of Simer (2015), descriptive statistics utilise the data in order to represent the description of the data empirically and through tables and charts. In the context of the present research, the concept of descriptive statistics has been utilised in order to explore the objectives of the research.

4.2.2.1 Introduction of the questionnaire

The questionnaire is considered as the most important research instrument that strives to explore the research objectives via stating the particular questions (Zohrabi, 2013). The questionnaire is used to collect the required data from the relevant sample of the population. In the context of the present research, related to the limitations and capabilities of mobile learning, the data was collected from the students of the University of Jordan by distributing the questionnaires among them. The questionnaire was based on the questions that are comprised of a total of four open-ended and six close-ended statements. The aim of the questionnaire was to find out the experience of the students at the University of Jordan regarding the content of mobile learning activity. From the University of Jordan, 156 respondents provided the answers to the questions. During the survey, it was observed that there were more males than females because traditionally, there are more males who study IT than females in Jordan, which explains the preponderance of males in the survey. The questions are related to the available quality and effectiveness of mobile learning in Jordan.

The following analysis seeks to understand mobile learning and its application and also to identify factors that affect the implementation of mobile learning in Jordanian higher education by evaluating the differences between Jordan's higher education institutes and the UK's higher education institutes. Moreover, this analysis of data also satisfies another objective, which is to adopt mobile learning content for the Jordanian and UK students according to the capabilities and limitations of available mobile learning technology.

The survey was conducted with the students of the University of Jordan. The reason for the execution of this survey was to explain and understand the students' experiences regarding the mobile learning content at the University of Jordan. There were ten questions in the survey and the number of close-ended and open-ended questions is displayed in the graph below:

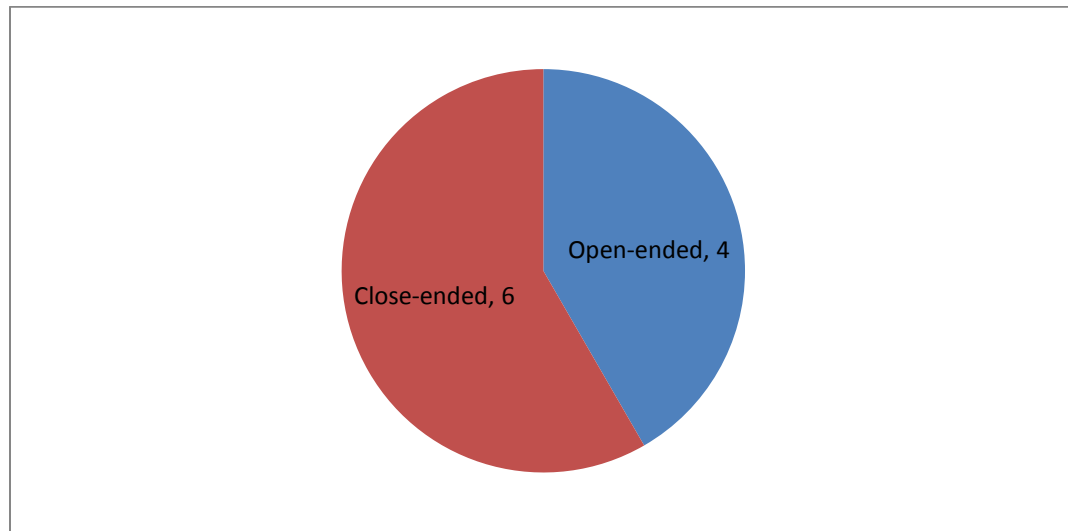


Figure 14: The distribution of questions

This survey was written by hand so it was also submitted by hand by the participants.

4.2.2.2 Reliability test

Reliability Statistics	
Cronbach's Alpha	N of Items
.706	10

Table 7: Reliability test

For the current research study phase, the questionnaire was comprised of a total of four open-ended and six close-ended questions. However, the nature of responses was such for the open-ended questions which required the participants to give a set of outputs and when the results were reviewed it was found that the results could be put into the categories of a five to seven scale and effectively reviewed accordingly.

From the test, it can be said that the reliability test has been conducted and the value of Cronbach's alpha is 0.706, which is greater than 0.50, which is the required standard

and Cronbach's alpha of less than 0.50 would require the analyst to perform the survey again to collect the data. Hence, for the current research study, the data gathered is authentic in line with studies of Nunnally (1978), which lead the researcher to perform other statistical tests, as consistency is evident by the value of Cronbach's alpha. The alpha coefficient calculated for ten items (questions measured multiple factors) is 0.706, showing the relatively high internal consistency of items. Hence, for the current research study, the data gathered is authentic; each question has strong internal consistency which leads the researcher to perform other statistical tests.

Coefficient alpha can create wrongly discarded or untrustworthiness for calculated results. In order to avoid this problem, the researchers initiated building an understanding of associated concepts of each question's homogeneity, internal consistency and uni-dimensionality. These factors help in the improvement of alpha (Tavakol and Dennick, 2011; Nunnally, 1978).

4.2.2.3 Statistical results

This part presents the data obtained from the questionnaire survey conducted at the University of Jordan and the results of each question are presented in a tabular form. The aim of the questionnaire was to find out the experience of the students at the University of Jordan regarding the content of mobile learning activity.

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	137	87.8	87.8	87.8
	Female	19	12.2	12.2	100.0
	Total	156	100.0	100.0	

Table 8: Statistics (Gender)

There were more males than females because traditionally, there are more males who study IT than females in Jordan, which explains the preponderance of males in the survey. The respondents of the study were asked to highlight their gender before contributing their views to the phenomenon under study. The results indicated that 137 male respondents have been made part of the research study. However, the remaining proportion of the respondents that have shared their views was female which constitutes a total of 19 respondents.

Do you think this way of teaching is helpful?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly agreed	32	20.5	20.5	20.5
Agreed	53	34.0	34.0	54.5
Disagree	56	35.9	35.9	90.4
Strongly Disagree	15	9.6	9.6	100.0
Total	156	100.0	100.0	

Table 9: Q1

The respondents were asked to highlight their views on whether they think the way of teaching being practised is helpful. The responses show that 54 percent of respondents agreed that teaching by using mobiles is a helpful way, whereas 45.5 percent disagreed with the statement, which shows that more than half of the respondents consider mobile learning as useful.

How would u rate the experience of working compared with classroom teaching?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Good	40	25.6	25.6	25.6
Good	44	28.2	28.2	53.8
Average	27	17.3	17.3	71.2
Bad	28	17.9	17.9	89.1
Very Bad	17	10.9	10.9	100.0
Total	156	100.0	100.0	

Table 10: Q2

Another question for which the target population has been surveyed is regarding how they would rate the experience of working compared with the classroom teaching. The responses of the participants indicated that the experience is very good, which has been supported by approximately 26 percent of the participants. Moreover, 28 percent exemplified that the experience is good. The majority of 54 percent found it good as compared to the classroom teaching. Some respondents – around 17 percent – explained that they rate the experience of working compared to the classroom teaching on average. The remaining reported that the experience was bad for them.

What do you think is the main beneficiary of mobile learning?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	University students	103	66.0	66.0	66.0
	Distant learning	20	12.8	12.8	78.8
	Physically challenged students	11	7.1	7.1	85.9
	Global universal platform	12	7.7	7.7	93.6
	Can open new opportunities of learning	9	5.8	5.8	99.4
	Not effective	1	.6	.6	100.0
	Total	156	100.0	100.0	

Table 11: Q3

In addition to this, the respondents were asked to shed light on the main beneficiary of mobile learning. A high proportion of the respondents were found to support the fact that the university students were the main beneficiary which is why 66 percent voted for this. Twelve percent stated that the main beneficiary is the distance learning; moreover, physically challenged students are also the main beneficiaries as this has been supported by around 7.1 percent of the respondents. The majority of the respondents thought that the mobile learning content is one of the best options for the university students.

Did you find any problem in using the mobile learning content? If yes can you please identify

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Problem at all	19	12.2	12.2	12.2
	Smooth running no glitches	10	6.4	6.4	18.6
	A little but Ok	35	22.4	22.4	41.0
	Couldn't load the lecture	35	22.4	22.4	63.5
	Problem with connectivity	57	36.5	36.5	100.0
	Total	156	100.0	100.0	

Table 12: Q4

One of the questions that was asked of the respondents of the study was regarding whether they find any problem in using the mobile learning content. The views indicated that 12 percent experienced no problem at all, 6 percent were of the view that it ran smoothly with no glitches, 22 percent explained that they have a little problem but they are okay with it. Twenty-

two percent highlighted that they couldnot load the lecture, 37 percent were of the view that they have a problem with connectivity. Many of the respondents highlighted that they have problems with the connectivity, which makes up a total of 37 percent. The problem is also in the difficulty of loading the lectures, which is likely to arise from the lower levels of connectivity. There is also a problem with the mobile learning content that is also associated with the internet being used.

What do you recommend to increase the learning experience?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Better internet connectivity	52	33.3	33.3	33.3
	Improved content	66	42.3	42.3	75.6
	Can be used as it is	38	24.4	24.4	100.0
	Total	156	100.0	100.0	

Table 13: Q5

The respondents of the study also contemplated the point of providing a recommendation regarding increasing the learning experience – around 33 percent recommended that better internet connectivity is one of the requirements, 42 percent also recommended that content needs to be improved, 24 percentstated that it can be used as no amendments are needed. The content being used in the mobile learning content is one of the prime concerns that are likely to be dealt with. The availability of the options and the information available, along with the content of these things, need to be improved.

How can this method of learning benefit students?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	It helps in learning about new technology	37	23.7	23.7	23.7
	It helps in gaining knowledge	61	39.1	39.1	62.8
	Access to the new and advanced way of doing things	58	37.2	37.2	100.0
	Total	156	100.0	100.0	

Table 14: Q6

The respondents of the study even considered how this method of learning benefits students – 24 percent were of the view that it helps in learning about new technology. Thirty-nine percent of the respondents explained that it helps in gaining knowledge. This explains that students want to learn themselves with the help of mobile learning content, as this offers them greater levels of connectivity. Moreover, 37 percent of the respondents explained that it helps in accessing the new and advanced way of doing things.

Do you think this method of learning can be used for comprehensive full time university education?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	47	30.1	30.1	30.1
No	57	36.5	36.5	66.7
Give Reasons for the Selection	52	33.3	33.3	100.0
Total	156	100.0	100.0	

Table 15: Q7

Thirty percent of the overall respondents explained that they think that this very method of learning can be used for comprehensive full-time university education. Similarly, it can be said that some of the respondents even disagreed with the fact which makes a total of 37 percent of the respondents. As 37 percent of the respondents disagreed with the fact that this method of learning cannot be used comprehensively in full-time university education, this is because they cannot fully rely on the use of mobile learning content for their learning as they need to consider the use of other sources, like books, libraries etc.

What according to you is the difference between this method of learning and normal learning process?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	It enables gathering in-depth information	40	25.6	25.6	25.6
	It is portable way of learning	44	28.2	28.2	53.8
	No accessibility issue	23	14.7	14.7	68.6
	More options are available as compared to normal learning	28	17.9	17.9	86.5
	Less time consuming as compared to normal learning	21	13.5	13.5	100.0
	Total	156	100.0	100.0	

Table 16: Q8

The respondents of the study were even asked to highlight their views towards what they think regarding the difference between this method of learning and the traditional learning process. The responses indicated that it enables gathering of in-depth information, as around 26 percent of the respondents supported this side of the statement. Moreover, 28 percent of the respondents believe that it is a portable way of learning, 15 percent elucidated that there has been no accessibility issue as well as more options being available compared to the normal learning which is why 18 percent of the respondents supported this very fact.

Can you list down factors that relate to better application of mobile learning?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Availability anytime and any place	42	26.9	26.9	26.9
	Perceived usefulness	50	32.1	32.1	59.0
	Portability	20	12.8	12.8	71.8
	Social influence	21	13.5	13.5	85.3
	More Options and features	23	14.7	14.7	100.0
	Total	156	100.0	100.0	

Table 17: Q9

The research participants were asked about the factors for the better application of mobile learning. A high proportion of the respondents highlighted that perceived usefulness can be one of the factors which is why 32 percent supported this very aspect; anytime and anyplace availability is one of the factors which is also contemplated by 27 percent of the respondents. Social influence is also highlighted as one of the factors which are supported by around 14 percent of the respondents. Lastly, around 14 percent of the respondents were of the view that they want more options and features.

What do you think are the key problems for implementation of mobile learning?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internet	47	30.1	30.1	30.1
	Infrastructure	45	28.8	28.8	59.0
	Devices	19	12.2	12.2	71.2
	Speed	18	11.5	11.5	82.7
	Awareness	27	17.3	17.3	100.0
	Total	156	100.0	100.0	

Table 18: Q10

Some of the key problems highlighted by the respondents of the study indicated that the most important problem for the implementation of mobile learning is the internet as it is supported by approximately 30 percent of the overall respondents. On the contrary, the infrastructure is also one of the problems as 29 percent were supporting this fact. The devices are also one of the problems– 12 percent supported this aspect. Moreover, speed is also an issue in the implementation of mobile learning as 12 percent supported this fact.

4.2.3 Thematic Analysis of Focus Group

Two sets of focus groups were conducted at Aston University. The thematic analysis is composed of three main parts: coding, themes and write-up. The focus group was conducted in two sessions as follows:

4.2.3.1 Participant demographics of Focus Group I – Jordan

Ten participants took part in the focus group:

Males	Females
7	3

Number of students	Age brackets
1	18–20
7	20–22
2	23–30

4.2.3.2 Participant demographics of Focus Group II – Jordan

Ten participants took part in the focus group:

Males	Females
5	5

Number of students	Age brackets
5	18–20
5	20–22

The thematic analysis was done to examine the data obtained by the focus group in Jordan. The thematic analysis of the focus group is composed of three stages: coding, creating themes and writing up.

4.2.3.3 Coding

The first step is coding, which was done by skimming through the transcription of the focus group, three times. The coding is shown below where the tally column shows the number of times code was repeated.

Codes	Tally
Shortcut learning way	//
Portable, adaptable and convenient way of learning	//// //// //// //// //// /
Quick and easy way of learning	//// //// //// //// //// /
Change in learning strategy	//
Type of distance learning	//// //// /
Installation issues	//
Negative and positive usages of mobiles	//
Mobile use for social media instead of learning activities	//// ///
Picture quality affects	//// //// //// //// ////

mobile learning	
Screen resolution issues	//// //// //// //// //
Problem in note-making	//// //
Availability of software for learning	///
Distraction due to calls and messages	//// //
Battery life	/
Editing is issue on mobile	/
Size, picture quality of mobile	//// //// //// //// ////
Application's diversity for reading long content	////
Size of keypad	////
Size of mobile	////
Reading application	//
Audio video quality issues	//// //// //// //// ////
Positive acceptance of	////

mobile learning	
Easy access to university/college database in Jordan and facilitate learning	////
Significant increase in learning opportunities	////
Encouragement for distance learners	////
Time saving learning	////
Successful for short learning time period	//
Shouldn't force but let them analyse its benefits	/
Encourage student by making it interactive	////
Use only in absence of laptop	////
Preferable for listening lectures not writing assignments	////
Use it for proofreading	////

Only use in emergency	////
Use mobile for learning often only	//
Good presentation	////
Easy to listen	///
Clear but not interactive	////
No impact	////
Presence of animations and pictures	////
Vague and unclear	////
Hard to understand main content	////
Interesting but small text wasn't readable	////
Without images the audio is useless	//
M-learning is the form of distance learning	//// //
Effective for	//// //

distance learners	
Lectures can be carried on mobile devices	////
For revision and memorising	////

Table 19: Coding

Table 20: Focus group coding for University of Jordan

4.2.3.4 Finding themes

The second step of the thematic analysis is theme finding, which is done by categorising codes as Dahan-Oliel et al. (2012) stated that finding themes is based on pattern identification or categorisation of data.

This write-up gives rich results obtained from the data collected through the focus group in Jordan. The final stage of thematic analysis of the focus group is writing up results under each theme where the responses of participants have been examined in light of pertinent literature.

Each theme against the hypothesis is displayed in tabular form below:

Themes of University in Jordan	Hypothesis	Acceptance and rejection of hypothesis with themes
Mobile learning explanation in terms of features of mobile devices	There are no barriers to mobile learning in Jordan for higher education	This hypothesis was rejected as some barriers were found for mobile learning in Jordan's higher education i.e. lack of technology and limited access of students to latest technology

		are key barriers in this connection
Appropriateness of images, voice, content and script in mobile learning	Using mobile learning for higher education requires considerable technology limitations	This hypothesis has been accepted because many technology limitations have to be considered while using mobile learning for higher education
The inability to prepare notes on mobiles restricts learning		
Social media and communicative activities restrict mobile learning		
Mobile screen affects learning through mobile		
Learning difficulties associated with mobile learning		
Introduction of new technology in mobiles facilitates learning	Mobile learning technology is positively associated with higher education	This hypothesis was accepted as the responses of the participants revealed that

		despite many learning difficulties the mobile learning technology facilitates higher education
Encouragement is required to attract students towards mobile learning	Students in Jordan are keen on using mobile learning for higher education	This hypothesis has been accepted as all participant students stated that the students in Jordan are interested in mobile learning and the education authorities and government should encourage students by providing them with more facilities

Table 21: Interview Themes

4.2.3.4.1 Mobile learning explanation in terms of features of mobile devices

The participants had different views about mobile learning in both focus group discussions in the University of Jordan. For B1, who was a male participant, mobile learning is a short-cut method of learning, and the same views were given by a male participant (M1) in the second set of focus group where he stated that it is a short-cut to learning as it extracts data from different channels. This is supported by the literature as Alzu'Bi and Hassan (2016) stated that mobile technologies facilitate learning by sending easy and simple text-based short lectures to mobile gadgets for review or a swift recap. On the other hand, the majority of participants, for instance, B2, B3, G8, M4, M3, M1 and M5 defined mobile learning as a portable, convenient, quick and easy learning method, as M3 stated that:

“From a student perspective, it is generally like a personal library. One can access information by not having to move physically”.

In the same vein, B2 in the first focus group revealed that:

“For me, this is the most convenient and portable way of learning”.

In this way, the participants defined mobile learning in terms of its characteristics, such as convenience, portability and ease of use, as Akbar (2016) wrote that the nature of mobility determines the conceptualisation of mobile learning, which may mean learning during travelling, sitting, working, etc. or it may mean hand and eye free learning and such interpretation affects the definition of mobile learning. Unlike this, some of the participants, such as B6 and M3, mentioned mobile learning as a change in learning strategy, as Alnabhan et al. (2012) discussed that the learners of tomorrow will be able to access a dynamically altering range of tools as well as services that will vary in speed, functioning and screening features. Barati and Zolhavarieh (2012) also pointed towards one of the aspects of mobile learning as being a changing learning strategy by stating that mobile learning technologies evidently back up the broadcasting and deliverance of rich multimedia material together with dialogues, communication and synchronous by making use of voice, text messages and multimedia.

Conversely, some of the participants, such as B1, B2, M1 and M3 define mobile learning in terms of distance learning, as B1 from the first focus group stated that:

“Mobile learning is the type of distance learning that is why I think it is the easiest way of learning”.

While in the same vein, M3 opined that:

“Distance learning is certainly one of the most important terms that are effectively used for the purpose of mobile learning”.

This aspect of mobile learning is mentioned by Keengwe (2014) in his book as he wrote that mobile technologies with their capacity produce varied learning frameworks with better conversation and communication which have huge potential to conquer the transactional remoteness divide that is intrinsically an ingredient of distance learning.

4.2.3.4.2 Social media and communicative activities restrict mobile learning

All participants envisaged a bright future for mobile learning in Jordan, but at the same time, different challenges were mentioned by the participants. Unlike the student participants, the teachers also mentioned installation issues and negative and positive usages of mobiles as one of the key challenges of mobile learning, as Blooshi and Ezziane (2013) mentioned that the

installation issues in mobile learning include management of all essential software instruments in a mechanical way from the group of devices included in the learning activities and communication between various nodes, such as mobile devices is still a problem to be resolved for the execution of an instantaneous interaction in learning activities.

The teacher and student participants both mentioned negative and positive usages of mobiles as key challenges of mobile learning, as B2 stated that:

“When I’m on my phone I never use it for a productive purpose I mainly use it for things like Whatsapp and Facebook and Twitter and all those social media apps and games so it basically distracts me”.

This is supported by Verhoeven et al. (2014) who state that one of the risks associated with mobile learning is a distraction as students are tempted more towards the entertainment channels, such as YouTube, and social media instead of concentrating on their lectures because the entertainment channels are available to them at zero or low cost. Installation complications, limited coverage of internet availability or expensive internet limit learning through mobile devices.

Learning through mobile devices was generally taken positively by the participants at the University of Jordan but the lack of IT infrastructure to facilitate installation of set-up for mobile learning was mentioned as one of the key hurdles in the way of effective mobile learning in Jordan. One of the participants stated:

“Installation of modules and set-ups for learning material for mobile learning requires big amount and expertise, which is not mostly available in the educational institutes in Jordan”.

The installation issue, as mentioned by the participants of the focus group, is also supported by the responses of the questionnaire survey regarding mobile learning content experience where 30 percent of participants mentioned the internet as one of the main factors hampering the implementation of mobile learning in Jordan, whereas 29 percent of respondents mentioned the lack of infrastructure as the obstacle in the way of carrying out mobile learning. In addition to this, the low response rate at the University of Jordan in quiz activity as compared to the quiz

activity at Aston University was also greatly due to lack of availability of supporting installation facilities to upload mobile learning content.

4.2.3.4.3 Introduction of new technology in mobile sets facilitates learning

The selection of a mobile device or another gadget depends upon its features and the main features mentioned by the participants and the teacher was portability, audio and video quality, screen resolution and availability of software for learning. One of the key findings from the focus group was the importance of mobile features in mobile learning, as Caballe et al. (2010) argued that diverse kinds of media have specific features due to which such media become more and less appropriate for the execution of some sorts of learning activities. According to all participating students, mobile features affect the learning procedure, as F1 stated that:

“I agree with you sir, that yes the quality is important like picture quality and other such feature”.

Regarding the varying features of mobiles, Godwin-Jones (2011) wrote that mobile devices come with the same hardware but their models are different, having varying capacities and attributes, so, the modules for mobile learning should be developed by considering the limits of the devices. The screen size appeared to be one of the key features that was given preference by all participants for mobile learning, which is supported by Terras and Ramsay (2012), who stated that mobile learning is facilitated by big screen mobiles as content display is clear on a big screen as compared to a small screen where learners need to spend more time on understanding the content.

Audio and video quality were also found to be key features in making mobile learning effective, as Caballe et al. (2010) argued that the presentation of the data is directly connected to the user-interface and the ability to show multimedia applications, as well as the quality of the pictures, audio, video, etc. is important. The participants’ responses are quite in line with this when F8 stated, after seeing a high-quality video clip, that:

“The presentation is indeed of excellent quality and it could be easily heard”.

Conversely, upon the display of low-quality video, all participants equally posit that low quality and vague videos or video affect learning and cause the distraction of learners, as B2 stated that:

“My selection of the gadgets will be based on the quality of the audio, picture quality as well as the portability”.

4.2.3.4.4 Learning difficulties associated with mobile learning

The incorporation of technology into education brings disruptions as well as prospects, as Alnabhan et al. (2012) stated that the challenges are higher when students are offered an omnipresent internet connection by the universities. Various difficulties attached to mobile learning were mentioned by the participants, and under this theme, these learning difficulties mentioned by the participants were reviewed in the light of pertinent literature. For mobile learning, the participants prefer laptops to tablets and mobile devices, as one of the participants during a casual discussion on mobile learning, stated that:

“It’s just everything you’re more into the work when you’re on a laptop than on your phone so I think a laptop would be better”.

Difficulty in reading was one of the few issues mentioned by the participants as it was said that:

“Reading a long document on the phone is not feasible”.

This reading issue was also pointed out by Mangen (2008) in her study which stated that physical agility is a problem due to the requirement for continuous scrolling, as the result of which psychological and physical distraction are caused and this makes written material retention a problem. Enforcing this point, Shuler (2009) mentioned that eye stress is the result of reading a large amount of different sized texts on the small screen of mobile learning.

4.2.3.4.5 Appropriateness of images, voice, content and script in mobile learning

Appropriate and relevant use of images was emphasised by all the participants, which was also mentioned by the participants at Aston University. The problem created due to the inappropriate or excessive use of images, as mentioned by one of the respondents (M4), was:

“I had been focusing on the image so much that it made it impossible for me to understand the concept”.

Though the participants mentioned the excessive use of images as an issue they supported the appropriate use of images while developing content for mobile learning. In the same vein, the voice quality, the quality of content and sizes of the content, especially text size, were mentioned

by the participants as decisive factors with respect to effective mobile learning implementation, which was quite similar to the responses obtained in the focus groups at Aston University.

4.2.3.4.6 The inability to prepare notes on mobile sets restricts learning

Note-making also appeared to be the main issue in mobile learning as it was stated that:

“With the help of mobile, you cannot make any notes”.

Soon (2011) also highlighted this issue by stating that writing skills are stigmatised due to excessive use of abbreviation and slang languages as complete sentence making is hard with small keypads of mobile devices. Supporting this view, Verhoeven et al. (2014) stated that mobile devices are very small and unfeasible for entering a huge quantity of text at once as this can be done rapidly with the help of a standard keyboard. Apart from this, difficulty in editing and writing on mobile devices is practically cumbersome as one of the students stated that:

“It takes too long for editing for the long documents via mobile”.

4.2.3.4.7 Mobile screen affects learning through mobile

One of the big challenges associated with mobile learning, as mentioned by the participants, was screen resolution issues, mentioned by the teacher as well as student participants, which further created issues while editing, proofreading and assignment-making, as M5 stated that:

“I would not prefer editing through mobile phones for editing. It takes relatively long time and wastes quite a long while for editing”.

Soon (2011) also mentioned that mobile learning is appropriate for quick bites of learning as such learning activities are easily compressed into less time and a smaller screen, unlike detailed and lengthy learning activities, such as editing and making notes, as F2 stated that:

“No, I don’t think that the notes should be prepared with the help of mobile phone, it is a small device which I don’t think will help more in preparing notes”.

As mentioned above, screen size was mentioned by all participants as the key risk with mobile learning, as Maniar et al. (2008) cited in their research that two fundamental explanations why size of screen is an issue are human optical view and attention as human visual perception limits the level of minute points they can notice which also influences their attention period. However, Cochrane (2010) argued that the type of media does not influence learning but learning is

influenced by the manner wherein the media is made use of, which means that learning centred upon videos will not essentially be more useful as it should be possible to develop a video or audio-centred application in a manner that aids a corresponding learning level. This is exactly in line with the statement of one of the participants (B1) that:

“In case of mobile phone, there is a lot of harm associated with it as the screen is smaller in size which might affect the eyesight”.

4.2.3.4.8 Encouragement is required to attract students towards mobile learning

The participants emphatically mentioned that mobile learning should not be enforced on students but students should be encouraged to avail this type of learning facility. The participants also stated that mobile learning is accepted positively by Jordanian people, as G8 stated that:

“In my point of view, the future of mobile learning in Jordan does sound to be highly effective, specifically for the individuals that are living in far flung areas and have no direct access to universities”.

One of the participants mentioned the urgent need for study due to exams being one of the determining factors for listening to lectures on a mobile, as in his words:

“Like once I travelled out of the city and I want to listen to the lecture as my exams were to be started after few days. So, I carried my lectures in my mobile phone and studied in my spare time”.

The future of mobile learning in Jordan was mentioned to be bright by all participants, alongside the teacher, as B1 stated that:

“Well, as far as the future of mobile learning is concerned, it can be said that the mobile learning in Jordan sounds an effective way for encouraging the learning for those that live at distance or to offer ease to the students”.

This positive acceptance of mobile learning is supported by the literature as the results of the study of Al-Zoubi et al. (2010) on mobile learning in Jordan mirrors the primary needs for effectual execution of mobile learning from the angle of cognitive science rather than technological development. While discussing the positive acceptance of mobile learning in Jordan, the participants mentioned online access to the university database and library as a fundamental reason behind the acceptance of mobile learning in developing countries.

4.3 Findings from Aston

4.3.1 Quiz Conduction

In the case of Aston University, the students were allowed to make as many as attempts as they liked for the quiz submission but the majority of the students made attempts only once or twice. The number of students who attempted the quiz at Aston University are shown below:

Serial No	Cybercrime	Business and technology	Green IT	System development	Knowledge management
Number of participants	148	211	150	180	324

Table 22: Number of students who attempted quiz at Aston University

The expected number of participants in the case of Aston University was 180 but the received response was more than the expectation; more than the limit of 300 for the quiz on knowledge management. The gender of participants in each quiz is shown in the table below:

Gender	Cybercrime (148)	Business and technology (211)	Green IT (150)	System development (180)	Knowledge management (324)
Male	83	103	76	91	182
Male participants number in %	57.8%	48.8%	50.6%	50.5%	56%
Female	65	108	74	89	142
Female participants number in	43.9%	51%	49%	49%	43.8%

%					
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Table 23: Gender participation in quiz at Aston University

The graph below shows the number of attempts made in each quiz by the students of Aston University:

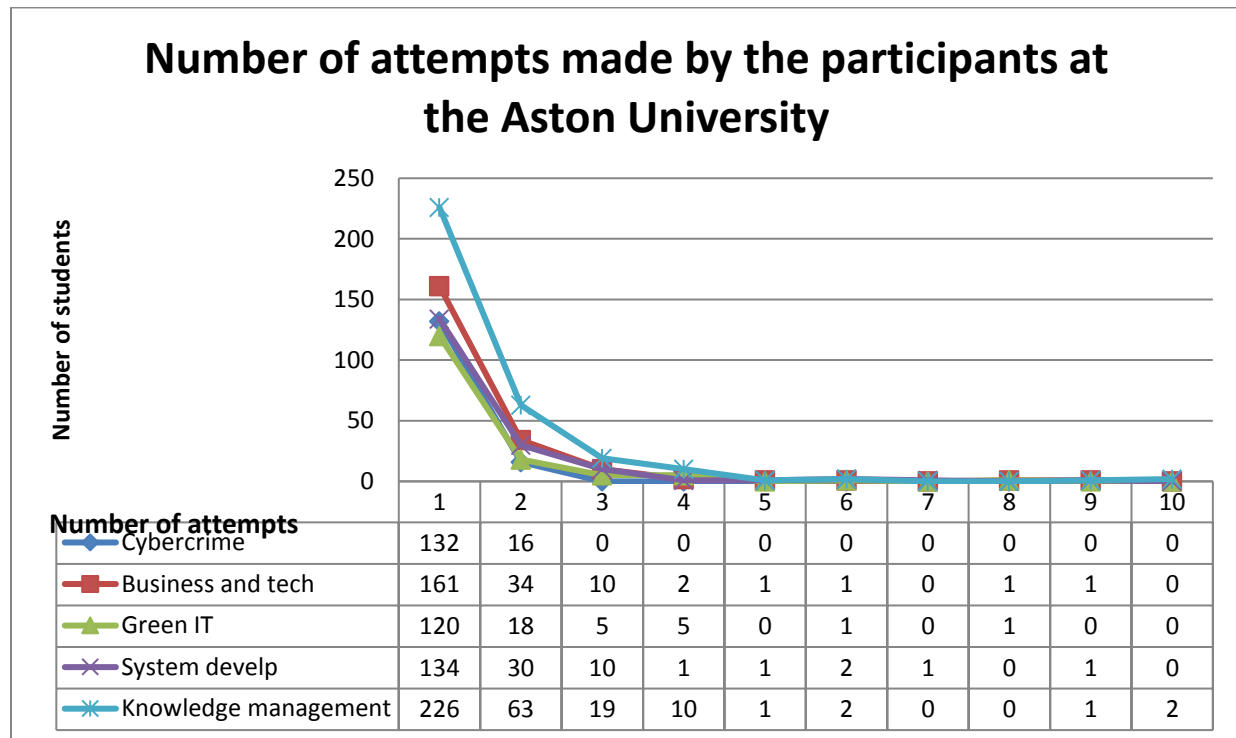


Figure 15: Number of attempts by students at Aston University

4.3.1.1 Cybercrime

The first quiz was based on the cybercrime lecture. The number of close-ended and open-ended questions is displayed below:

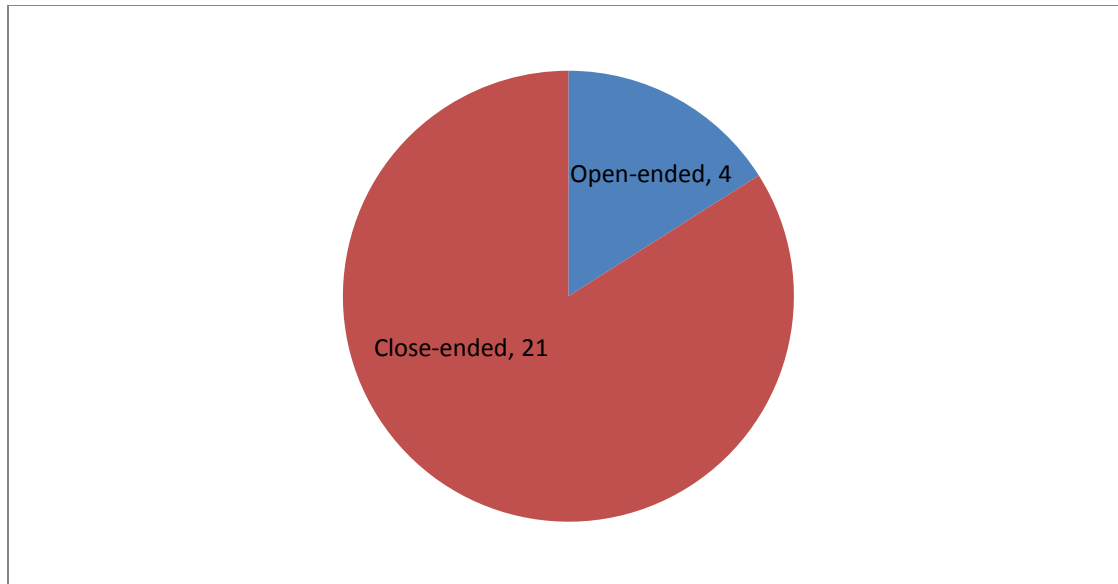


Figure 16: The distribution of questions about cybercrime at Aston University

The number of quizzes submitted at Aston University is shown below:

Cybercrime quiz	Completely correct submissions	Partially filled quiz submissions	Incomplete quiz submissions
148	100	38	10

Table 24: Number of quizzes submitted at Aston University

The results showed that the majority of participating students were quite aware of the concept of cybercrime, which was indicated by the fact that 130 participants correctly mentioned the current number of cybercrime sufferers present on the internet. The response of the participants regarding the quiz is displayed below:

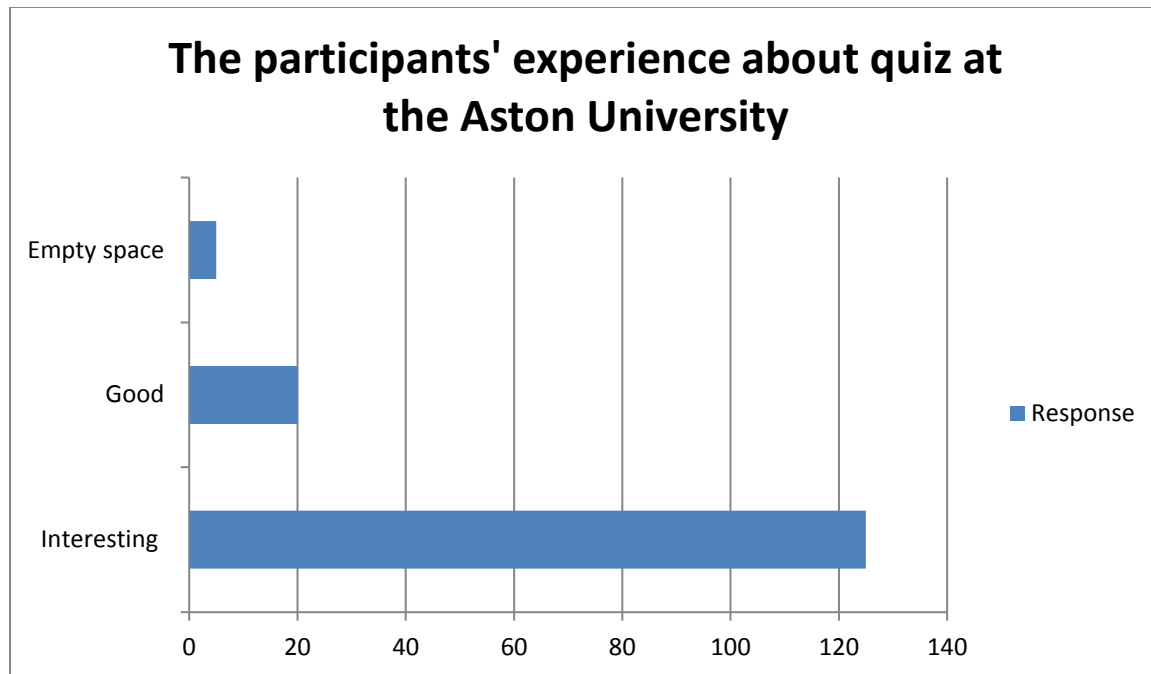


Figure 17: Participants' experience at Aston University

The response rate of the participants was positive regarding this quiz.

4.3.1.2 Business and technology

As can be seen from the data shown in the table below, the number of incomplete quiz submissions was only eight participants in the case of the quiz on business and technology, which, if compared with the results of the University of Jordan, was far less (35).

Business and technology quiz	Completely correct submissions	Partially filled quiz submissions	Incomplete quiz submissions
211	180	23	8
In %	85%	11%	4%

Table 25: The number of submissions at Aston University

4.3.1.3 System development

The quiz on system development was attempted by 180 participants at Aston University as shown below:

System development quiz	Completely correct submissions	Partially filled quiz submissions	Incomplete quiz submissions
180	150	25	5
In %	83%	14%	3%

Table 26: The number of submissions at Aston University

4.3.1.4 Knowledge management

The total number of close-ended and open-ended questions in this quiz is displayed in the graph below:

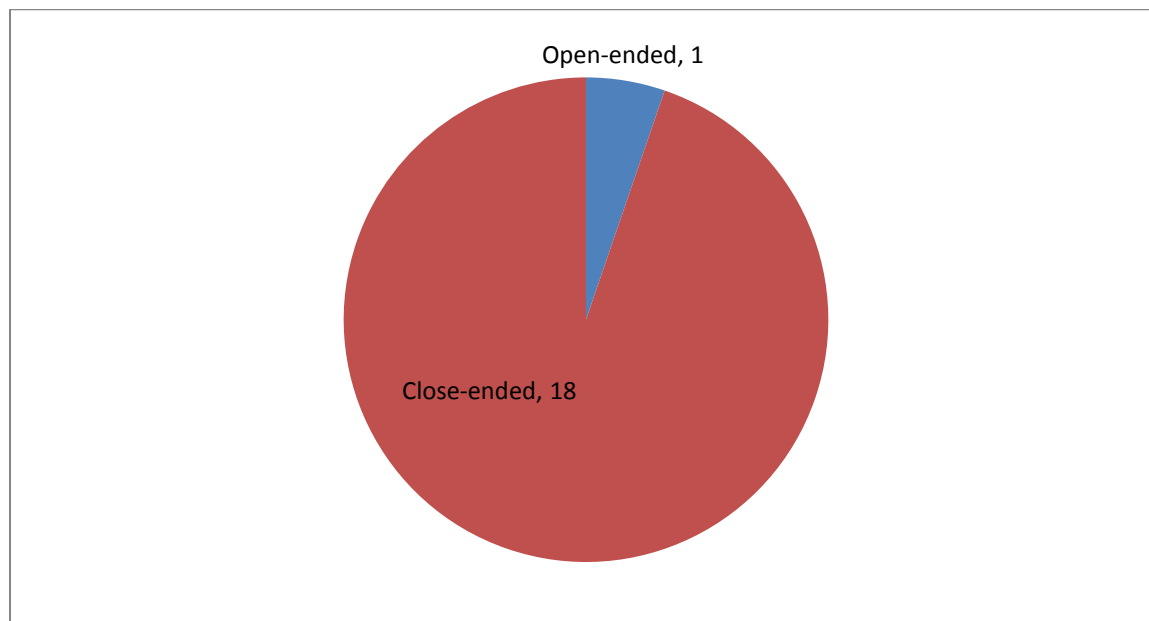


Figure 18: No of Questions

Figure 17: The distribution of questions

The questions were developed to examine the students' understanding regarding information and knowledge management and regarding the difference between information and knowledge

management. Moreover, the intention was also to examine the participants' understanding regarding the significance of managing knowledge workers in the business.

The number of students at Aston University who attempted this quiz was the highest than that of the previous quizzes, i.e. 324, which was not only more than the expectation of 180 but also very much higher than the number of University of Jordan participants, i.e. 134.

Knowledge management quiz	Completely correct submissions	Partially filled quiz submissions	Incomplete quiz submissions
324	295	27	2
In %	91%	8%	1%

Table 27: The number of submissions at Aston University

Like other quizzes, the participants found the quiz informative and interesting as the number of incomplete submissions was merely 1 percent in this quiz, pointing towards the interest and seriousness of students. The high number of completely correct quiz submissions mentioned the high importance of knowledge management among the students of Aston University.

4.3.1.5 Green IT

This was the last quiz designed on green IT which contained 17 questions. The number of close-ended and open-ended questions in this quiz is given below:

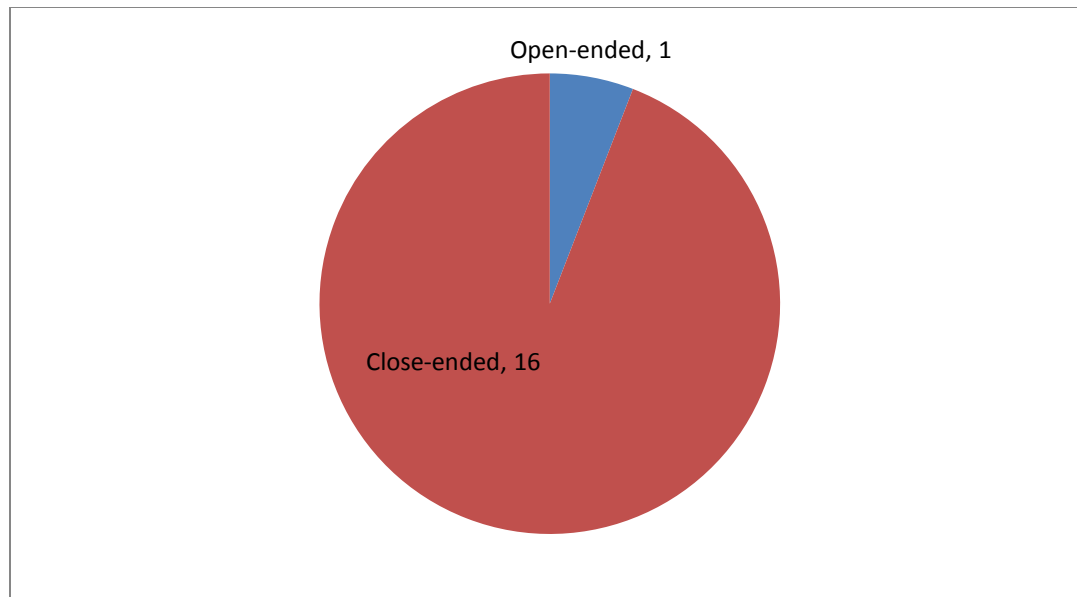


Figure 19: The distribution of questions

Like other quizzes, the number of participants (150) in this quiz was also more than the number of participants in case of the University of Jordan (118). Likewise, the number of completely correct submissions was 110, which was greater than 25 in the case of the University of Jordan. The number of incomplete submissions was only 5, which was also less than 35 (in the case of the University of Jordan).

Green IT quiz	Completely correct submissions	Partially filled quiz submissions	Incomplete quiz submissions
150	110	35	5
In %	73%	23%	3%

Table 28: The number of submissions at Aston University

4.3.2 Thematic Analysis of Focus Group

Two sets of focus groups were conducted at Aston University. The thematic analysis is composed of three main parts: coding, themes and write-up. The focus group was conducted in two sessions as described in the following sections.

4.3.2.1 Participant demographics of Focus Group I – Aston

Ten participants took part in the focus group:

Males	Females
6	4

Number of students	Age brackets
2	18–20
4	20–22
4	23–30

4.3.2.2 Participant demographics of Focus Group II – Aston University

Ten participants took part in the focus group:

Males	Females
3	6

Number of students	Age brackets
3	18–20
4	20–22
2	23–30

4.3.2.3 Coding

Coding is done by skimming through the qualitative data and taking out repetitive points. The coding provides a basis for identifying themes.

Codes	Tally
Portable, adaptable and convenient way of learning	////
Quick and easy way of learning	////
Mobile use for social media instead of learning activities	//// ////
Picture quality affects mobile learning	//// //// //// //// ////
Screen resolution issues	//// //// ////
Problem in note-making	//// /
Distraction due to calls and messages	//// ////
Battery life	////
Editing is an issue on mobiles	///
Size, the picture quality of mobile	///

Size of keypad	////
Size of mobile	////
Audio video quality issues	//// //// //// //// ////
Shouldn't force them but let them analyse its benefits	/
Encourage students by making it interactive	////
Preferable for listening to lectures, not writing assignments	////
Use mobiles for learning often only	//
Good presentation	////
Easy to listen to	
Clear but not interactive	////
No impact	////
Presence of animations and pictures	////

Vague and unclear	///
Hard to understand main content	///
Interesting but small text wasn't readable	///
Without images the audio is useless	//

Table 29: Aston University focus group coding

4.3.2.4 Themes

Themes are like main headings upon which the entire qualitative data is based. The themes that have been developed are elucidated and examined in the following section. When the participants were asked whether mobile learning should be enforced or not the respondents mentioned that instead of enforcing, the students were encouraged, as one of the respondents mentioned that:

“It is the difference between forcing and encouraging people to use it. Basically, it should be designed in a manner that makes it more interactive for users”.

Each theme against the hypothesis is displayed in tabular form below:

Themes of university in Aston	Hypothesis	Acceptance and rejection of hypothesis with themes
Mobile learning facilitates assistive learning	Mobile learning technology is positively associated with higher education	This hypothesis has been accepted as the analysis of the participants revealed that the students found mobile learning an assistive way of learning

Blurred video or audio is less interactive	Using mobile learning for higher education requires considerable technology limitations	This hypothesis has been accepted as the participants mentioned numerous technology limitations with respect to mobile learning
Image usage as a determining factor of mobile learning		
Size of audio/video as a determining factor of mobile learning		
Speaker's accent as a determining factor of mobile learning		
Lecture length restricts learning on mobiles		
Screen size restricts learning on mobiles		
Laptop is preferred to mobile device for mobile		

learning		
Mobile usage for learning is distractive		
Battery timing is a restrictive element in mobile learning		

4.3.2.4.1 Blurred video or audio is less interactive

Two sets of focus groups at Aston University were shown two different quality videos as audio/video is the best medium for mobile learning. Godwin-Jones (2011) stated that the mobile learning material in the form of audio, text, video, graphics, animation and multimedia help the learners to attain and to comprehend data more conveniently depending on the sensory memory of users. The second theme is extracted from the responses of the participants after watching and listening to different quality videos and audio. Regarding high-quality video, the respondents stated that the presentation of the video alongside clarity was good but the respondents did not find it interactive as one of them mentioned that:

“Well the slides were clear but I don’t like how interactive it is like consuming it too much in hand and sliding in and out, in and out”.

The respondents opined that the video was too full of information and data, which is why it loses its impact, as Wu et al. (2012) stated that learning material in video and audio formats for mobile learning needs uncomplicated material that circumvents overloading the student with data. Instead, the content should be focused on the particular learning result or target to guarantee that the material of the mobile learning course is engaging. Unlike high-quality video, when the low-quality video was shown to the participants they mutually opined that the video was unclear and confusing due to too much data and information. However, the participant’s complaint about the use of small text, which was hard to read, as Caballe et al. (2010) stated that big text size

should be used instead of small because the use of big font eliminates the need for zooming, which is hard on mobile devices due to the small screen. The participants stated that the quality was so low that they would have switched to another video if they had been watching the same video on YouTube. This shows that the learners were also distracted due to low-quality video in mobile learning so to improve the quality of the video small amounts of content should be used, as Godwin-Jones (2011) stated that bite-sized amounts of data, which is a transmission technique to mobile learning, may seem to be the best method of material deliverance. However, for You et al. (2010), although mobile device operators are making significant investments in the development of the variant mobile design to support video content, no such effort is being made by educational institutions to design videos in a mobile-friendly interface.

4.3.2.4.2 Mobile learning facilitates assistive learning

One of the themes derived from the analysis of responses obtained in the focus group at Aston University was that the mobile learning aids assistive learning as learning through mobiles supports the learning phenomenon, as one of the participants stated that:

“I usually use mobile learning for webinars and for downloading fixed documents as it is easy to access PowerPoint”.

Quite a large number of uses of mobiles for learning were mentioned by the participants in both sets of focus groups. One of the uses mentioned by the participants was greater involvement of learners in the learning procedure as it was stated that:

“Mobile learning is beneficial as it allows interactivity”.

Alnabhan et al.(2012) state that the student participation level is higher in the case of mobile learning due to the handheld property of mobile devices. Conversely, for some students their concentration level is low while using mobile devices for learning purposes. Portability and convenience were mentioned by the majority of students as the major uses of mobiles for learning purposes, as stated by the participants, was that they can carry lectures with them anywhere and listen whenever they feel it to be convenient, as mentioned by one of the participants that:

“Ease of access to a big deal like we could use easily you don’t need to sign up for anything you don’t need to do anything literally just put six digits in and do an interactive thing”.

In addition to this, the participants found learning through mobile helpful as mobile devices make them perform their learning activities, even while travelling. For example, one of the participants mentioned:

“If I am going home or I am on a flight or I have a train to catch, I will use it”.

4.3.2.4.3 Images used as a determining factor of mobile learning

The participants appreciated the use of images and pictures in video content, as You et al. (2010) stated that videos for mobile-based learning should be developed by using the maximum number of images and graphics instead of text. However, the participants also pointed out that excessive use of images did not allow them to concentrate on audio as one of the participants mentioned that:

“It was like that there were pictures or animation for everything because it was like looking at pictures rather than what he was saying”.

This perspective of the participant was in line with what Schreiber et al. (2010) stated, that while developing videos for mobile learning, the use of irrelevant or unnecessarily large images should be avoided so that learners cannot be distracted.

4.3.2.4.4 Size of audio/video as a determining factor of mobile learning

When the participants were asked what quality elements they see while selecting between high-quality video or low-quality video for mobile learning, the response was clarity; however, the teacher mentioned the video resolution as the key considering factor in this regard as high resolution video takes a long time to download, which is quite in line with what Wu et al. (2012) stated, that large audio clips reduce download speed, especially with slow internet connections, so the content developer needs to keep in mind the exchange between size of file together with the quality of the audio while choosing the compression set-up in audio software.

4.3.2.4.5 Speaker's accent as a determining factor of mobile learning

The participants also mentioned that the accent of the speaker in the audio/video is one of the quality determinants of video/audio as one of the respondents stated:

“I think it was quite clear but you still have to listen very carefully to focus on like it was still the same kind of clarity in the voice”.

For the participants, with a clear accent, the students do not have to struggle much to understand what the speaker is saying, which facilitates learning. However, the participants also stated that clarity of accent is required, which does not necessarily mean that the speaker must be well-known, even audio that is prepared with the accent of unknown speakers can be clear and easily understandable for the students. However, all participants were satisfied with the British accent.

4.3.2.4.6 Lecture length restricts learning through mobiles

The length of the lectures also appeared as one of the negative points associated with learning through mobile devices as one of the participants complained that large audio/video size eats up the battery of his mobile, as he stated:

“I hate like downloading stuff I don’t get battery life”.

Therefore, the length of the lectures developed for mobile devices needs to be small so that students do not have to face battery related issues. The issue of length due to limited device capacity is supported by the results obtained through the questionnaire survey for mobile learning content experience where 12 percent of participants mentioned the option of ‘devices’ as one of the issues restricting the implementation of mobile learning, which means limited capacity of devices for downloadable material hampers the execution of mobile learning, not only in developing countries, for example, Jordan, but also in the UK as well.

4.3.2.4.7 Screen size restricts learning on mobiles

A small screen was also mentioned by the participants as a big problem in mobile learning as it was stated that:

“The size of the screen is important, as it depends on the interface of the mobile learning content. The clarity of the application is defined with the help of screen size”.

The issue of a small screen with mobile learning is highlighted by Wu et al. (2012) who state that learning based on videos/audio is not essentially effective as it should be possible to plan a transcript or auditory-centred application in a manner that aids a corresponding level of learning. The results of the focus group indicated that screen size creates a problem for mobile learning, which was supported by the study of Maniar et al. (2008) where they concluded after the questionnaire survey that the size of the screen of a mobile device affects learning procedure

greatly as a mobile with a big screen gives more data through video in contrast to a mobile device with a small screen.

4.3.2.4.8 Laptop is preferred to mobile device for mobile learning

The students were asked, if they were given free Wi-Fi, then which device would they prefer to keep and in their response to this question all students mentioned the laptop as their preference to facilitate their learning. One of the key findings from the two sets of focus groups was that the laptop was preferred for learning purposes by the students more than tablets and mobiles as one of the students mentioned that:

“I don’t download lectures on a mobile phone, but yes, I do prefer laptop too because I can open various links at a time, at the same time reviewing my lecture”.

All students keep a laptop for assistance in their learning, however, only two students had tablets. However, no student had a desktop machine with him/her to use as a learning tool. This response is supported by the literature, as Chen and Denoyelles (2013), in their study, mentioned that although there is a drastic increase in the popularity of using mobile technologies for learning purposes, laptops are still preferred by the majority of students for the attainment of academic success, whereas tablets and mobile devices, smartphones etc., come in second position in the list of students’ preferences, which is increasing noticeably with the technological advancements. Unlike other responses, one of the participants was against mobile learning especially for accounting and computing, because he was unable to use computing tools on his mobile.

4.3.2.4.9 Mobile usage for learning is distracting

By skimming through the responses obtained through the two sets of focus groups in Aston University, distraction appeared to be one of the main issues attached to mobile learning as it was stated that:

“I think I spend a lot of time because it distracts a lot, as many people get distracted due to notification on the mobile phone regarding updates”.

The factor of distraction, as mentioned by the participants, is also highlighted in academic literature as Verhoeven et al. (2014) stated that mobile devices are deemed disturbing due to different issues, such as ringtones during lectures, multitasking alongside the camera facility

attached to phone devices, which may cause confidentiality problems. However, Blooshi and Ezziane (2013) stated that technology-driven disruption is an issue that cannot be ignored as an omnipresent mobile learning set-up becomes routine.

One of the reasons mentioned by the student participants for not preferring mobile phones for learning is the purpose of the mobile, which is to communicate instead of learn and learning activities, especially editing, are hard on mobile devices as the student participant stated that:

“Specifically no for editing via mobile as it takes long”.

According to the participants, working on a Word document is preferable and convenient on laptops rather than mobiles despite the fact that mobiles are more easily portable due to their weight and size. On the other hand, some of the student participants prefer mobiles only if they are good quality, which supports learning activities. Likewise, for some respondents, the laptop was distracting when used for learning purposes, whereas for others mobiles were distracting due to SMS and other communication applications. This is supported by literature, as Kearney et al. (2012) stated that the factor of distraction is the main apprehension which obstructs the learning process and distracts too many students, as the result of which, mobile devices are often banned during lectures.

4.3.2.4.10 Battery timing is a restrictive element in mobile learning

The short span of battery life appeared to be another big issue with mobile learning in both sets of focus groups, which is quite in line with the results obtained in the focus group at the University of Jordan. One of the participants at Aston University stated:

“Yeah yeah battery life is definitely one of the big disadvantages and then another one is the screen size like I just cannot imagine watching because when you’re just watching you won’t be able to understand the slides people watch that on a tablet or on a laptop, what’s the need to watch it on your phone?”

All participants unanimously mentioned limited battery life as the key issue attached to learning through mobiles, which is backed up by the findings from the reviewed literature where Berge and Muilenburg (2013) mentioned in their book that the battery needs to be monitored by the learners and teachers everyday in order to ensure that the device is charged considering the number of hours the mobile devices are used for.

However, the students also mentioned that because of battery issues they have to keep charging devices with them, which is not possible all the time. Regarding battery issues, one of the participants mentioned that the battery issue mainly appears when one has to download lectures or slides. Therefore, the participants supported the short size of lectures for learning through mobiles.

4.4 Critical Comparison of Findings

4.4.1 Quiz Conduction

In this part of the analysis, the findings from the execution of the same exercise of mobile learning content with the students of Aston University and the University of Jordan have been examined. The activity of uploading lectures to the websites of Aston and Jordan Universities alongside quizzes was done to develop a higher education learning module using mobile learning content that has been taught to students of the UK and Jordan for comparative analysis of limitations of technology.

The topics of the lectures and quizzes (cybercrime, business and technology, green IT, system development and knowledge management) were the same as were loaded on the website of the University of Jordan, but the only difference was made in the visual quality of the mobile learning content. The visual quality of the mobile learning content in the case of Aston University was fine than the mobile learning content uploaded on the website of the University of Jordan. This is so, because the quality of the internet and technology in Aston University was much higher than that in the University of Jordan.

The contents have been modified, keeping in view the technology limitations of both the countries, enabling identification of the broader aim of identifying appropriate measures for mobile learning within limited technology environments. This activity shows that the participants at Aston University showed more interest in the activity than the participants at the University of Jordan because the expected amount of participants in the case of Aston University was about 150–200 but the received response was more than the expectation, as more than 300 participants took the quiz on knowledge management. On the other hand, it was expected that almost 150–200 students would participate from the University of Jordan but in actuality the number of students who attempted the quiz did not reach the expected limit, which shows low interest and a lack of seriousness among students regarding taking part in the uploaded quiz and lectures on the website of the University of Jordan.

Data obtained through quizzes at Aston University and the University of Jordan have been presented in such a way that makes it easier to compare the mobile learning content experience of both the UK and Jordan. Comparative participation in both quiz activities is as follows:

	Number of participants	
Serial No	Jordan	Aston
Cybercrime	124	148
Business and technology	143	211
Green IT	118	150
System development	135	180
Knowledge management	134	324

Findings

Aston students made a higher number of attempts than in the case of the University of Jordan to get a completely correct quiz. Moreover, the majority of the students made second attempts, similar to the case of the University of Jordan. The participants were free to make as many attempts as they liked in the quiz activity. The above table, therefore, concludes that there is a wide difference between the number of quiz responses between the students of the two universities. The drastic fall in the number of attempts in the case of the University of Jordan might be for two reasons: the non-seriousness of students in the quiz activity and the low quality of the mobile learning content. On the other hand, in the case of Aston University, the responses were quite good in numbers in comparison to the University of Jordan. The main reason for this good response is the availability of modern technology that allows students to have high-quality pictures, videos and audio in their mobile phones.

4.4.1.1 Cybercrime quiz

In order to get an idea about the mobile learning experience of the students of the University of Jordan and Aston University, a few online quizzes were made from the lectures. The first quiz was developed from the lecture about 'cybercrime'. The number of participants who correctly

answered the questions about cybercrime in the case of the University of Jordan was only 40, which was far less than 130. This indicated the involvement of the participants of Aston University in contrast to the University of Jordan. One of the reasons for less involvement from the students of the University of Jordan was the low quality of the mobile technology provided. As discussed by Khaddage et al. (2015), the quality of pictures and HD video significantly enhanced the interest of the students regarding m-learning. Participants' concepts regarding the bottom-up and bottom-down approaches in context to security were not found to be very clear in the Jordanian students because the participants gave very vague statements as they mentioned that the bottom-up approach is taken by the administrative authority for safety improvements of the systems whilst the security steps taken by top-level managerial staff is a top-down approach.

4.4.1.2 Business and technology quiz

The second quiz was made from the other module topic, the business and technology lecture. The participants at the University of Jordan did not attempt the quiz seriously, which is indicated by the fact that only 35 participants out of 143 correctly answered the 13th question, which was regarding the speed of the fastest computer in the world. The students were to attempt the quiz after examining the available lecture and despite this facilitation only 35 students attempted the question appropriately, clearly mirroring the non-seriousness of the participating students.

The results obtained showed that the majority of 170 participants of Aston University opined that technology is available at cheap rates today, which mirrors the reality that in developed countries technology is cheaper than technology in the developing countries as in the case of the University of Jordan quiz, where only 30 participants mentioned that technology is cheaply available today. In a similar context, Rekkedal and Dye (2007) highlighted that the advanced and less expensive technology is the reason for high levels of adoption behaviour of the students of Aston University regarding m-learning. This is supported by the literature, as Melville (2010) stated that access to technology is expensive in developing countries, which makes people reluctant to accept the technology.

4.4.1.3 System development quiz

The third quiz was prepared for the students from the system development chapter. When comparing the number of 180 at Aston University, with that of 135 participants in the case of the University of Jordan, then a clear difference can be examined. In the same line, the number of correct submissions was 150, which was far greater than that of 30 submissions at the University of Jordan. The amount of incomplete submissions in the case of Aston University was only 5, which was a lot less than the 20 submissions in the case of the University of Jordan. The reason for the incomplete submissions from the students of the University of Jordan may be the presence of weak mobile applications that were prepared especially for this quiz. In the view of Park et al. (2012), the response from the students to m-learning is highly dependent on the available quality of the technology. The participants of the University of Jordan, and the great majority of participants of Aston University (170) were well aware of the concept of the system development life cycle but at the same time they also correctly answered the 14th question on the number of phases involved in the system development life cycle, which in the case of the Jordanian participants was answered correctly by only 30 participants. This pointed towards the greater level of seriousness of the Aston University participants in contrast with the University of Jordan students.

4.4.1.4 Knowledge management quiz

By comparing the submissions of both universities a vast difference can be seen as a gap of almost 200 participants is found between both universities. Also, it is noted that 91 percent of Aston University participants filled in the complete quiz, however, only 26 percent of the University of Jordan participants were able to fill in the complete quiz. This could be due to various reasons, such as reluctance or inability to complete the whole quiz or a non-serious attitude. As discussed by Hou (2015), the availability of efficient technology allows the learner to fulfil their study task through m-learning. On the other hand, they may fail to complete the learning process due to the lack of good quality applications. However, from the responses gathered, it was determined that both universities' students understand the importance of management for knowledge development and placed great emphasis on training for workplace learning.

4.4.1.5 *Green IT quiz*

The last quiz was developed for the students of the University of Jordan and Aston University from the lecture of green IT. In both universities, the number of attempts at this quiz was less than the attempts of previous quizzes which shows that this area needs considerable development in both countries. The total number of submissions of the quiz was less than previous ones which show that even though students are aware of the green IT concept, they are still not familiar with various elements associated with it or do not have a correct understanding of it. According to Molla et al. (2008), the concept of green IT is quite new for the students of information technology. The concept of green IT is the combination of those initiatives that are taken in order to reduce carbon emissions.

4.4.2 Questionnaire Analysis

The results of the survey showed that a large majority –85 percent of participants – thought that mobile learning is an effective way of learning. The main problem that the students face during mobile learning activity is poor connectivity. However, the principal hurdle in the way of mobile implementation at the universities, according to the participants, was a lack of IT infrastructure and internet issues. The findings of the questionnaire have been critically analysed using the Wilcoxon signed rank test.

4.4.2.1 *Wilcoxon signed rank test*

The one-sample Wilcoxon signed rank test is used to compare the value of sample statistics. The rejection of the null hypotheses would indicate a positive response to certain questions and the acceptance of null hypotheses would represent a rather negative response generalised to the population in other cases.

4.4.2.2 *Hypotheses analysis*

The variables pertaining to individual hypotheses have been analysed and the results obtained from SPSS are provided as follows.

H0: Students in Jordan are not keen on using mobile learning for higher education

H1: Students in Jordan are keen on using mobile learning for higher education

The SPSS output is given below.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of What according to you is the difference between this method of learning and normal learning process? equals 2.000.	One-Sample Wilcoxon Signed Rank Test	.011	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

As the p -value is less than the level of significance, which is 5 percent, so the null hypothesis is rejected and the alternative hypothesis is accepted.

H0: Mobile learning technology is not positively associated with higher education

H2: Mobile learning technology is positively associated with higher education

This hypothesis can be tested based on the question regarding the perception of respondents regarding mobile learning at university level.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of Do you think this method of learning can be used for comprehensive full time university education? equals 1.000.	One-Sample Wilcoxon Signed Rank Test	.007	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The output given above shows the rejection of the null hypothesis, therefore the alternative hypothesis has been accepted. Secondly, another question can be used to verify this result and that is regarding the perception of respondents about who is the main beneficiary of mobile learning. The SPSS output of the Wilcoxon test for this variable is given as follows.

Hypothesis Test Summary			
	Null Hypothesis	Test	Sig. Decision
1	The median of What do you think is the main beneficiary of mobile learning? equals 6.000.	One-Sample Wilcoxon Signed Rank Test	.002 Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The hypothesis stands rejected, which means that the category of 'Not Effective' has been rejected as median and the categories representing students who retain their position indicating that the mobile learning is directly linked with the education.

H0: Using mobile learning for higher education requires considerable technology limitations

H3: Using mobile learning for higher education does not require considerable technology limitations

The median value of 1 is tested through the Wilcoxon test and the output is given below.

Hypothesis Test Summary			
	Null Hypothesis	Test	Sig. Decision
1	The median of What do you think are the key problems for implementation of mobile learning? equals 1.000.	One-Sample Wilcoxon Signed Rank Test	.083 Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

As indicated in the output above, the hypothesis that the median value is 1 is retained, which shows that the respondents are facing problems in the implementation of the mobile learning, especially internet related problems. This proves the hypothesis that using mobile learning for higher education requires considerable technology limitations. So we accept the null hypothesis and reject the alternative hypothesis.

H0: There are barriers to mobile learning in Jordan for higher education

H4: There are no barriers to mobile learning in Jordan for higher education

If the median value of 4 is generalised according to the Wilcoxon test, then we can conclude that there are barriers to mobile learning in Jordan for higher education; otherwise, no barriers to mobile learning exist in Jordan for higher education. The following output provides the results of the Wilcoxon test.

Hypothesis Test Summary			
	Null Hypothesis	Test	Sig. Decision
1	The median of How would u rate the experience of working compared with classroom teaching? equals 4.000.	One-Sample Wilcoxon Signed Rank Test	.063 Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The hypothesis that the median value is 4, representing a rating of 'Bad', cannot be rejected at 5 percent level of significance as the p -value is 0.063, which is greater than 5 percent, so according to the test results, we are confident in concluding that no barriers exist when it comes to mobile learning in Jordan for higher education.

4.4.3 Thematic Analysis

The thematic analysis of two sets of focus groups at Aston University and the thematic analysis of two sets of focus groups at the University of Jordan was conducted.

From the themes developed in both focus groups, significant themes developed and many themes overlapped with each other while some different themes also emerged.

Themes from Aston	Themes from Jordan
Mobile learning facilitates assistive learning	Mobile learning explanation in terms of features of mobile devices
Blurred video or audio is less interactive	Appropriateness of images, voice, content and script in mobile learning
Image usage as a determining factor of mobile learning	The difficulty of note preparation on mobile sets restricts learning
Size of audio/video as a determining factor of mobile learning	Social media and communicative activities restrict mobile learning
Speaker's accent as a determining factor of mobile learning	Mobile screen affects learning through mobiles
Lecture length restricts learning on mobiles	Learning difficulties associated with mobile learning
Screen size restricts learning on mobiles	Introduction of new technology in mobile sets facilitates learning
Laptop is preferred to mobile device for mobile learning	Encouragement is required to attract students towards mobile learning

Mobile usage for learning is distracting
Battery timing is a restrictive element in mobile learning

Table 30: Comparison of themes

From the table, similar themes are shown in the same colour, while themes have been shown without colour. The findings from the themes of focus groups suggest that there are some challenges associated with mobile learning, for example, reading long documents and editing on mobiles were found to be the key issues in this respect. The comparison of the themes from the focus group discussions from the respondents of the University of Jordan and the students of Aston University highlights various issues that are somewhat similar in both countries. The table mentions that students from both universities consider mobile learning to be the new approach of effective learning with a variety of benefits. On the other hand, there are various issues that are faced by the students of both countries such as the video quality, audio system, picture resolution and the size of the video and pictures. These features hold fundamental importance in order to provide effective learning opportunities by employing the concept of mobile learning. In line with this, the students from both universities indicate that the size of the screen is the key component in order to gain knowledge from m-learning. The small screen size discourages the students from adopting m-learning because learning from the small screen is a hassle for the students. Furthermore, students from both universities face the limitation of the difficulty of note preparation from the mobile phone devices. They also highlight that mobile phone devices distract them from their learning due to the presence of active social applications. The continuous notifications and messages distract the attention of the students from m-learning. Furthermore, the students of Aston University prefer to use laptops for distance learning rather than m-learning because mobile phones have the restriction of short battery life. On the other hand, the students from the University of Jordan think that students are required to be encouraged towards taking part in m-learning through the provision of better quality mobile phones with support features.

Despite the challenges, the future of mobile learning was seen as bright by the students at the University of Jordan. The themes from Aston University were a preference for a device for mobile learning, audio/video quality, issues with mobile learning and mobile users for learning purposes. On the other hand, the themes from the University of Jordan were defining mobile learning, mobile learning challenges and significance of mobile features in mobile learning and the future of mobile learning in Jordan.

4.4.4 Key Findings from the Analysis

The present research is all about mentioning the limitations that are faced by the higher education of the UK and Jordan in order to implement m-learning. Moreover, the research also discusses the capabilities of m-learning. Different types of data collection techniques were utilised to collect the required data. The data was collected from two phases: focus group discussion and online quiz conduction. First of all, the online quiz was prepared from the class lectures for the students of the University of Jordan. Moreover, the questionnaire survey was also conducted from the students of the University of Jordan. To empirically test the quantitative data, SPSS was utilised. The reliability test was conducted to check whether the data is reliable or not. Furthermore, the focus group discussion was arranged for the present research in order to get the insights from the students' learning experience regarding the limitations and capabilities of mobile learning. To analyse the findings from the focus group discussion, the thematic analysis is composed of three main parts: coding, themes and write-up. In the subsequent section, the quiz was conducted and the focus group discussion was arranged for the students of Aston University. After this, the critical comparison of findings rejects the null hypothesis and accepts the alternative hypotheses such as, mobile learning technology is positively associated with higher education and there are barriers in the way of implementation of the concept of m-learning. The next step after analysis is the derivation of themes from the three different activities that were done for this study, namely quiz conduction, questionnaire survey regarding mobile learning content experience and the focus group at two universities, i.e. Aston and Jordan. These themes have been critically discussed in detail in the next chapter, which is called the discussion chapter. The following themes are drawn upon:

4.4.4.1 Low interest of participants in the quiz activity

This theme was developed to display the low interest of the participants towards the quiz activity, which means that in this theme, an attempt has been made to elucidate how the participants responded to the quiz activity, for instance, whether the participants took the activity seriously or not and the attempts of the participants showed the seriousness of the participants. The students were allowed to make as many attempts as they liked to fill in the quizzes but the maximum number of attempts made by the participants was three, which shows the students did not take it very seriously.

Moreover, the turnout rate of the students to participate in the quiz activity also made this theme develop as this theme has revealed whether the expected rate of participation was equal to the real participation rate in the activity or not. So this theme is originated from the information regarding the participation level of the students. The development of this theme is significant because it reflects the students' attitudes and behaviour toward activity based on mobile learning. The activity helps us to understand whether students consider mobile learning as beneficial or not. Therefore, students' responsiveness to mobile learning quiz activity is a theme because it concisely describes the attitude and behaviour of student participants regarding mobile learning as one of the learning methods in higher education.

4.4.4.2 Screen size is a big concern attached to mobile learning

From the analysis of the responses in the three activities done for data collection, quiz conduction, questionnaire survey for mobile learning content experience and focus group conduction, the screen size was found to be one of the key issues attached to learning through mobile devices. The results obtained from the focus group at Aston University as well as the University of Jordan show that small screen size of mobile devices restricts the process of learning activities, such as reading and writing, especially of long documents, which is hard and tiresome with mobile devices.

4.4.4.3 Mobile learning is interactive as it engages students

This theme is developed to discuss that the participants consider mobile learning interactive as it engages many students at a time. Despite the fact that mobile learning is considered to be interactive by the participants, the participation level of students in the quiz activity at the University of Jordan was lower than expected.

4.4.4.4 Mobile learning is not supportive for writing and reading long documents

This was the first theme derived from the focus group done at Aston University. It comes from the analysis of the responses of the students regarding the preferred devices they use for mobile learning. This theme is chosen to be a theme because, during it, a discussion has been made on the results obtained by analysing the responses of the participants in three activities. It also helps the examiner to examine and compare the mobile learning issues mentioned by the students at Aston and Jordan universities.

4.4.4.5 Quality of audio/video makes students switch medium for learning from mobile to other devices

Low or poor quality audio/video made the participants lose interest in the mobile learning content and as a result of this they switched to another learning medium. In this theme, a discussion has been made on the results with respect to audio/video quality obtained through the focus group as well as quiz conduction, which is the inferior quality of audio/video due to which the interest of the participants in quiz activity at the University of Jordan was lower than the interest of the participants at Aston University.

4.4.4.6 Encouragement is required to attract students towards mobile learning

This theme is generated from the analysis of the responses of the participants regarding the use of mobiles for learning purposes. The participants insisted on the encouragement of students towards mobile learning instead of enforcing this method of learning.

4.4.4.7 Calls and social media use on mobiles distract learning through mobiles

Distraction was mentioned by the participants as one of the main issues why mobile learning is not usually preferred. This theme is developed to discuss the results obtained through three activities with respect to the element of distraction associated with learning through mobile devices. This could be the big reason for the low interest of students in the quiz activity because students are busy engaging in social media activities on their mobile handsets.

4.4.4.8 Device charging needs make learning restrictive through mobiles

This theme is developed to discuss the analysis of the responses of the participants with respect to challenges associated with mobile learning in three different activities. The charging issue can be one main reason for the low interest of students in the quiz activity as the participants in a focus group at both universities mentioned that charging issues hamper the mobile learning process.

4.4.4.9 Mobile learning promotes assistive learning

The last theme was originated from the analysis of the responses of the Jordanian students with respect to the uses mobile learning offers.

4.5 Chapter Summary

This chapter of data analysis and the result has mentioned that to explore the research objectives of the present study, the data were collected from three different techniques, i.e. quiz activity, questionnaire and focus group. First of all the quiz was conducted by the students of Jordan, the expected responses and interest of the students in the quiz activity was lower than at Aston. A key factor attributed to this could be the low scale of content in terms of video and audio quality that was presented at Jordan.

In addition, a questionnaire was conducted in Jordan. In order to empirically test the quantitative data, SPSS was utilised. Moreover, the focus group discussion was also arranged in order to get the insights regarding their experience about m-learning and the challenges they are facing. To

analyse the findings from the focus group discussion, the thematic analysis is composed of three main parts: coding, themes and write-up. In the subsequent section, the findings from the data of both universities were compared and it is concluded that mobile learning technology is positively associated with higher education. In line with this, there are multiple limitations and capabilities of mobile learning that were highlighted and converted into themes that will be critically discussed in the following discussion chapter.

5 Chapter 5: Discussion

5.1 Introduction

This chapter covers the discussion of the findings that have been detailed in the previous chapter. In the first section, the findings are discussed in the light of a conceptual framework and corresponding literature is discussed. In the next section, regarding the key themes that have been highlighted in the findings that are discussed in light of literature. The themes have been viewed in terms of support and contradiction to the literature and the new ideas that have emerged from these findings. The discussion of findings in light of the literature gives a critical assessment of the findings and enables us to conclude our findings for the study.

5.2 Findings of the Research under the Proposed Conceptual Framework

The conceptual framework of the present research depicts the link between the associated variables of the research. The study revolves around the concept of mobile learning and its effectiveness on the higher education of the UK and Jordan. The present research strives to explore the capabilities of mobile learning and the limitations, and moreover, how this limitation affects the implementation of m-learning that is faced by the higher education institutes of the UK and Jordan. The research also aims to portray the challenges that are faced by the students of the University of Jordan and Aston University. This section relates the findings of the present research to the proposed challenges, limitations and capabilities of m-learning.

5.2.1 Limitations of M-Learning

The emerging concept of mobile learning faces various limitations in developing and developed countries. But the magnitude of the limitations that are faced by higher education in developing countries is much greater than the limitations in the developed countries (Hosseini, 2015). As far as the findings of the research regarding the limitations are concerned, the higher education of the University of Jordan and Aston University is facing limitations in the context of technology limitations.

5.2.1.1 Technology limitations faced by m-learning

As stated by Ferreira et al. (2013), being an emerging concept, m-learning also requires the serious attention of the authorities of developing countries. The educational institutes are required to have the technical support in order to implement the concept of m-learning in an effective manner. The limitations include scarcity of localised initiatives, privacy and censorship, negative perception of mobile learning and lack of synergies and partnerships.

5.2.1.2 Scarcity of localised initiatives

As mentioned by Prasad et al. (2012), the adaptation of mobile learning in the educational institutes is far greater than in the developing countries. The education section is facing a scarcity of localised initiatives such as technical support and the sufficient speed of internet connection. As far as the findings of the present research are concerned, the online quiz conduction of the University of Jordan and the smaller number of responses is evidence that implementation of m-learning is facing the limitation of a lack of technical support, therefore, the students do not have the required quality of m-learning.

5.2.1.3 Concerns about privacy and censorship

In the view of El-Hussain (2010), the concern of privacy and censorship is also a huge limitation standing in the way of successful implementation of mobile learning in the developing countries. As stated by Traxler and Vosloo (2014), there have been various instances of different governments across the world that have restricted access to information through mobile and other technological tools and have also suppressed their discussion with citizens. As a result, censorship creates a massive source of a hindrance for improving the potential of mobile learning opportunities. With reference to the findings of the present research, according to the views of the students of the UK and Jordan, the students are discouraged when they cannot get access to the website of the relevant source of information through mobile phones during the study.

5.2.1.4 Negative perception of mobile learning

The perception of the people or consumers regarding any product significantly affects the adaptability of the particular goods or service. In a similar context, the perception of the students and academicians regarding mobile learning holds significant importance (Ozdamli and Cavus, 2011). In the view of Sarraf et al. (2012), many researchers or academic professionals have not even experienced the relative benefits associated with mobile learning. It is a fact that various teachers and educational professionals did have negative experiences related to mobile learning. With reference to the present research, the students of the University of Jordan and Aston University are facing numerous issues regarding picture resolution, audio quality and other features. In comparison to the students of Aston University, the students of the University of Jordan are facing multiple issues related to m-learning such as connectivity issues, picture resolution, audio quality and other flaws discouraging the students from m-learning. It is evident that the responses to the online quiz conduction were less than expected due to the above-stated issues.

5.2.1.5 Lack of synergies and partnerships

The lack of synergies and partnerships are the main hurdles in the way of implementing the issue of mobile learning. The implementation of mobile learning requires technical support and technical development to have partnerships and coordination of the relevant department with each other. Installation of projects that go across the initial stage requires effort from educational researchers, teacher trainers, practitioners, web developers, ministries and telecom companies (Sharp, 2007). In the context of the present research, students from the University of Jordan are facing numerous challenges due to the lack of coordination of the relevant department with each other.

The installation issue as mentioned by the participants of the focus group is also supported by the responses of the questionnaire survey regarding mobile learning content experience where 30 percent of participants mentioned the internet as one of the main factors hampering the implementation of mobile learning in Jordan, whereas 29 percent of respondents mentioned lack of infrastructure as an obstacle standing in the way of carrying out mobile learning. In addition to this, the low response rate at the University of Jordan to the quiz activity, in comparison to the

quiz activity at Aston University, was also greatly due to lack of availability of supporting installation facilities to upload mobile learning content.

5.2.2 Challenges of M-Learning

According to deWaard et al. (2011), the revolutionary progress of the concept of m-learning is also facing numerous challenges. The institutions, teachers and the students are facing huge challenges, which may include: screen size, internet connectivity, speaker's accent, the length of the lecture, distractions due to the presence of social applications and others.

5.2.2.1 Connectivity and battery life challenges

The distance learning through mobile learning requires good internet connectivity speed and long battery life. As stated by Dhaheri and Ezziane (2015), it is not possible for a mobile learning application to be made use of for a long time without draining the mobile phone's battery. In the context of the present research, the students of Aston University mentioned that because of battery issues they have to keep charging devices with them, which is not possible all the time.

5.2.2.2 Screen size and key size challenges

One of the most important challenges is the size of the screen of the mobile phones. To read the content and develop the understanding of that content, the screen size should be of sufficient size. When a user has a large screen, mobile learning becomes easy and desktop radical buttons can be used and the user can stay engaged through action (Terras and Ramsay, 2012). With reference to the present research, the focus group discussion from the University of Jordan and Aston University summarises that screen size creates a problem that stands in the way of mobile learning. The participants highlight that one of the big challenges associated with mobile learning are screen resolution issues, mentioned by the teacher as well as student participants, which further creates issues while editing, proofreading and writing of assignments.

5.2.2.3 *Limited memory*

The limited availability of memory in mobile phones is also a bottleneck in the adoption of m-learning as a learning technology. Students who do not have access to smartphones and high-quality mobile phones always find it difficult to download lengthy lectures. Trying to retrieve data from external memory often requires more time in comparison to retrieving data from internal memory. Depending on the mobile device of the student, the amount of available memory may differ (Oz, 2015). The findings of the present research also highlight that students from the University of Jordan and Aston University face this challenge of limited memory in comparison to lengthy lectures and notes.

5.2.2.4 *Technical issues*

There is no doubt that m-learning is a time saver and facilitates the amazing experience of learning but due to technical issues, the students may be discouraged. The mobile gadgets may have technical issues depending on their quality of features and size and there is an extensive diversity in the features of mobile gadgets, thus, this diversity in the features brings confusion for the mobile learners (Wu et al., 2012). The findings of the present research also highlight that unlike high-quality video, when the low-quality video was shown to the participants they mutually opined that the video was unclear and confusing due to too much data and information. However, the participants have also complained about the presence of small text and the absence of high-quality video and audio which discourages them because they find it difficult to understand the lectures.

5.2.2.5 *Download speed and restricted internet access*

Effective mobile learning cannot be implemented in countries where there are internet issues as with low internet speed and download speed students would lag behind. Slow internet speed is known to disturb students' learning process (Khaddage et al., 2015). In the context of the present research, the findings from the questionnaire survey of the University of Jordan indicate that the majority of the respondents highlight that they are facing insufficient internet speed and

problems with internet access too. Due to this reason, the students of the University of Jordan find difficulty downloading the lectures.

5.2.2.6 Risk of distraction

Despite having the significant importance of m-learning, there is a risk of distraction which is also associated with mobile learning due to the presence of social applications and messaging features of mobile phones (Soon, 2011). The downside of utilising mobile gadgets for learning is that when learners have constant access to social media, YouTube and other entertainment sources, it is tempting and distracts students from working on assigned activities (Verhoeven et al., 2014). With reference to the findings of the present research, the findings from the focus group discussion highlighted that students from Aston University and the University of Jordan find more distractions during the learning period from using mobile phones. One of the reasons mentioned by the student participants for not preferring mobile phones for learning is the purpose of the mobile, which is to communicate instead of learning and learning activities. Students have mentioned that they are tempted more towards the entertainment channels, such as YouTube and social media instead of concentrating on their lectures because the entertainment channels are available to them at zero or low cost.

5.2.3 Capabilities of M-Learning

The capabilities of m-learning is the main element of the proposed framework of the present research. Hashemi et al. (2011) highlighted the capabilities alongside the constraints of mobile learning, which are commonly categorised into psychosomatic, academic and technological limitations. They concluded in their work that the conventional learning practices were not reinstated by mobile learning, but mobile learning is merely a different learning technique by making use of an evolving technology. According to Cocharane and Bateman (2010), the capabilities of mobile technology were examined in terms of the facilities mobile learning offers to the learners. The capabilities of m-learning may include flexibility, social influence, perceived mobile value, digital learning and collaborative learning.

5.2.3.1 Flexibility

According to Wu et al. (2012), due to the flexible attributes, the concept of m-learning is becoming more popular in educational institutions. It provides ease and support to the teachers as well as the students. Therefore, being a relatively advanced system of learning and development in countries across the world, mobile learning is considered to be an enhanced version of traditional teaching. In the context of the UK, the study of Cheon et al. (2012) highlights that in various UK universities, the utilisation of mobile technology has helped to bring a wide variety of learning and development opportunities for students that have very limited resources and are unable to gain access to college education. As far as the findings of the questionnaire survey are concerned, 34 percent of research participants from the University of Jordan think that m-learning is quite helpful for the students due to its flexible attributes such as timings, place and others. Moreover, 54 percent of participants responded that m-learning is a facilitating tool for teaching purposes because of its flexible attributes.

5.2.3.2 Social influence

The emerging concept of m-learning is due to the increase in the consumption of mobile phones. Social influence is one of the strong reasons for an individual to adopt any new technology. Students and teachers are inspired by the positive attributes of m-learning that encourage them to adopt the concept of m-learning (Ally and Prieto-Blazquez, 2014). According to Lee et al. (2003), social influence can also be defined as an extremely important attribute for user acceptance regarding technology and information systems. With reference to the present research, the findings of the focus group and the questionnaire survey highlight that social influence is the key factor in adopting the concept of m-learning in both countries – Jordan and the UK. Sixty-six percent of respondents from the questionnaire survey think that m-learning is highly beneficial for university students. This perception indicates the social influence which is the reason behind the increasing adoption of m-learning.

5.2.3.3 *Perceived mobility value*

Njenga and Fourie (2010) discussed that the perceived mobility value comprises of immediacy, portability and convenience. Mobility value allows the users to view the required information anywhere with the help of mobile devices. In line with this, the study of Ally and Prieto-Blazquez (2014) concludes that social influence affects the intentions of the individuals regarding the utilisation of m-learning. In the context of the present research, the findings of the study highlight the importance of the capabilities of mobile learning such as perceived mobility value. The majority of the respondents from the focus group discussion and questionnaire survey indicate that portability is the main attribute that encourages learners and teachers to adopt the concept of m-learning. Being students from a developing country, the participants also stated that mobile learning is accepted positively by Jordanian people due to online access to the university database and library. Portability and convenience were mentioned by the majority of the students as the major uses of mobiles for learning purposes as it was stated by the participants that they can carry lectures anywhere with them and listen whenever they feel it is convenient.

5.2.3.4 *Digital learning*

As far as the concept of digital learning as a capability of m-learning is concerned, the study of Abu-al-aish and Love (2013) indicates that the relationship between digital learning and the technological adaptation is positive. It allows the individual to gain knowledge from the remote areas where he/she cannot manage to go. In the view of Adedaja et al. (2013), digital literacy could be stated as the measure of the ability of an individual for using different tools of communication, digital technology and for managing technical resources. For this reason, the relative measure of an individual's literacy towards technology emphasises their skill in using a different range of technologies. In the light of the present research, the findings portray that most of the students think that being a fundamental essence of m-learning, the digital learning provides them with the opportunity of learning new skills via telecommunication devices. The majority of the students from Aston University and the University of Jordan stated that they can find m-learning very convenient because it allows them to learn without being presented in the class. They can download the class lectures through specific website portals that are exclusively made for the purpose of m-learning.

5.2.3.5 Collaborative learning

The concept of collaborative learning was discussed by Rekkedal and Dye (2007), who highlighted that mobile phones and smartphones are those devices that encourage collaborative learning. Due to collaborative learning, people can easily interact with each other and exchange knowledge. In the view of Park et al. (2012), the utilisation of wireless technologies may result in the improvement of communication, coordination, negotiation, mobility and interactivity that was not possible without technology. With reference to the present research, the findings show that the majority of the respondents think that m-learning allows the distance learners from remote areas to collaborate with teachers, instructors, supervisors, teaching assistants and peers. The research participants further highlighted that due to the concept of m-learning they can seek guidance from their tutors and class fellows without being physically present in the classroom.

5.3 Analysis of Findings in Light of the Literature

The themes that are in line with the literature are elucidated below. These themes briefly display the similarities between the findings and the reviewed literature.

5.3.1 Screen Size is a Big Concern Attached to Mobile Learning

The small screen issue associated with mobile learning appeared to be one of the main issues as mentioned by the participants in all three activities. The low interest of students in the quiz activity can also be due to the small screen size of mobiles as one of the participants of the focus group states that:

“No, I don’t think that the notes should be prepared with the help of mobile phone, it is a small device which I don’t think will help more in preparing notes”.

The issue of the screen makes students less engaged in the learning activity and this is the reason why the majority of 36 percent of students in the survey regarding mobile learning content experience at the University of Jordan mentioned that the method of mobile learning cannot be used for comprehensive full-time university education. The issue of the small screen is also supported by the literature, as Soon (2011) also mentioned that mobile learning is appropriate for

quick bites of learning, as learning activities are easily compressed into less time and a smaller screen, unlike detailed and lengthy learning activities, such as editing and reading.

Moreover, a small screen does not facilitate students to edit efficiently and additions in text documents or notes creates a barrier to effective preparation of notes. Similarly, it has also been observed from the findings that the display of videos in mobile phones is not satisfactory. Most of the students in Aston University admitted that they face problems with resolution and pixel setting while playing videos regarding teachers' lectures.

One of the participants of the focus group also stated that:

“In case of mobile phone, there is a lot of harm associated with it as the screen is smaller in size which might affect the eyesight”.

It has been analysed from the above statement that small mobile phone screens directly affect the eyesight of students. Several complaints have been made by the students on a daily basis regarding their eyesight which is the result of using mobile phones for their studies. No doubt, mobile phones provide ease to students for recording and listening to classroom lectures but at the same time a small screen does not allow them full access to view an entire document or other files. Most of the students, therefore, prefer tablets because they want access to notes without scrolling their fingers up and down. The study of Gedik et al. (2012) also advocates that small mobile phone screen size requires deep and intense eye contact of students that may result in poor eyesight. Doctors and eye specialists indicate that mobile phones exhibit dangerous rays that are harmful for human eyesight and continuous interaction with mobile phones may even cause the loss of eyesight. Similarly, Hwang and Tsai (2011) stated that students suffer with headaches, eye strain and itching eyes due to the use of mobile phones for help in their studies. All these health issues result in the lack of students' interest in their studies which has a negative impact on their grades. Apart from other points, the screen size and resolution issue was mentioned by the participants as one of the key concerns with respect to mobile learning, which was also supported by the literature, as Maniar et al. (2008) in their study, concluded that size of screen of a mobile device greatly affects the learning procedure as a big screen mobile gives more data through video in contrast to a mobile device with a small screen. One of the main points that was found simultaneously in the findings and the literature was the bright future of mobile learning in Jordan despite various challenges.

The theme of the present research concludes that size of the screen is the dominant issue that stands in the way of the adoption of m-learning. The small size of the screen is the key hurdle for the students of the University of Jordan and Aston University. In order to implement effective m-learning in higher education, this issue must be addressed from the side of the authorities. As mentioned by Gedik et al. (2012), the issue of screen size is a big challenge for the students who adopt m-learning. The government of Jordan should intervene in the sector of information communication technology (ICT) by considering the imports of modern technology with reducing import tariffs. The mobile phone companies must consider the screen size of the mobile phones and the resolution of the screen so that students do not find it difficult to study via mobile phones. Moreover, to meet the affordability issue of the students, the university administration should provide phones to the students with big screens that can be paid for in easy instalments.

5.3.2 Mobile Learning is not Supportive for Writing and Reading Long Documents

One of the issues found after analysing the results obtained through focus group activity was reading and writing issues with regards to mobile learning. In addition, learning activities such as editing are hard on mobile devices as a student participant stated:

“Specifically no for editing via mobile as it takes long”.

According to the participants, working on a Word document is preferable and convenient on laptops than a mobile despite the fact that a mobile is more easily portable due to its weight and size than laptop devices. On the other hand, some of the student participants prefer a mobile only if it is good quality, which supports learning activities. Likewise, reading of long documents was also found difficult from the analysis of the participants' responses, which is supported by the review of pertinent literature, as Shuler (2009) mentioned that eye stress is the result of reading a large amount of different size texts on the small screen of mobile phones. Alongside reading, preparation of notes was also found to be difficult on mobile devices from the analysis of the focus group responses.

However, despite the issues, laptops and mobile phones were found to be the first preference of the participating students from the focus group at Aston University. This is quite in line with what is found through the review of pertinent literature, as Garcia et al. (2015) wrote that

according to the survey of the London School of Economics in 2013 it was found that 94 percent of smartphones were owned by students. This validates the results obtained through the focus group where although the majority of the participating students mentioned laptops as the preferred device for learning, phones were also found to be the second most preferred choice of the participants. The main reasons the participants gave for preferring laptops to smartphones were the usability issues as the different sites and links can be easily opened on a laptop, but are very hard to open on smartphones due to small screen limitations. This is supported by literature, as Huang (2008) stated that not many words of lecture slides or documents can be viewed on the smartphones because of their small screens where font cannot be made as big as it can be made either on a laptop or computer screen. Huang (2008) also mentioned another very primary limitation with respect to the reasons for preferring laptops over smartphones, i.e. that reading of lengthy documents is hard on smartphones as scrolling up and down to make sense of the flowing paragraphs causes fatigue to the readers.

One contradiction that was found between the results of the focus group and the review of the literature was the point that the results of the focus group at Aston University showed that laptops were preferred over smartphones for mobile learning but the research work, for example in the study of Hafner and Faust et al. (2006) on the employment of smartphones for academic libraries it was stated that the mobile devices have been advanced into complete functional microcomputers, which has slowed the problem of displaying a lot of lecture content on small screens and because of these advanced features the smartphones have been replaced by laptops and computers in order to access services or data for mobile learning. In the same vein, Lovis et al. (2014), in their book, talked about a questionnaire survey on mobile learning readiness of nursing students in 2013 and found that mobile phones were owned by 75.4 percent and laptops were owned by 45.2 percent of participating students for the learning purposes, while the ownership of laptops grew when the survey was again conducted after three months.

The literature finding revealed two types of trends; one was that the mobilephones are the preferred choice of students as indicated by Hafner and Faust et al.'s (2006) study and the second trend was the greater use of laptops than mobile phones as indicated by the study done by Lovis et al. (2014). This shows via the results obtained through conducting the focus group that the laptop was the first preference of participating students, which is also backed up as well as contradicted by the literature.

One of the themes of the present research indicates that students find it difficult to use Word documents for writing and reading long documents. The features related to reading and writing in mobile phones hold significant importance in order to adopt m-learning (Ferreira et al., 2013). In order to resolve this issue, government should enhance the volume of funding in the sector of information technology so the technology providers can improve the existing features of mobile phones. The technology providers must address this issue by improving the features related to documents and screen size so that students can easily read and edit documents. In addition to this, the university administration should persuade the teachers not to make such long documents that can be a hassle for the students while learning from mobile phones. The long documented topics can be divided into other small documents.

5.3.3 Quality of Audio/Video Makes Students Switch Medium for Learning from Mobile to Other Devices

The audio/video was shown to the participants in high as well as low quality versions and against each quality the participating students responded differently, so the second theme was derived from the analysis of the responses of the participants regarding the quality (which includes both audio and video) of audio/video. The analysis of the responses of the participants indicated that the quality of audio/video has a direct relationship with the effectiveness of mobile learning as poor quality audio/video makes students distracted and switch it off or move to another method. The results also highlighted the components that constitute the quality of audio/video. One of the ingredients in this connection was the use of images. The participants did not find video useful if it was overcrowded with images and at the same time the voice quality was also responsible for making video quality high or low.

This was supported by the analysis of the response of the students in quiz activity at the University of Jordan where the participation level of the students was low, which can be due to low quality audio/video as mentioned by the participants later in the focus group activity. The results obtained with respect to audio/video quality are similar to those of the reviewed literature where Sampson et al. (2012) wrote that video lectures are a significant part of the entire structure of mobile learning as they incorporate presentations with interactive images and simulations developing the soundtrack of the data. Excessive use of slides was also mentioned by the

participants as the main constituting factor of quality of audio/video, which is supported by the criterion mentioned by Sampson et al. (2012) for developing video lectures. The criterion of Sampson et al. (2012) stated that simple navigation in the video lecture and the slides is one of the key points for the development of modules for mobile learning.

The screen resolution was also mentioned by the participants to be one of the constituting factors of video/audio quality. The significant role of screen resolution in mobile learning is supported by the literature where Maniar et al. (2008) wrote in their study that visual perception of human beings, together with attention, are the reason why small screen size is a serious issue. This is because the attention period of students is affected by the level of details available on the screen, which is restricted by visual sensitivity of the human. However, Schreiber et al. (2010) wrote that this problem can be solved by zooming in on videos but even then the user needs the ability to remember all data that is available in the video so that the complete picture can be seen.

Audio/video that is overloaded with data or information was revealed as one of the decisive factors that determine the quality of video, which further makes mobile learning ineffective or less effective. Examining this in light of the literature it was found that literature supports the response of the participating students, as You et al. (2010) stated that the appropriateness and relevancy of audio/video content helps the students to get focused, as the result of which the experience of mobile learning becomes effective. Audio/video and content quality were mentioned as one of the factors facilitating or hindering the mobile learning technologies. The participants opined that over-filled video/audio content negatively impacts the learning process, which was supported by the literature as Schreiber et al. (2010) highlighted the negative effect of using irrelevant or unnecessarily big images in mobile learning, whereas Caballe et al. (2010) emphasise the use of appropriate text size while developing content for mobile learning.

Video and pictures are significant features that can convey ideas and concepts in an interactive manner. The successful implementation of m-learning requires good voice and audio quality. In a similar context, it is highlighted by Liu and Carlsson (2010) that a standard quality of video and audio is the prerequisite for m-learning. In the context of the present research, the findings highlight that bad quality audio and video discourages them from using mobile phones as learning devices. To cope with this issue, it is suggested that technology providers enhance the video quality and the audio quality in smartphones. Moreover, good internet connection speed

can improve the quality of the voice. The adaptation of HD quality by the technology providers has the capability to cope with this issue.

5.3.4 Calls and Social Media Use on Mobiles Distract Learning via Mobiles

Distraction was one of the points mentioned as a key issue associated with mobile learning, both in the reviewed literature and the findings from the data. For example, distraction appeared to be one of the main issues attached to mobile learning while skimming through the responses obtained through the two sets of focus groups in Aston, which was also supported by the reviewed literature, as Verhoeven et al. (2014) stated that mobile devices are deemed disturbing due to different issues, such as ringtones during lectures, distraction or multitasking alongside the camera facility attached to phone devices, which may host confidentiality problems. Likewise, the laptop was found to be the most preferred device for mobile learning as all students at Aston University not only keep, but also prefer, the laptop for assistance in their learning and only two students had tablets. This was supported by the literature as Chen and Denoyelles (2013), in their study, mentioned that although there is a drastic increase in the popularity of using mobile technologies for learning purposes, laptops are still preferred by the majority of students for the attainment of academic success, whereas tablets and mobile devices (smartphones, etc.) come in second position in the list of students' preferences, which is increasingly noticeable with technological advancements.

The participating students find mobile learning to be a distracting way of learning as according to the students mobile phones and smartphones are devices that are basically developed for day-to-day communication purposes, which distracts them from the learning process. The attribute of distraction with respect to mobile learning is a debatable point in the literature. Academics such as Verhoeven et al. (2014) stated that though mobile devices are distractive during the learning process it does not mean that the use of such a new technology should be banned from the learning process in schools and universities. However they also agreed that this device has been contributing in increasing the use of social media sources such as YouTube, Facebook etc. which are considered as a source of entertainment for students, distracting them from their studies and tasks assigned to them as part of their course.

Hence, it can be stated that the facts highlighted through responses can be supported by the facts highlighted by Tyner (2014). Conversely, academics, such as Soon (2011), opined that the learning process becomes lengthy and less effective if mobile phone devices are used for learning purposes, however, Soon (2011) also highlighted the risk associated with the distraction caused among students with this device which is majorly due to the multiple usages offered by mobile phones. A similar kind of fact was highlighted by Lowenthal (2010) as well, as according to him, as long as students are using mobile phones for learning in classrooms, they will be distracted by other facilities provided by their mobile phones.

Hence, considering these factors, it can be stated that there is a need for developing methods that would limit the usage of this device, especially in accordance with the age group and purpose for which the device is being used. But this would be a challenging task as well as the other sources facilitating this device which have been developing their accessibility further with time. However, this should not limit or stop the implementation of this technology in useful areas and should not affect the effectiveness of this technology. It has been highlighted by gsma.com (2012) that in certain regions the mobile learning technology is becoming affected within the UK as well due to the fact that teachers feel reluctant to use mobile phones within their classrooms which would be due to the same factors as they might be considered a distraction for students.

This perspective of Godwin-Jones (2011) has been supported by the participants who stated that the constant communication with social media friends does not allow the students to focus on the topics because it is quite natural that the attention of students is more on the response of their friends on their mobile devices instead of on the lesson running on the devices. However, Liaw (2010) highlighted another factor that the young generation is in a way addicted to use of this technology, i.e. they cannot ignore or stop using this device for communication. El-Hussein and Cronje (2010) wrote that it is argued by Nyir and his contemporaries that the traditional pattern of learning in a fixed classroom environment, libraries and lectures hall, is undermined and removed by mobile machines. Considering this statement, it can be stated that El-Hussein and Cronje (2010) are basically not supporting the involvement of this technological advancement in this field. They further stated that the traditional static models of learning spaces needed to be revolutionised to remove monotony in environment and broadening this space through mobile devices makes the learning more communicative and effective. However, according to other sources, it has been observed globally that this implementation of technological advancement is

becoming appreciated by a great number of countries and they have been further facilitating this implementation and its advancement as well. This perspective of academics by El-Hussein and Cronje (2010) was supported by the participants, as the majority of them were unanimous about the communicative and interactive features of mobile learning.

The issue of distraction discourages the students from learning through m-learning. The distraction not only wastes the time of students but it also distracts the teachers (Soon, 2011). The smartphones that are usually used for m-learning have access to all the social applications that are used for active communication. The findings of the present research highlight the issue of distraction from the mobile phone devices while learning. To address this issue, the administration of the universities should restrict access to social apps such as Whatsapp, Facebook, Twitter and others in such a way that students will not be able to use interactive games. In line with this, particular videos from YouTube and other websites that do not relate to the academic purposes should also be restricted in the university premises.

5.4 Themes in Contradiction to Literature

From the literature, it was found that one of the key factors necessary for the successful adoption of mobile technologies is information regarding students using mobile phones, as Male and Pattinson (2011) wrote that to make the effective use of mobile technologies in colleges and universities, the management needs to have data with respect to students having mobile sets or other handheld devices in use. However, during the focus groups and in the questionnaire survey no participants talked about the value of data regarding students using mobile devices for the successful and effective implementation of mobile learning. The high cost of fast networks for uninterrupted connectivity was found to be a significant factor facilitating mobile learning in the reviewed literature, as Hasan et al. (2011) stated that the networks that are supportive for mobile learning are costly for the students as well as the school-centred programs. However, the cost of mobile networks was not mentioned as a challenge by any of the participants at the University of Jordan. The advanced features of mobiles were mentioned by the participants as the factor facilitating the process of mobile learning, which is quite opposite to what was found in the reviewed literature where Wu et al. (2012) stated that the availability of diverse features of mobile sets are responsible for the creation of confusion in mobile learning.

The literature also highlighted that the students are unaware of using the latest features in mobile devices, which creates hurdles in mobile learning. However, in comparison, no single participant mentioned the fact that the use of latest technology features is difficult for students. This contradiction of the findings with the reviewed literature revealed that in reality the advanced features of mobile devices are not at all difficult for students whether they belong to a developed or developing country. Likewise, the reviewed literature pointed out the incompetence of educators for the creation of mobile learning apparatus as one of the issues with respect to mobile learning, as according to Sarraf et al. (2012), competency is one of the factors required for the effective set-up of mobile learning apparatus. However, the participants did not mention competency of educators as the key factor in this respect, which shows the contradictions found in the results obtained through activities and the reviewed literature.

One of the points that was present while reviewing the pertinent literature was the acknowledgment of the role of government for the implementation of mobile learning facilities in the higher education sector, as Almarabeh et al. (2014) in their work mentioned the positive role of King Abdullah II for facilitating the use of technology in the learning sector. However, unlike the literature, no participant at the University of Jordan highlighted the role of the government in this regard.

5.4.1 Encouragement is Required to Attract Students Towards Mobile Learning

The analysis of the focus group also revealed that participants emphasised the encouragement of the students for mobile learning instead of forcing them towards this medium because only encouragement can ensure the bright future of mobile learning in Jordan. This response obtained through the focus group was found to be quite in line with the results obtained through the questionnaire survey about mobile learning content experience at the University of Jordan as upon asking whether teaching through mobile or mobile learning is helpful or not, the majority of 85 percent of participants stated that they find mobile learning helpful.

This finding is backed up by the literature, as in the study of Abu-Shanab and Ala'a (2014) that was done in 2008, showed rapidly increasing mobile ownership among the students of the University of Jordan. However, the study attributed the difference in ownership of mobile phones with the difference in gender and ages of the participating students. According to that

study, 87.2 percent of students owned mobile phones, which is quite a good amount revealing the greater opportunity for implementation and acceptance of mobile learning in higher education institutes and universities in developing countries like Jordan.

However, a contradiction is found in the literature in this regard, for example, in contrast to this, it has been mentioned by Godwin-Jones (2011) that mobile learning is beneficial for the university students but at the same time, there are various negative aspects linked with it as well which might affect the students adversely. It can be said that mobiles are preferred just for their portability, however, some might misuse this useful technology. Similarly, as explained by Fuller and Joynes (2015), the use of mobile learning is now a necessity for students studying in the universities of Jordan.

The analysis of the activities, although concentrated on the encouragement of the students, also revealed different issues responsible for hindering mobile learning execution. Connectivity and installation inefficiencies were mentioned by the participants as one of the key challenges hindering mobile learning in Jordan, which also gains the support of the literature where Blooshi and Ezziane (2013) mentioned that the installation issues in mobile learning include management of all essential software instruments in a mechanical way to the group of devices included in the learning activities and communication between various nodes, such as mobile devices, is yet a problem to be resolved for the execution of an instantaneous interaction in learning activities.

The results of the questionnaire survey about mobile learning content experience also supported the response of the participants of the focus group as 57 percent of participants mentioned low connectivity as the problem in using mobile learning content. Not only this but 52 percent of respondents recommended high internet speed as a measure to improve the experience of mobile learning content on mobile devices.

The successful execution and the implementation of m-learning require the provision of efficient features and the good internet connection speed to the students and the teachers (Alnabhan et al. (2012). The findings of the present research also highlight these issues that discourage. Srivastava (2012) mentioned slow internet speed and connectivity issues as being big hurdles standing in the way of mobile learning. Moreover, the lack of supporting features is also a big dilemma that restricts the learners to utilise the concept of m-learning to the optimal level. In order to encourage the students to adopt m-learning, the universities should provide good internet

speed throughout the premises of the university. Moreover, the administration of the universities should collaborate with technology providers so that they can provide high quality featured phones to the students with a reasonable range of prices so that they can afford them.

5.4.2 Mobile Learning is Interactive as it Engages Students

The analysis of the results obtained from the three activities, quiz conduction, questionnaire survey and focus group, revealed that students find learning through mobiles interactive due to a high level of engagement. For example, 85 percent of participants in the questionnaire survey opined that learning through mobile is useful whereas 71 percent did not find it useful. Likewise, the participants also appreciated the teaching through mobile as 28 percent of participants mentioned this type of experience as being good. The results obtained through the questionnaire survey are supported by the results obtained through the focus group where the analysis shows that the students find mobile learning interactive, as in the words of one of the participants:

“Mobile learning is beneficial as it allows interactivity”.

For students, the involvement of students can be increased through mobile learning, which contradicts the review of pertinent literature, as Alnabhan et al. (2012) wrote that mobile learning increases distraction levels while learning as the mobile is basically a communicative device. From the analysis of the results obtained in the focus group, one of the participants at Aston University mentioned that the teachers use mobiles for learning through games, which increase interactivity and students’ involvement in the learning activity. However, the results of the survey and the focus group contradict with the analysis of the results of the quiz activity where the interest level of participating students at the University of Jordan was low as compared to Aston University, which might be due to an absence of technical facilitation for the installation of mobile learning content.

The results from Aston University and the University of Jordan were contradictory to the literature in a sense that the students from the focus group submitted different opinions, both in favour and in opposition of the statement. The majority of students from Aston University showed reliability towards mobile learning because they can carry the lectures anywhere with

them and study them at their ease. One of the students from the focus group at Aston University stated that:

“Ease of access to a big deal like we could use easily you don’t need to sign up for anything you don’t need to do anything literally just put six digits in and do an interactive thing”.

In the light of the above participant’s answer, cloud computing accessibility facilitates the students to log in to their emails and other social media applications without using digits for passwords. This feature has removed the tension of remembering long passwords and just allows access to important lectures and teachers’ notes with a click. All these facilities and techniques of mobile phones keep the students more involved with their studies as compared to the desktop machines. However, this contradicts the literature, as Sarraf et al. (2012) stated that aberrant features and navigation of mobile devices sometimes stop students from actively participating in mobile learning.

Learning from mobile phones allows the learners to interact with each other and with teachers and instructors even when they are not present in the classrooms (Rekkedal and Dye, 2007). The findings of the present research indicate that students have appreciated the teaching mechanism of m-learning as it is an interactive way of learning. To sustain this interactivity and improvise the supporting features, the technology providers should ensure the provision of high quality features such as audio, video and picture resolution. Moreover, the accessibility of effective cloud computing must be provided so that students can easily log into their accounts and get access to the webinars and lecture notes. Moreover, the government should increase their share of investment in the field of ICT so that the network connectivity issues could be resolved.

5.5 Contribution to Literature

The themes discussed in this sub-section give new data, which is obtained as the result of this research conduction.

5.5.1 Low Interest of Participants in the Quiz Activity

From the analysis of the quiz activity it was found that the interest of the student participants was lower than the expectations. The students were free to make as many attempts as they liked for quiz completion but the participants only made one or two attempts. However, a large majority of students made only one attempt at both universities, which shows the low level of interest of students with respect to the quiz exercise. It was expected that almost 150–200 students would participate at the University of Jordan but in actual fact, the number of students that attempted the quiz did not reach the expected limit, i.e. the maximum number of students was 143 while attempting the quiz on ‘business and technology’, which shows a low level of interest and lack of seriousness among students regarding attempting the uploaded quiz and lectures on the university website. Conversely, the expected number of participants in the case of Aston University was about 150–200 but the received response was more than the expectation and more than the limit of 300 for the quiz on knowledge management.

The overall response from the quiz activity at Aston University was far better and encouraging than the response in the University of Jordan, where the students were not serious while taking part in the five different quizzes. For example, the obtained results from the quiz activity in both universities clearly indicated that the number of participants (124) who attempted the first quiz on cybercrime at the University of Jordan was less than that of Aston University participants (148), which shows that the interest of students of Aston University was more than the students of the University of Jordan. There can be various reasons for low interest of the participants in the quiz activity at the Jordanian university and one main reason in this connection would be the lack of technological support for the installation of mobile learning content as mentioned by 36 percent of participants in the question survey who said that the connectivity issue was the main problem they experienced while using mobile learning content.

Similarly, the number of completely filled in first quiz submissions in the case of Aston University (100) was also far more than the University of Jordan’s complete submissions (40), which mirrors the seriousness of participants for the mobile learning activity. In the same vein, the number of partially filled in first quiz submissions was 38, which was less in the case of the University of Jordan (59), whereas incomplete submissions was 10 in the case of Aston University, which was also less than the University of Jordan (25). The reason for low interest of

students at the University of Jordan was due to low quality lectures as the analysis of the results obtained from the questionnaire survey showed that 22 percent of participants highlighted that they could not load the lecture, whereas 37 percent of participants were of the view that they had a problem with the connectivity.

The persistent interest of the students is the significant factor standing in the way of successful implementation of m-learning (Almarabeh and Mohammad, 2013). The findings of the present study portray that during quiz conduction, students from the University of Jordan responded with low interest as compared to the students from Aston University. There were various reasons such as poor internet connectivity and lack of supporting features. To improve the supporting features in the mobile phones, the technology providers should improve the size of the screen so that students are better able to read the content. The technology providers should install high definition voice and audio in order to enhance the interest of the students in m-learning. In line with this, university administration should hire IT professionals who would manage the internet connectivity issues.

5.5.2 Mobile Learning Promotes Assistive Learning

From the analysis, it was found that the mobile learning was seen as assistive learning by the participants as one of the participants in the focus group at Aston University stated that through mobile games learning is done in the classroom so that more and more students can interconnect with each other. The analysis also revealed that the participants mentioned various uses of mobiles for learning purposes and interactivity was one of the aspects often mentioned by the participants. Mobile devices are communicative devices and so are highly interactive and this feature of such devices increases the involvement of learners in the learning process. It has been observed that the respondents within the study agreed that these mobile learning devices have helped them in developing ease and accessibility.

As Shen et al, (2008) wrote, these devices have been providing them with the software and techniques that have been helping them in developing ease and convenience throughout, for example, one of the respondents highlighted that the use of Microsoft PowerPoint has been helping the respondent with the documents. Another respondent highlighted the fact that these devices have really provided ease with their good accessibility that has been providing them with

the ease to access a great number of learning activities anytime they want. Hence, it can be stated that these devices have been providing students with ease, accessibility and assistance. However, these devices have been acting as an assistive learning device for the students suffering from learning disabilities or facing challenges during learning and studying as Alnabhan and Jaafer (2012) posit that these devices basically help them in making it simple in an attractive manner. This basically provides students with a number of techniques, software, tools, graphics and other sources which make the overall experience attractive, interesting and easy and develops scope for them which affects their learning abilities to a greater extent. This is one of the reasons why this technology is also becoming appreciated by the students and teachers.

However, the literature also pointed out that collaborative learning by sharing information with each other is difficult with mobile devices, as Engel and Green (2011) wrote that mobile devices are not very interactive as a group of students cannot share a screen for sharing their notes and content during class duration. And this issue was not mentioned by any of the participants, which may be because of the presence of advanced networking and facilities for mobile learning in developed countries such as the UK. For example, single display groupware is developed to create the computer system that helps with face-to-face combined interactions on a single display or screen. This kind of facility makes mobile learning interactive as mentioned by almost all participants.

Mobile learning assists the learning procedure as it is portable and can be moved conveniently to any place so that the learning process can be restarted. Portability and convenience was the second most mentioned purpose of mobile uses for learning mentioned by the participants as they can easily move with their lectures anywhere they like and the literature also supports these uses of mobile devices.

As mentioned by Motiwalla (2015), m-learning allows the learners to communicate with their class peers and teachers even if they are not present in the classrooms. The students can get access to the class lectures and collaborate with the teachers through webinars. In the context of the present research, the majority of the respondents highlight that m-learning is a good source of learning as it increases the interconnectivity among the students and teachers. In order to sustain this attribute of m-learning, the university should arrange training sessions for the instructors regarding the utilisation of m-learning in an effective manner. The teachers must be trained in the

context of uploading the content, the length of the content and effective communication with the students.

5.5.3 Device Charging Needs Make Learning Restrictive via Mobiles

From the analysis, battery limitation appeared to be one of the foremost issues associated with mobile learning. This limitation can be one of the reasons why students at the University of Jordan did not show high participation in the quiz activity. Due to restricted battery issues, the student participants preferred laptops to mobiles for mobile learning. Laptops and mobile phones were found to be the first preference of the participating students from analysis of the focus group at Aston University. The main reasons the participants gave for preferring laptops to smartphones was the usability issues, as Shen et al. (2008) stated that the different sites and links can be easily opened on laptops, which are very hard to open on smartphones due to small screen size limitation.

One contradiction that was found between the outcomes of the focus group and the review of the pertinent literature was the point that the results of the focus group at Aston University showed that laptops were preferred to smartphones for mobile learning but the research work, for instance in the research of Hafner and Faust et al. (2006) on the employment of smartphones for academic libraries it was stated that the mobile devices have been advanced into complete functional microcomputers, which has slowed the problem of displaying plenty of lecture content on small screens and because of these advanced features the smartphones have been replaced by laptops and computers in order to access services or data for mobile learning. In the same vein, Lovis et al. (2014) in their book talked about the questionnaire survey on mobile learning readiness of nursing students in 2013 and found that mobile phones were owned by 75.4 percent and laptops were owned by 45.2 percent of participating students for learning purposes while the ownership of laptops grew when the survey was again conducted after three months.

The literature findings revealed two types of trends; one was that the mobilephones are the preferred choice of students as indicated by Hafner and Faust et al.'s (2006) study and the second trend was the greater use of laptops than mobile phones as indicated by the study done by Lovis et al. (2014). This shows that the results obtained through the conduction of the focus group that

the laptop was the first preference of participating students which is also backed up as well as contradicted by the literature.

The learning from mobile phones requires enough battery timing because students need to use mobile phones for hours as a learning device. Therefore, the battery life of the mobile phone must last for the whole day (Tarhini et al., 2014). With reference to the present research, the findings indicate that the majority of the respondents respond that due to battery life issues, the students find it difficult to utilise mobile phones as learning devices due to the battery limitations. To address this issue, the technology providers must consider the battery timing and improvise the longevity of the battery life. In line with this, to resolve the issue of battery life, the university should provide charging facilities for the mobile phones and install sockets at each bench in the classrooms so that students will not face any difficulty while charging their devices.

5.6 TPACK and Connectivism Theory

In this section of the discussion chapter, an attempt is made to analyse whether the contradictory themes agree or disagree with the TPACK theory by Mishra and Koehler (2006) and connectivism by Downes (2008), which provide the theoretical foundation to this study. One of the contradictions found after analysing the collected data was the significance of information regarding students using mobile devices for successful and effective implementation of mobile learning. This contradiction with the literature is supported by the Connectivism theory, which explains how new opportunities have been created by internet technologies and how people today have better opportunities to learn and share information across the Web and amongst themselves.

This is so, because without having information about the students using mobile phone devices, the mobile devices cannot be used for learning purposes. Therefore, the teachers must have knowledge regarding students having mobile handsets or other handheld devices in use to make the effective use of mobile technologies in colleges and universities. In addition to this, as stated in the Connectivism theory, the mobile technology can support the conversational procedure by linking students to other students no matter whether they are in a similar classroom, diverse cities or anywhere in the world. However, this is only possible after gaining information about whether the students use mobile devices and which types of mobile handsets have been used by them.

Along the same lines, the other theory, which is TPACK, also supports the contradiction found as it explicates the efficient implementation of learning technology. However, for the effective execution of learning technology, the data about the number of students using mobile handsets is necessary to know.

The second contradiction found was about the high cost of providing uninterrupted connectivity for the effective implementation of mobile learning, which was supported by the Connectivism theory as this theory emphasises the exploration of new opportunities by internet technologies to learn and share information across the Web and amongst themselves. Another contradiction found is regarding the lack of awareness of students of utilisation of the latest features in mobile devices, which creates hurdles standing in the way of mobile learning. The TPACK framework also supported this contradiction, as student knowledge about technology is one of the four components of this framework, whereas the other three are content, pedagogical and technological.

Similarly, the incompetence of educators for the creation of mobile learning apparatus was also found to be one of the contradictions, which is also backed up by the TPACK framework, as pedagogical knowledge is one of the four components of the framework. This is so because the focus of the TPACK approach is on the creation of instructions centred upon content-focused pedagogy, which is directed by prudently opted and implemented technologies and this concentration is in proportion to the situated, event-focused and interrupted trait of knowledge of instructors. Therefore, the educators' knowledge is the key to effective mobile learning implementation, which although is in line with the theory, is not found in the analysis of the collected data. Another contradictory point was regarding the role of governments' involvement in mobile learning.

The selected theories neither support contradiction nor reject it because the role of government in mobile learning is not clearly highlighted in the TPACK framework and Connectivism theory. However, one of the four elements of the TPACK framework, which is content, pointed towards the area where government's part can be played. This is so because the TPACK framework studies existing technology approaches to integrate technology with teaching, discussing that a range of present methods are technocentric, generally skipping the ample concern of the dynamic and complex links among content, technology, pedagogy and framework and the integration of

technology into teaching or content of mobile learning requires government support to be well executed.

5.7 Chapter Summary

This chapter compares findings with literature. The first section discussed the conceptual model and elaborated variables of the study in light of the findings. In the subsequent sections, the key themes of the study have been discussed to review support and contradiction of the literature. The findings of the study, i.e. screen size and social media distraction, are strongly supported by the literature and relate this due to the problems of mobile learning. While the findings also highlighted that students need encouragement to use mobile devices for learning and therefore the acceptance of mobiles as a learning tool is still under consideration, there has been limited support for literature on this and the area should be explored. Moreover, under the light of the findings of the present research, it is also mentioned how the government, university administrations and the technology providers can intervene to improve the supporting features of m-learning. Also, it was accepted by students that mobile learning can be a tool for assistive learning but students show limited interest in participation in any mobile learning activity as this was observed in the focus group and quiz conduction activity.

6 Chapter 6 Conclusion and Contribution

6.1 Introduction of the Chapter

This chapter aims to discuss the knowledge contribution of the present research related to the limitations, challenges and capabilities of m-learning. The chapter further indicates the exploration of the research objective of how the present research has achieved the goals of the study. In line with this, the chapter presents the conclusion of the overall study so that the reader can get an overview of the research. Furthermore, this section demonstrates those limitations that were faced by the researcher while doing the present research. In order to cope with the challenges, the required policy implications and their effectiveness are mentioned. The last section of this chapter highlights the research areas related to m-learning that can be explored by future researchers.

6.2 Contribution to the Knowledge

As in developed countries, the emerging concept of m-learning is also penetrating into the educational institutions of developing countries. To attain the objective of the study related to the effectiveness of m-learning, the present study has made a significant contribution to the existing literature. The main contribution of the research is that it has utilised two theories of learning: TechnologicalPedagogical and Content Knowledge (TPACK) and Connectivism theory. As mentioned by Mishra and Koehler (2006), the theory of TPACK includes three core elements such as technology, pedagogy and content and according to this theory, these days education not only follows the traditional modes of learning and teaching but the modern technology is also utilised along with traditional methods. As far as Connectivism theory is concerned, it is highlighted by Transue (2013) that Connectivism theory is used to explain how new opportunities have been created by internet technologies and how people today have better opportunities to learn and exchange knowledge. The selection of both these theories allows the study to highlight teachers' technological literacy and academic knowledge and the use of mobile phones as a learning tool from the perspective of the students. The research contributes to the application of Connectivism and TPACK theories in the mobile learning domain by extension of these theories to understand the issues faced by the learner. Various researches have explored the challenges and limitations that are faced while adopting the concept of m-learning. The research

of Ferreira et al. (2013) explained that it has now become easy for students who cannot attend the classes physically, due to unavoidable reasons, to get mandatory learning through the developing concept of e-learning or distance learning. In a similar context, the study of deWaard et al. (2011), highlighted that distance learning helped those students who do not have access to higher education. For this, the best example is massive open online courses (MOOC), but, the focus of the present research is to evaluate the perception of the students of the University of Jordan and Aston University regarding the effectiveness of m-learning. Moreover, the concept of m-learning has been evaluated by many researchers in the context of developed countries. For instance, the study of Hosseini (2015) indicates that being an emerging concept, m-learning is widely adopted in the educational institutes of developed countries because it supports the accessibility of the supporting features of the mobile phone devices. On the other hand, the present study strives to compare the views of the students regarding the challenges and limitations faced by the students during m-learning and the capabilities of m-learning.

6.3 Research Objectives

The following are the main objectives of this study:

- To critically review literature in order to have a deeper understanding of the scope and limitation of mobile learning technology and their application for mobile learning as published in literature.

The first objective focused upon understanding the scope and limitation of mobile learning technology and their application for mobile learning as published in available literature, which was achieved through the literature review that highlights some of the major issues that create a difference within both kinds of countries for technological adaptation, like the availability of advanced technology, resource limitation etc.

- To identify factors that affect the implementation of mobile learning in Jordanian higher education by evaluating differences between Jordan's higher education institutions and the UK's higher education institutions.

This objective was attained through conducting focus groups with the students of the University of Jordan and Aston University. The analysis of the data obtained through focus groups highlights

the factors responsible for affecting the implementation of mobile learning at the University of Jordan.

- To examine the capabilities and limitations of using telecommunication technology for learning in Jordan.

This objective is achieved through the questionnaire survey carried out with the students of the University of Jordan regarding the mobile learning content. The responses obtained through this survey highlight the technology capabilities and limitations in Jordan for the implementation of mobile learning at university level.

- To adapt mobile learning content for Jordanian and UK students according to the capabilities and limitations of available mobile learning technology.

This objective has also been achieved by collecting data through the questionnaire survey regarding mobile content at the University of Jordan as the students' difficulties regarding mobile learning content help the researcher to adapt the content considering the technology limitations faced by the students of the universities in Jordan.

- To make recommendations arising from the research to education policymakers and teachers.

This objective is achieved by making suggestions in light of the obtained results by doing three activities – quiz, questionnaire survey and focus group – during this research.

This study was focused upon identifying the challenges and limitations within the use of communication devices for mobile learning within Jordan. It was observed that the limited availability of such devices and lack of financial resources were the major challenges in this regard. In addition, the availability of an efficient network system was also a limiting factor. Other than that, the usage of such devices within the classroom is not appreciated within Jordan which is mainly associated with the mindset that it would distract the students etc. Hence, it can be stated that the study achieved this objective of the research.

The quality of mobile learning content was also evaluated by conducting a test in which the students from both universities participated and they were provided with the lectures associated with their field through their university websites and furthermore they had to fill in a quiz which they had to complete after reading the lectures. Aston University was fine as compared to the

University of Jordan. This was due to the quality of network in both countries. However, there were also certain internal factors that were the differences within the appearance and the preview of websites which were not discussed in detail that might have affected the responses of the students. This factor limited the development of a proper comparison between both universities. There was another objective associated with this objective which was the adaption of mobile learning content for the Jordanian and UK students according to the capabilities and limitations of available mobile learning technology. This was also due to the fact that the participation of students in these activities was not as expected. This factor affected the outcomes of the test, hence affecting the result.

The study was also aimed at making recommendations resulting from the research to the relevant stakeholders that would help in improving the adaptation of this mobile learning technology within the country, while considering the specific weaknesses that have been highlighted through the research. This was done to some extent in which some recommendations are provided by the end of the dissertation. However, there was still need for developing or highlighting a proper plan through which these steps for improvement could be taken. This should also demonstrate a proper implementation of the recommendations, while considering the factors that would influence the implementation. Taking this into consideration, it can be stated that this objective was not achieved completely.

6.4 Conclusion

The study was conducted to assess the capabilities and limitations of mobile learning technology and its impact on learning in the Jordanian higher education system. The study was planned to collect and examine data directly from the related subjects instead of only relying on the secondary data. For the collection of data directly from the related people, three activities were done. In the first activity, a quiz was done with the first year IT students in the second semester of Jordan and Aston Universities. The second activity was the questionnaire survey with the students of the University of Jordan regarding mobile learning content experience. The mobile learning content experience questionnaire survey was not carried out at Aston University as the UK is a developed country, having the latest technology facilitation, so there was no need for the

mobile learning content experience survey. The last activity was the two sets of focus groups at each university.

After examining the collected data, this study came to the conclusion that the significance of mobile learning cannot be overlooked in higher education with rapid technological advancement all over the world. The attraction of mobile learning is due to the large amount of benefits that it offers in term of easy, flexible and interactive learning. It is evident from the literature review that quite a large number of universities and higher education institutes have been making use of mobile learning strategies in order to facilitate their students and for facilitation of the students the higher education universities in the developed and developing universities also equally developed mobile-optimised versions of their websites. In acknowledging and realising the rapid growth of mobile learning technologies the higher education institutes also developed mobile-based applications that can easily be downloaded by students from the application stores. The success of adoption of mobile learning is based greatly on the data with respect to the mobile usage among students and access to the internet.

It was also found through this study that the students of Aston University took more interest in the activities done for data collection for this research than compared to the students of the University of Jordan. This conclusion is made on the basis of seriousness of the participants while attempting five sets of quizzes. Likewise, the number of fully completed quizzes were higher in the case of Aston University than the University of Jordan, which shows that the students at Aston University went through the five uploaded lectures completely to answer the quiz questions. Conversely, the number of correct answers was found to be low in the case of the University of Jordan which highlights the fact that the participants did not go through the lectures fully as the answers to all the questions of the quizzes were clearly given in the lectures uploaded onto the websites of both universities.

This study also concludes that mobile learning is not done necessarily through smartphones or mobile phone devices, but all handheld devices, such as tablets, laptops, etc. are also used for this purpose. From the analysis of the collected data through the focus group it is concluded that laptops were the most preferred choice of the participating students compared to the other handheld devices because of their large screens and internet connectivity facilitation. Apart from a small screen, a small keypad was also found to be the key challenge hampering the mobile

learning process, which has not yet been resolved. Typing with small keys or even with a small touchpad is cumbersome, which is the reason why the students prefer laptops to handheld devices. The literature also supports this finding as the researchers, such as Iqbal and Qureshi (2012), in their study, revealed that laptops are the most effective devices when used with mobile phones or smartphones for the purpose of mobile learning. It is also concluded that the main reason behind the popularity of handheld devices for mobile learning is easy connectivity and convenient use as almost all participants opined that laptops and handheld devices are portable so students can start learning in any place they want, which facilitates students – especially distance learners.

At the same time, this study also revealed that the participants in the focus group also find mobile learning through handheld devices cumbersome for different reasons. The main reason as mentioned by all participants at both universities, i.e. Aston and the University of Jordan, was the small screen that restricts the learning process. The literature supports this reason as Rajasingham (2011) stated that due to small mobile phone and smartphone screens, the students prefer to open lectures on their laptops. However, with the development of wide-screen mobiles having the latest technology installed the small screen issue attached to mobile learning has been greatly resolved. Despite that fact, no participant talked about this point, which revealed that though the mobile developers have widened the mobile screens, a small screen is still a problem as the laptop screen is wider than those of smartphones and mobile phones.

The participants clearly mentioned the difficulties they face by using handheld devices for learning purposes, for example, the participants stated that they do not use their mobile phones for reading long documents as they cannot scroll constantly while reading. Likewise, writing on handheld devices was also found to be difficult by the participants as they do not have many tools available on handheld devices for writing. In addition to this, the participants also mentioned handheld devices as communicative devices and due to this reason such devices are not considered to be helpful as the majority of the participants emphatically stated that messages and social media contacts are factors, due to which the students avoid using handheld devices for learning purposes.

This study also concludes that the availability of technology also plays a significant role for the success of mobile learning in higher education, for example the participants from the University

of Jordan mentioned technical and installation issues as the key reasons why mobile learning is not as prevalent as it is in developed countries. The features of mobiles also proved to be a challenge to mobile learning in Jordan, like in developing countries. The access to mobile centred modules runs effectively on high quality mobile phones in comparison to low-feature mobiles, which hampers the learning process through mobile phones. It is also concluded that limited battery life is one of the main reasons why which mobiles are not preferred by the students for the mobile learning process. Alongside the limited battery issue, limited memory features also make mobile learning unpopular or ineffective in developing countries but no participant at the University of Jordan mentioned this point. The issue of limited battery life was found to be an issue that is not only associated with mobile devices but laptops as well, although the participants mentioned this issue with respect to mobile or handheld devices and still preferred laptops. The literature revealed that the limited battery issue has long been resolved with the introduction of power bank devices offering charging facilities for handheld devices and laptops as well but the participants did not consider this solution worth mentioning.

Though this study concludes that mobile learning is effective, the development of content for mobile learning is very much a delicate task as the developers need to consider a lot of things while developing lectures for mobile learning. One of the main things in this context is the development of concise lectures as big content cannot be run uninterruptedly on the handheld devices. Likewise, the appropriate use of images and slides also determines the effectiveness of the lectures. The excessive use of images and content was found problematic and distracting as the participants stated that learning discontinues with too much content on a single slide, which means the development of slide-based content needs to be balanced to keep learners on track.

It is also found that content security and copyright issues are challenges that hinder mobile learning, not only in Jordan, but also in the UK as well. However, the measures to curb cybercrime issues are strongly implemented in developed countries in contrast to in developing countries. Handheld devices, especially mobile phones, are at a high-security risk due to the presence of personal data. In addition to this, mobile phone theft and unauthorised access to mobile devices or hacker attacks on the learning system are also included in security concerns, which occur more in developing countries than in developed countries. This is because the laws and measures devised by authorities in developed countries to curb all kinds of security issues are very strongly implemented, whereas developing countries are still struggling in this context.

There is an immense need for the installation of firewall policies, virus control software and filtering policies in developing countries. The participants in the questionnaire survey and the focus group also talked about security issues hindering mobile learning in the country but did not suggest any recommendations in this context.

Different reasons were found behind the high security related issues in developing countries than in developed countries, for example, on one hand, lack of monetary and non-monetary resources along with ineffective legal laws are one reason. On the other hand, lack of knowledge and know-how with respect to damage to mobile or handheld devices are another reason behind this. One of the conclusions drawn after reviewing the pertinent literature was concerning the unreliable mobile networking systems that hamper the learning process as a strong connection is necessary for the reception and delivery of commands and lectures respectively during mobile learning. This issue of weak connectivity was also mentioned by the participants of the questionnaire survey regarding mobile learning content experience at the University of Jordan, which shows that the issue with respect to mobile networking is rampant in developing countries. This kind of issue was not mentioned by the participants of the focus group conducted at Aston University, which implies that due to technological advancements the mobile networking issue is not found in developed countries.

This study also concludes that mobile learning content is developed with particular consideration paid to electronic learning based on desktop computers, which create problems when opened through handheld devices due to different restrictions, such as limited bandwidth and restricted features of mobile devices. Moreover, mobile devices with high specs and features are not within the budget of all students, which also limits the process of mobile learning. Furthermore, the networking of mobile phones is also constrained on the infrastructural scale as networking technology is just available in the developed regions. The multiplicity of operating systems in mobile devices also limits the concept of mobile learning as the development of a learning concept for different types of operating system is challenging and practically not viable. Although this issue was not mentioned by any of the participants, it is still an issue, particularly in the case of higher education institutes in developed countries where the educational institutes already have meagre resources at their disposal. This type of issue is not found in developed countries due to the presence of advanced technology and where greater numbers of students own handheld and other technology-centred devices.

It is also concluded that the quality of video and audio content also limits the mobile learning process as low quality video or audio not only distracts students but also causes a loss of interest as the result of which the students switch to other online sources instead of making use of the mobile learning content developed by their institutes. It is also found that the quality of audio is determined by the voice quality and accent of the speaker, whereas the quality of video is determined by the number of slides and material used for a single lecture. The digital literacy skills are also found to be contributing factors with respect to the effectiveness of mobile learning. The teachers and students both need training with respect to the digital literacy skills for the smooth implementation of the mobile learning process. The research also concludes that the concept of mobile learning does not have any proper definition but it is defined as a process in terms of the facilities it offers, for example the participants considered it to be distance learning or a process of learning which is portable and convenient.

One of the key challenges with respect to mobile learning as mentioned by the participants was difficulties in editing and writing. Typing long pieces of work on mobile and handheld devices is difficult as it affects not only figures but also causes multiple errors. Moreover, a small keypad limits the typing speed to a great extent. Likewise, writing requires many assistive tools, such as highlighting, copy/paste, image and table and diagram creation and other options, which cannot be made use of on mobile devices. The literature not only supports this but also added that working on Microsoft tools, especially a Word file or PowerPoint document is not available on mobiles, which restricts mobile learning. The options for editing are also limited on mobile devices, which makes mobiles the second choice of students for mobile learning in contrast to laptops, which not only offer big screens but also wide keypads.

It is also concluded that unreliability of mobile network systems, especially in developing states, limits the mobile learning opportunities because the presence of a consistent and strong relationship in-between the handheld and mobile device and the servers is necessary for the reception and delivery of lectures. The best networking gadgets that are trustworthy and dependable and give the best link are 3G and 4G but access and availability to high level networks for the students of developing countries is hard. In addition, the educational institutes and universities do not provide their students with high networking facilities due to a lack of resources. This situation is intensified due to weak and poor internet and networking

infrastructures in developing countries. This directly affects the quality of content for mobile learning, which discourage students.

Files composed of content heavy lecture cannot be transferred easily via weak and dying internet connections, which is the reason why the majority of students prefer laptops for mobile learning purposes more than using their mobile phones. In addition to this, the lectures that are designed are computer-centred or suitable for electronic learning, so the format of computer-centred lectures is inappropriate for mobile learning, restricting learning via mobiles. The higher education institutes in developing countries do not pay much attention to, and take serious steps to, design separate lectures and content particularly for mobile learning by keeping in mind the features of handheld devices. It is also concluded that the higher education management must have access to data regarding mobile phones and other handheld devices for students for the sake of development and design of lectures and syllabus.

Distraction appeared to be the key reason found through this study due to which mobiles are not preferred by students and teachers for learning purposes. As the handheld devices, and particularly mobile phones and smartphones, are designed for communication purposes, so SMS, texting and phone calls are distractions that interrupt the learning process. This is the main reason why mobile phones and smartphones are usually not allowed in educational institutes. In addition to this, social media networking worsens the situation as in the presence of Facebook, Twitter and other platforms, students cannot focus on their studies. Therefore, students do not prefer to use their mobile handsets for their studies. However, simultaneously, it was also found that the tool of social media and features of mobile phones are also utilised for the learning purpose as all these facilities offer opportunities for interactive learning, which has altogether changed the traditional style of learning. The study also concluded that the social, cultural and religious factors are not hindering mobile learning in developing countries, such as Jordan, but the lack of technological and infrastructural resources are the main reason why mobile learning has not been prevalent. On the other hand, the trend of mobile learning is a custom in developed countries due to technological advancements and highly sophisticated networking systems.

6.5 Recommendations

The primary findings of this research are that mobile learning is positively accepted in Jordan but is associated with many challenges. Some of the main challenges were installation, device

features, screen resolution and others. Mobile learning was viewed as distance learning as well as one of the most convenient ways of learning. Moreover, video and audio quality were found to affect the learning most profoundly. In addition to this, the analysis revealed that mobile learning was considered by the participants as a useful way of learning as it is convenient, portable and effective. However, it was also concluded that issues are also attached to mobile learning as the users found some issues, for example, with small screen size, distraction and limited battery life in this context.

One of the major challenges that has been highlighted with the implementation of this technology is that it has been distracting students from their actual activities and tasks assigned to them. This was majorly due to the multitasking aspects of these devices. One major distraction that has been highlighted through the study is that it is also and majorly used as a device for communication which makes it irresistible to use this as a communication device. Considering this, it can be recommended that there is a need to limit the adaptation of this technology in accordance with the purpose and aim for its implementation. However, although this would be a challenge as well, it would certainly help in reducing the distraction caused throughout. The recommendations include developing an effective monitoring system and developing the perspective and attitude of students towards these devices especially while studying would also be helpful in this regard. Monitoring the activities of students would be really helpful in limiting their usage to unnecessary sources and mediums. This would majorly include resisting the employment of social media sites such as YouTube, Facebook and Twitter etc.

The findings of the present research have explored that students are facing numerous challenges while earning through mobile phone devices. Moreover, the higher education institutions of Aston University and the University of Jordan are facing certain limitations in the way of implementing the concept of m-learning. Therefore, this section strives to suggest particular solutions that can help the students and the administrations of the universities to eradicate those issues that are presenting as bottlenecks standing in the way of successful execution of m-learning.

The findings highlight that internet connectivity and a lack of supporting features are the main hurdles in the way of successful implementation of m-learning. To address this issue, governments should decline import duties from the import of smartphones. The decline of the

import duty makes smartphones less expensive for students. Moreover, the technology providers of the country and local manufacturing firms of mobile phone devices should upgrade the picture quality, screen size and adopt the concept of HD for the purpose of effective learning.

To address the challenge of distraction, university administrations should restrict access to the social apps such as Whatsapp, Facebook, Twitter, Line, Snapchat and others so that students are not able to play interactive games. Furthermore, particular videos from YouTube and other websites that do not relate to academic purposes should also be restricted in the premises of the universities.

To resolve the issue of connectivity, the administration of the universities should hire IT specialists who will be liable to ensure the smooth internet connectivity of the devices without interruptions. Moreover, to improvise the network issues, the government authorities should increase investment in the department of the information and communication sector. This will help the students to see a reduction in the issues related to internet speed and connectivity.

It is also found that m-learning requires encouragement in order to attract the students to adopt it. To address this issue, the administration of universities should arrange training sessions for teachers regarding the effective utilisation of the technology in teaching. This will allow teachers to create and distribute notes via websites and portals in an effective manner and reduce the significant number of hindrances via mobile learning that would encourage the students towards the adaptation of m-learning. This strategy would also encourage collaborative learning and students could easily get connected to teachers and peers without even being present in the classroom.

The research highlights that students are facing the challenge of short battery life that discourages them from mobile learning. To resolve the limitation of battery timing and life, it is suggested that the technology providers and local manufacturers work on the improvement of the battery life of mobile phones. In line with this, universities should fix electrical sockets near the bench of every student so that students can charge their devices without any hurdles and in the premises of university students so that they do not face this issue.

A small screen has been recognised as the major barrier in mobile learning. Therefore, the manufacturers of handheld devices should take immediate action towards this and they must

upgrade the resolution and pixel setting of smartphones so that the students can get better access to videos and images with small screens.

The handheld manufacturers should also launch the latest phones with bigger screens as this may attain a higher response from users, especially students. However, the tablets as a substitute are available in the marketplace but their prices are not affordable for many students and also, smartphones are more portable than tablets. Therefore, it is a requirement of modern times to launch big screen portable smartphones with an affordable price.

It is not possible for students to use mobile learning content with consistency for a long time because of short battery life issues. This problem is more common in smartphones and it can be resolved by manufacturing phones with high quality genuine batteries so that students can read important documents and prepare their notes without any resistance.

Another barrier in mobile learning is cybercrime, which must be considered by handheld manufacturers, students and teachers as well. Handheld device manufacturers should upgrade their mobile technologies based on firewall policies, filtering and virus control software. The teachers and educational institutions should also take on the liability of certifying the security and safeguarding of their learners from such harm.

The small screen and emission of dangerous rays not only affect eyesight but also influence the overall health of students. It is recommended to the teachers and students to limit the use of smartphones and guide the students towards other handheld devices such as laptops and tablets. It is also the responsibility of smartphone manufacturers to make the latest phones with mobile phone radiation shields or low EMF protection.

Slow download speed and partial internet access have become the most common issue in accomplishing the projects, assignments and presentations on mobile phones, especially in developing countries. It is recommended to the mobile cellular broadband sector to focus towards technological adaption to solve the issue of internet speed. It is also recommended to the regulatory bodies of the developing nations to solve the complexity of the current education system and bring about the execution of information and communication technology as electronic learning initiatives.

6.6 Research Limitations

The main limitations of this study lie in the methodology section, which are scope of the research, sample size, data collection techniques, time limitations, language restriction and some limitations that are associated with ethical considerations and the employment of a mixed study paradigm. The main limitation of this study is that the results or outcomes are only applicable for the students of the University of Jordan and Aston University in the UK. It cannot be used for other university students or researchers, especially in the context of Asian developing countries as it is restricted to the students of the University of Jordan and Aston University in the UK.

Furthermore, despite the use of comprehensive past researches, usage of a sample population and conducted surveys for this study in data collection, there some limitations still remain. The respondents have answered and filled in the questionnaires based on their personal knowledge and experiences, which means this study is only useful for a specific age group that is mainly the university students. Furthermore, the questionnaires were close-ended restricted questions to share the limited personal knowledge and experience. Therefore, this study cannot be used in a generalised manner; it only covers the views and experiences of a limited audience.

Although the use of multiple research methods (mixed design approach) is useful for conducting an effective study, this study has employed multiple research methods and paradigms. Both qualitative and quantitative research methods have been used and research paradigms, namely positivism and interpretive paradigm, are incorporated. But the main weak aspect of mixed research is that it gives vague outcomes and provides ample general information about the study. This makes it difficult for a researcher to manage and handle finding out accurate results of the study. Further, it creates problems in analysing the results and weakens the reliability results. While, on the other hand, utilisation of multiple research paradigms makes the study vague and it becomes unable to give a clear picture of the research assessments. Furthermore, according to Almasri (2015), there is no possibility of mixing different methods for the research study. Alongside this, using a mixed paradigm approach loses the essence of achieving the research objectives.

Moreover, a limited sample size is also a limitation of this research study and data was collected through a convenience sample due to further limitation of time and resources. Further, limitations are associated with ethical considerations. Mostly, the data has been gathered from students who might not have followed the standards and guidelines while responding to the

questionnaires. Additionally, language was also one of the limitations in this study as this study was only conducted in English, whereas the students might use other languages such as Arabic and French. In addition, other limitations in this study are restrictions on time and financial resources.

6.7 Future Work

This research certainly unfolds various and new avenues for future researchers, who may be further interested in assessing the capabilities and limitations of mobile learning technology and its impact on learning in Jordanian higher education. This study can be conducted in different universities around the world, under different factors and conditions. Furthermore, this study can be conducted by including more variables and increasing the number of universities in the study.

Additionally, this research can be conducted in different phases of data analysis in the future, as this study is only based on two phases. These two phases are limited to quizzes, class lectures, surveys and focus group discussions. While it can be further enhanced and carried out into several phases to engage more faculty members and student alumni, mainly the seniors, to target a bigger audience and broaden the scope of this study, the activities took place only with sophomore (first year) students. Alongside this, the topics of the lectures and quizzes were limited to cybercrime, business and technology, green IT, system development and knowledge management. These topics can be increased further and students from other universities can also participate in future studies.

For the future work thematic analysis can be conducted by changing the parameters and variables of the current study. For example, in this study mobile coding, themes and writing-up factors have been tested for mobile learning in the University of Jordan and Aston University. In future studies, other features and aspects of mobile learning can be incorporated.

Additionally, future work can highlight and conduct studies on the highlighted problems of this current study. In this study, the major problems students faced were mobile learning activity on poor connectivity, internet issues and the IT infrastructure of universities. Conversely, further study can be done again regarding mobile learning issues and the significance of mobile features in mobile learning and the prospect of mobile learning in Jordan. Furthermore, a separate study can be carried out on thematic analysis to build more interest and participation of the students. Moreover, more theories and conceptual models can be incorporated to test effective mobile

learning for the students. Finally, a further comprehensive study can be carried out between the senior IT students of the University of Jordan and Aston University on improving mobile learning for higher education.

6.8 Chapter Summary

This chapter aims to portray the conclusion of the findings and the presence of the required recommendations that can help the educational institutes to successfully implement m-learning. The chapter presented the knowledge contribution of the present research into theory and practice. This section highlighted how the present study has utilised the TPACK theory and the theory of connectivism into practice. In addition to this, the challenges and limitations are explored in the context of the developing country. Furthermore, the perception of the students was also evaluated regarding m-learning. In line with this, the limitations of the present research are also mentioned in this chapter. To explain the area of further research, the Future work section mentions those areas that can be explored by future researchers.

This research was done by employing equally qualitative and quantifiable research methods. To gather data for this study, three activities were done – quiz conduction, questionnaire survey with the students of the University of Jordan and focus group conduction with the students of Aston and the University of Jordan. The questionnaire-based quiz was uploaded to the website of Jordan and Aston Universities for the first year IT students. The five uploaded lectures were based on their teachers' lectures in the second semester whereas the questionnaire for five quizzes was based on the five lectures uploaded at each university. The participating students were asked to answer the quiz questions after reading the uploaded lectures. For this study, close-ended questions were given preference over open-ended as close-ended provides stable feedback in comparison with the outcomes attained from the open-ended questionnaire. The first quiz was based on the cybercrime lecture and was comprised of 25 questions.

The second quiz was composed of 21 questions and based on a lecture on business and technology. The next quiz was on system development and comprised of 21 questions. The total amount of queries in the fourth quiz was 19 and was based on the knowledge management lecture. The last quiz was designed on green IT by containing 17 questions. Alongside five lecture-based quizzes, one questionnaire was developed about the mobile learning content experience, which was a mixture of close-ended and open-ended questions by using the Likert

scale. The purpose of the questionnaire survey on mobile learning content experience in Jordan was to find out the students' experiences regarding the mobile learning activity and mobile learning content due to the high level of technological limitations in Jordan. There were ten questions in the survey, out of which four were open-ended and the rest were close-ended. Two sets of focus groups were conducted with the first-year students of IT studying in their second semester at Aston University and two at the University of Jordan.

The data obtained through three activities was analysed with different techniques. For the analysis of data obtained through the quizzes, a simple descriptive statistics percentage method, along with the use of inbuilt Word doc tools, tables and graphs was used. Conversely, for the study of data obtained through the questionnaire survey regarding mobile learning content experience, IBM SPSS 22.0 was used. The test for the data examination was one sample t-test, and mean values, whereas for the analysis of data obtained through the focus group, a thematic analysis technique was used as the data obtained is qualitative.

The theoretical addition of this research is the application of the TPACK theory by Mishra and Koehler (2006) and the Connectivism theory of Siemens and Downes (2008) for the making of mobile learning content in the Jordanian context. The theory of connectivism is highly suitable for the research topic of mobile learning because this theory is particularly designed for the digital age and incorporating technological methods in the learning process. The theory of connectivism is not negated while applying it; instead it facilitated the development of mobile learning content for this study, which was developed to incorporate technology into learning. On the other hand, the reason for applying the TPACK framework is its inclination towards the usage of mobile applications and functions that provide different ways for students to enhance their skills. Moreover, this theory can also facilitate in developing mobile learning content as it focuses on those specifications that have been purposely designed for the learning environment.

The contradictions found while analysing the collected data with the literature review do not require the restating of both the theories, i.e. Connectivism and TPACK, because the contradictions found are connected to the features of mobile learning instead of the theoretic aspect of using mobile gadgets for the learning purpose. Moreover, the developed conceptual framework for this study is also supported by the results of this research as the results obtained after analysing the obtained data are related to the two main components of the framework, i.e.

capabilities and limitations. The obtained results elucidate the capabilities and limitations of using mobile learning technologies in the higher education sector.

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8 Appendix

8.1 Quizzes

8.1.1 Session 1: Introduction & Knowledge Management

Please answer following question, in case you need any assistance please ask your instructor.

Name: _____

Session attended at (circle Appropriate): Jordan Aston

1. The decision can not affect or change the data.
 - a. Yes
 - b. No
2. Data are raw facts which are
 - a. Meaningful
 - b. useful
 - c. meaningless
 - d. unusual
 - e. trends
3. The data which is processed is _____?
 - a. programme
 - b. bio data
 - c. procedure
 - d. information
 - e. file
4. The DIKW model is presented by _____?
 - a. Henry Capac
 - b. moray
 - c. Rowley j.
 - d. RusselAckoff
5. According to DIKW model how can state of wisdom be achieved?
 - a. Input and programming

- b. Analysis and application of human input on data
 - c. Evaluating data into information
 - d. Transforming from information to knowledge is wisdom
6. _____ comes at the top of DIKW model?
- a. information
 - b. data
 - c. wisdom
 - d. knowledge
 - e. None of the above
7. The person contributing to create knowledge is known as
- a. student
 - b. teacher
 - c. know ledger
 - d. knowledge worker
8. Knowledge Management provides opportunities for the employees to?
- a. Exchange knowledge
 - b. Brainstorm ideas
 - c. Devise new ways
 - d. All of the above
9. The culture of knowledge cannot be developed without
- a. information
 - b. support of management
 - c. Business variables
 - d. None of the above
10. Knowledge worker is not a
- a. Multiple relationship
 - b. Linear relationship
 - c. None
11. As the organisations interact with the environment they
- a. Generate information

- b. Absorb information
 - c. Use information
12. The organisations take the actions based on their own
- a. Experience
 - b. Values
 - c. Internal rules
 - d. All of above
 - e. None of above
13. The important role of the Knowledge Management in organisations is that to?
- a. Ensure Access to knowledge
 - b. Develop knowledge workers
 - c. Create opportunities for knowledge creation
 - d. Enhance employee potential
 - e. Define what is knowledge for the organisation
14. The knowledge can be formally transferred through
- a. Training
 - b. Workplace socialisation
 - c. All of above
 - d. None
15. The knowledge can be informally transferred through
- a. Training
 - b. Workplace socialisation
 - c. All of above
 - d. None
16. Knowledge can be accessed in the firm through
- a. Inside sources
 - b. Outside sources
 - c. Both of above
 - d. None of above
17. In the process of Knowledge Management the key ends are:

- a. Management and technology
- b. Strategy and management
- c. Strategy and technology

18. Knowledge Worker promotes:

- a. Active listening
- b. Active learning
- c. Active speaking
- d. None

19. Please share your experience about the session activity with us in few words

8.1.2 Session 2: Business and Technology

Please answer following question, in case you need any assistance please ask your instructor.

Name: _____

Session attended at (circle Appropriate): Jordan Aston

1. Technology is important for business?
 - a. Yes
 - b. No
2. Why business needs to adopt technology?
 - a. It decreases productivity
 - b. It increases productivity
 - c. It creates social awareness
 - d. It maintains protocol
3. Technology increases reach
 - a. Yes
 - b. No
4. Technology can improve the efficiency of
 - a. Human resource
 - b. marketing
 - c. value chain
 - d. above all
 - e. none
5. Technology is growing at a rapid scale across the globe
 - a. Yes
 - b. No
6. The number of websites in recent years have been increased to
 - a. 5 billion
 - b. 20 million
 - c. 50 million
 - d. 1 million

7. Technology is now available at lower cost
 - a. Yes
 - b. No
8. Business model is applicable to
 - a. Production department
 - b. Marketing department
 - c. Sales department
 - d. All of the above
9. Idea that can improve efficiency of value chain activities is:
 - a. Virtual value chain
 - b. Brick & Mortar
10. Computers are extremely accurate
 - a. Yes
 - b. No
11. Computers can be applied to _____ range of tasks
 - a. Small
 - b. Large
12. Machines get bored easily
 - a. Yes
 - b. No
13. Speed of world's fastest computer is
 - a. 1.5 peta flop
 - b. 2peta flop
 - c. 3.7 peta flop
 - d. 1 peta flop
14. Technology has changed the way small business functions
 - a. Yes
 - b. No
15. Technology provides competitive edge to the business
 - a. Yes

- b. No
- 16. Technology helps in creating
 - a. New markets
 - b. New business models
 - c. New products & services
 - d. All of the above
- 17. Business model of _____ industry has seen drastic changes in recent years
 - a. Automobile industry
 - b. Tourism industry
 - c. Music industry
- 18. Marketing department is interconnected with all the other departments
 - a. Yes
 - b. No
- 19. _____ has been successful in creating new business models
 - a. Enron
 - b. Apple
 - c. none
- 20. Online shopping has increased tremendously in the recent years
 - a. Yes
 - b. No
- 21. Please share your experience about the session activity with us in few words

8.1.3 Session 3: Green IT

Please answer following question, in case you need any assistance please ask your instructor.

Name: _____

Session attended at (circle Appropriate): Jordan Aston

1. Which of these is not a cause due to which the concept of Green IT came into being?
 - a. Increase in energy consumption by IT
 - b. IT industry accounts for 3% of world's emission
 - c. A PC runs at 6% efficiency, data centers run at 56% efficiency
 - d. Unauthorized users could also log in to confidential systems
2. IT industry accounts for higher emission than
 - a. Data centers
 - b. Steel industry
 - c. Airline industry
 - d. Chemical industry
3. Energy consumed by IT has increased many folds since
 - a. 1985
 - b. 1990
 - c. 1995
 - d. 2000
4. One of the Key contaminants are:
 - a. LCDs
 - b. LEDs
 - c. Lead in CRTS
 - d. None of these
5. Which of these is not a function of Green IT?
 - a. Minimizes the carbon footprint of computer
 - b. Reduce travel (video conferences)
 - c. Unified communications & virtualisation
 - d. Minimizes documentation in a software process

6. E-waste is
 - a. Describes household wastes
 - b. Describes the discarded electrical or electronic devices
 - c. Describes deforestation
 - d. Describes discarded E-mails
7. E-wastes can be recycled, reused and refurbished.
 - a. Yes
 - b. No
8. During the last decade the growth of e-waste has been considerably
 - a. High
 - b. Low
 - c. Average
 - d. None of these
9. There have been various efforts done in area of recycling to control the issue which has result in _____ of recycling during 2011.
 - a. 14%
 - b. 18%
 - c. 24%
 - d. 36%
10. Which of these has the highest contribution in composition of e-waste
 - a. consumer electronics
 - b. IT technologies
 - c. Large House hold appliances
 - d. All have equal contribution
11. In power saver mode, the top item is necessary
 - a. Yes
 - b. No
12. Energy Star is a “seal of approval” by the
 - a. Solar Star organisation of the government
 - b. Energy Star organisation of the government

- c. Bright Star organisation of the government
 - d. Power Star organisation of the government
13. Use LCDs instead of CRTs as they are more _____ efficient
- a. Cost
 - b. Power
 - c. Working
 - d. None of these
14. _____ is one area that has been identified clearly as a base for unethical business behaviour through the application of technologies.
- a. Security
 - b. Communication
 - c. Privacy
 - d. Content
15. Companies and governments cannot easily monitor digital, text-based communication, such as email
- a. Yes
 - b. No
16. Companies monitor employees and visitors and collect much additional information in the name of _____
- a. Security
 - b. Communication
 - c. Privacy
 - d. Content
17. Please share your experience about the session activity with us in few words

8.1.4 Session 4: Cybercrime

Please answer following question, in case you need any assistance please ask your instructor.

Name: _____

Session attended at (circle Appropriate): Jordan Aston

1. Cybercrime is
 - a- bad use of technology and internet
 - b- bad use of cameras
 - c- bad use of communication
 - d- bad use of authority
2. Which of these is not a use of internet to commit a crime
 - a- Identity Theft
 - b- Downloading
 - c- Hacking
 - d- Viruses
3. There are _____ elements of computer security.
 - a- One
 - b- Two
 - c- Three
 - d- Four
4. Integrity means data is correct and hasn't been altered by authorized users or software.
 - a- Yes
 - b- No
5. How is cybercrime committed? Elaborate with the required tools.
6. List those electronic components that may make us vulnerable to cybercrime.
7. Define Information security and give example of any institution involved.
8. Discuss the famous bottom up and bottom down approaches in context to security.
9. List the tools crucial to information security.
- 10 "Only those authorized to view information" is called

a) Confidentiality b) Integrity c) cybercrime

11. Data is available to _____ users:

a) Registered b) end c) authorized

12. _____ billion surfers are present on the internet

a) 3.5 b) 7.5 c) 2.5 d) 2.0

13. Percent of global trade happening on the internet is

a) 16 b) 20 c) 19 d) 18

14. The world's top second country in cybercrime is

a) India b) Kenya c) turkey d) china

15. Which country did not score a place in the top 20 cybercrime list

a) Thailand b) china c) India d) USA

16.3.1 million _____ searches are made every month

a) Bing b) yahoo c) google

17. one of the cybercrime components is:

a) TV b) washing machine c) radio d) cell phone

18. analysis starts with the documentation of the findings and a feasibility analysis update

a) true b) false

19. Who should be careful to protect themselves online:

a) Cyber criminals b) policemen c) lawmakers

20.A computer can be

a) Subject of attack b) object of attack c) both a and b d) none of these

21. During investigation, a preliminary ____ analysis is developed

a) cost b) profit c) loss

22. To develop and execute specific security policies and procedures, additional _____ support and technical expertise is required

a) Administrative b) political c) educational

23. It takes a wide range of professionals to support a diverse information security program.

a) Yes b) no

24. ____ phase In investigation is the most important

a) First b) second c) third

25. Please share your experience about the session activity with us in few words

8.1.5 Session 5: System Development

Please answer following question, in case you need any assistance please ask your instructor.

Name: _____

Session attended at (circle Appropriate): Jordan Aston

1. Good system keeps _____ the system efficiency.
 - a. Decreases
 - b. Increases
 - c. Normal
 - d. failure
2. Bad implementation of the system may lead to
 - a. Downfall
 - b. Total decrease
 - c. Total failure
 - d. Total increase
3. During planning for the system one should
 - a. Improve process performance
 - b. Optimize process design
 - c. Define new processes
 - d. All of the above
4. The goal is to understanding the _____ business.
 - a. Pre existing
 - b. Existing
 - c. Past
 - d. future
5. understanding of business and system is necessary in order to create
 - a. business
 - b. system
 - c. improvement
 - d. none
6. focus on the present means
 - a. analysis of present organizational processes
 - b. business plans and goals
 - c. both of the above
 - d. none
7. focus on the future means:
 - a. analysis of communication
 - b. analysis of informing needs
 - c. all

- d. none
- 8. analysis of information needs applies
 - a. What data is needed
 - b. what system outputs are needed,
 - c. who/when/where needs them
 - d. all of the above
- 9. Designing system is about creating a new IS or a major upgrade of an existing IS.
 - a. Yes
 - b. No
- 10. The _____ is defined according to the model of organizational process resulting from the System Analysis step
 - a. Data analysis
 - b. Processing of data
 - c. Data designing
 - d. none
- 11. User interface is the point of connection between
 - a. User and System,
 - b. System and computer
 - c. Business and system
 - d. None of the above
- 12. User interface determines
 - a. expenditures of users' time and effort
 - b. Productivity factors.
 - c. Both
 - d. None
- 13. SDLC stands for
 - a. System designing life cycle
 - b. System developing life cycle
 - c. All
 - d. None
- 14. SDLC contains ____ steps
 - a. 6
 - b. 7
 - c. 8
 - d. 9
- 15. After implementation there comes _____ in SDLC.
 - a. Analysis
 - b. Development
 - c. maintenance
 - d. None of the above

16. Before the development in SDLC there comes
- a. Analysis
 - b. Maintenance
 - c. Testing
 - d. design
 - e. None
17. _____ involves establishing a high-level plan of the intended project and determining project goals
- a. Planning phase
 - b. Maintenance phase
 - c. Analyzing phase
 - d. None
18. _____ involves analyzing end-user business requirements and refining project goals into defined functions and operations of the intended system
- a. Planning phase
 - b. Maintenance phase
 - c. Analyzing phase
 - d. None
19. _____ involves performing changes, corrections, additions, and upgrades to ensure the system continues to meet the business goals
- a. Planning phase
 - b. Maintenance phase
 - c. Analyzing phase
 - d. None
20. _____ determines which projects offer the organization the greatest benefits with the least amount of cost.
- a. Value chain analysis
 - b. Strategic alignment
 - c. Cost/benefit analysis
 - d. Resource availability

21. Please share your experience about the session activity with us in few words

8.2 Questionnaire for mobile learning content experience

Date: _____

Gender: _____

Instructions: This questionnaire is developed to get data about the students' experience about the mobile learning content. Please, select the suitable option. Please select only one the most appropriate option instead of picking up many. Your cooperation is appreciated.

1. Do you think this way of teaching is helpful?
 - a. Strongly agreed
 - b. Agreed
 - c. Neither agree or disagree
 - d. Disagree
 - e. Strongly Disagree
2. How would you rate the experience of working compared with classroom teaching?
 - a. Very Good
 - b. Good
 - c. Average
 - d. Bad
 - e. Very Bad
3. What do you think is the main beneficiary of mobile learning?
 - a. University students
 - b. Distant learning
 - c. Physically challenged students
 - d. Global universal platform
 - e. Can open new opportunities of learning
 - f. Not effective
 - g. Not satisfied and don't recommend
4. Did you find any problem in using the mobile learning content? If yes can you please identify?
 - a. No Problem at all
 - b. Smooth running no glitches

- c. A little but Ok
 - d. Couldn't load the lecture
 - e. Problem with connectivity
5. What do you recommend to increase the learning experience?
- a. Better internet connectivity
 - b. Improved content
 - c. Can be used as it is
6. How can this method of learning benefit students?
- a. _____
 - b. _____
 - c. _____
7. Do you think this method of learning can be used for comprehensively full time university education?
- a. Yes
 - b. No
8. What according to you is the difference between this method of learning and normal learning process?
- a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
 - f. _____
9. Can you list down factors that relate to better application of mobile learning?
- _____
- _____
- _____
- _____
- _____
10. What do you think are the key problems for the implementation of mobile learning?

Thank you

8.3 Solved Questionnaire 1 for mobile learning content experience

Date: _____

Gender: _____

Instructions: This questionnaire is developed to get data about the students' experience about the mobile learning content. Please, select the suitable option. Please select only one the most appropriate option instead of picking up many. Your cooperation is appreciated.

1. Do you think this way of teaching is helpful?
 - a. Strongly agreed
 - b. Agreed
 - c. Neither agree or disagree**
 - d. Disagree
 - e. Strongly Disagree
2. How would you rate the experience of working compared with classroom teaching?
 - a. Very Good
 - b. Good
 - c. Average**
 - d. Bad
 - e. Very Bad
3. What do you think is the main beneficiary of mobile learning?
 - a. University students**
 - b. Distant learning
 - c. Physically challenged students
 - d. Global universal platform
 - e. Can open new opportunities of learning
 - f. Not effective
 - g. Not satisfied and don't recommend
4. Did you find any problem in using the mobile learning content? If yes can you please identify?
 - a. No Problem at all
 - b. Smooth running no glitches

- c. A little but Ok
 - d. Couldn't load the lecture
 - e. **Problem with connectivity**
5. What do you recommend to increase the learning experience?
- a. **Better internet connectivity**
 - b. Improved content
 - c. Can be used as it is
6. How can this method of learning benefit students?
- a. **It helps in learning about new technology**
 - b. It helps in gaining knowledge
 - c. Access to the new and advanced way of doing things
7. Do you think this method of learning can be used for comprehensively full time university education?
- c. **Yes**
 - d. No
8. What according to you is the difference between this method of learning and normal learning process?
- a. It enables gathering in-depth information
 - b. It is portable way of learning
 - c. **No accessibility issue**
 - d. More options are available as compared to normal learning
 - e. Less time consuming as compared to normal learning
9. Can you list down factors that relate to better application of mobile learning?
- Availability anytime and any place
- Perceived usefulness
- Portability**
- Social influence
- More options and features
10. What do you think are the key problems for the implementation of mobile learning?
- Internet
- Infrastructure

Devices

Speed

Awareness

Thank you

8.4 Solved Questionnaire 2 for mobile learning content experience

Date: _____

Gender: _____

Instructions: This questionnaire is developed to get data about the students' experience about the mobile learning content. Please, select the suitable option. Please select only one the most appropriate option instead of picking up many. Your cooperation is appreciated.

1. Do you think this way of teaching is helpful?
 - a. Strongly agreed
 - b. Agreed
 - c. Neither agree or disagree**
 - d. Disagree
 - e. Strongly Disagree
2. How would u rate the experience of working compared with classroom teaching?
 - a. Very Good
 - b. Good
 - c. Average
 - d. Bad**
 - e. Very Bad
3. What do you think is the main beneficiary of mobile learning?
 - a. University students**
 - b. Distant learning
 - c. Physically challenged students
 - d. Global universal platform
 - e. Can open new opportunities of learning
 - f. Not effective
 - g. Not satisfied and don't recommend
4. Did you find any problem in using the mobile learning content? If yes can you please identify?
 - a. No Problem at all
 - b. Smooth running no glitches

- c. A little but Ok
 - d. Couldn't load the lecture**
 - e. Problem with connectivity
5. What do you recommend to increase the learning experience?
- a. Better internet connectivity
 - b. Improved content**
 - c. Can be used as it is
6. How can this method of learning benefit students?
- a. It helps in learning about new technology**
 - b. It helps in gaining knowledge
 - c. Access to the new and advanced way of doing things
7. Do you think this method of learning can be used for comprehensively full time university education?
- e. Yes
 - f. No**
8. What according to you is the difference between this method of learning and normal learning process?
- a. It enables gathering in-depth information
 - b. It is portable way of learning
 - c. No accessibility issue**
 - d. More options are available as compared to normal learning
 - e. Less time consuming as compared to normal learning
9. Can you list down factors that relate to better application of mobile learning?
- Availability anytime and any place
- Perceived usefulness
- Portability
- Social influence**
- More options and features
10. What do you think are the key problems for the implementation of mobile learning?
- Internet
- Infrastructure

Devices

Speed

Awareness

Thank you

8.5 Solved Questionnaire 3 for mobile learning content experience

Date: _____

Gender: _____

Experience of working in the activity: _____

Instructions: This questionnaire is developed to get data about the students' experience about the mobile learning content. Please, select the suitable option. Please select only one the most appropriate option instead of picking up many. Your cooperation is appreciated.

1. Do you think this way of teaching is helpful?
 - a. Strongly agreed
 - b. Agreed
 - c. Neither agree or disagree
 - d. Disagree**
 - e. Strongly Disagree
2. How would u rate the experience of working compared with classroom teaching?
 - a. Very Good
 - b. Good
 - c. Average**
 - d. Bad
 - e. Very Bad
3. What do you think is the main beneficiary of mobile learning?
 - a. University students
 - b. Distant learning
 - c. Physically challenged students**
 - d. Global universal platform
 - e. Can open new opportunities of learning
 - f. Not effective
 - g. Not satisfied and don't recommend
4. Did you find any problem in using the mobile learning content? If yes can you please identify?
 - a. No Problem at all

- b. Smooth running no glitches
 - c. A little but Ok
 - d. Couldn't load the lecture**
 - e. Problem with connectivity
- 5. What do you recommend to increase the learning experience?
 - a. Better internet connectivity**
 - b. Improved content
 - c. Can be used as it is
- 6. How can this method of learning benefit students?
 - a. It helps in learning about new technology
 - b. It helps in gaining knowledge**
 - c. Access to the new and advanced way of doing things
- 7. Do you think this method of learning can be used for comprehensively full time university education?
 - g. Yes**
 - h. No
- 8. What according to you is the difference between this method of learning and normal learning process?
 - a. It enables gathering in-depth information
 - b. It is portable way of learning**
 - c. No accessibility issue
 - d. More options are available as compared to normal learning
 - e. Less time consuming as compared to normal learning
- 9. Can you list down factors that relate to better application of mobile learning?
 - Availability anytime and any place**
 - Perceived usefulness
 - Portability
 - Social influence
 - More options and features
- 10. What do you think are the key problems for the implementation of mobile learning?
 - Internet

Infrastructure

Devices

Speed

Awareness

Thank you

8.6 Solved Questionnaire 4 for mobile learning content experience

Date: _____

Gender: _____

Experience of working in the activity: _____

Instructions: This questionnaire is developed to get data about the students' experience about the mobile learning content. Please, select the suitable option. Please select only one the most appropriate option instead of picking up many. Your cooperation is appreciated.

1. Do you think this way of teaching is helpful?
 - a. Strongly agreed
 - b. Agreed
 - c. Neither agree or disagree**
 - d. Disagree
 - e. Strongly Disagree
2. How would you rate the experience of working compared with classroom teaching?
 - a. Very Good
 - b. Good
 - c. Average**
 - d. Bad
 - e. Very Bad
3. What do you think is the main beneficiary of mobile learning?
 - a. University students
 - b. Distant learning
 - c. Physically challenged students
 - d. Global universal platform
 - e. Can open new opportunities of learning
 - f. Not effective
 - g. Not satisfied and don't recommend**
4. Did you find any problem in using the mobile learning content? If yes can you please identify?
 - a. No Problem at all

- b. Smooth running no glitches
 - c. A little but Ok
 - d. Couldn't load the lecture
 - e. Problem with connectivity**
- 5. What do you recommend to increase the learning experience?
 - a. Better internet connectivity
 - b. Improved content**
 - c. Can be used as it is
- 6. How can this method of learning benefit students?
 - a. It helps in learning about new technology
 - b. It helps in gaining knowledge
 - c. Access to the new and advanced way of doing things**
- 7. Do you think this method of learning can be used for comprehensively full time university education?
 - i. Yes
 - j. No**
- 8. What according to you is the difference between this method of learning and normal learning process?
 - a. It enables gathering in-depth information
 - b. It is portable way of learning**
 - c. No accessibility issue
 - d. More options are available as compared to normal learning
 - e. Less time consuming as compared to normal learning
- 9. Can you list down factors that relate to better application of mobile learning?
 - Availability anytime and any place
 - Perceived usefulness
 - Portability**
 - Social influence
 - More options and features
- 10. What do you think are the key problems for the implementation of mobile learning?
 - Internet

Infrastructure

Devices

Speed

Awareness

Thank you

8.7 Solved Questionnaire 5 for mobile learning content experience

Date: _____

Gender: _____

Experience of working in the activity: _____

Instructions: This questionnaire is developed to get data about the students' experience about the mobile learning content. Please, select the suitable option. Please select only one the most appropriate option instead of picking up many. Your cooperation is appreciated.

1. Do you think this way of teaching is helpful?
 - a. Strongly agreed
 - b. Agreed**
 - c. Neither agree or disagree
 - d. Disagree
 - e. Strongly Disagree
2. How would you rate the experience of working compared with classroom teaching?
 - a. Very Good
 - b. Good
 - c. Average**
 - d. Bad
 - e. Very Bad
3. What do you think is the main beneficiary of mobile learning?
 - a. University students**
 - b. Distant learning
 - c. Physically challenged students
 - d. Global universal platform
 - e. Can open new opportunities of learning
 - f. Not effective
 - g. Not satisfied and don't recommend
4. Did you find any problem in using the mobile learning content? If yes can you please identify?
 - a. No Problem at all

- b. Smooth running no glitches
 - c. A little but Ok
 - d. Couldn't load the lecture**
 - e. Problem with connectivity
- 5. What do you recommend to increase the learning experience?
 - a. Better internet connectivity**
 - b. Improved content
 - c. Can be used as it is
- 6. How can this method of learning benefit students?
 - a. It helps in learning about new technology**
 - b. It helps in gaining knowledge
 - c. Access to the new and advanced way of doing things
- 7. Do you think this method of learning can be used for comprehensively full time university education?
- k. Yes
- l. No**
- 8. What according to you is the difference between this method of learning and normal learning process?
 - a. It enables gathering in-depth information
 - b. It is portable way of learning**
 - c. No accessibility issue
 - d. More options are available as compared to normal learning
 - e. Less time consuming as compared to normal learning
- 9. Can you list down factors that relate to better application of mobile learning?
 - Availability anytime and any place**
 - Perceived usefulness
 - Portability
 - Social influence
 - More options and features
- 10. What do you think are the key problems for the implementation of mobile learning?
 - Internet

Infrastructure

Devices

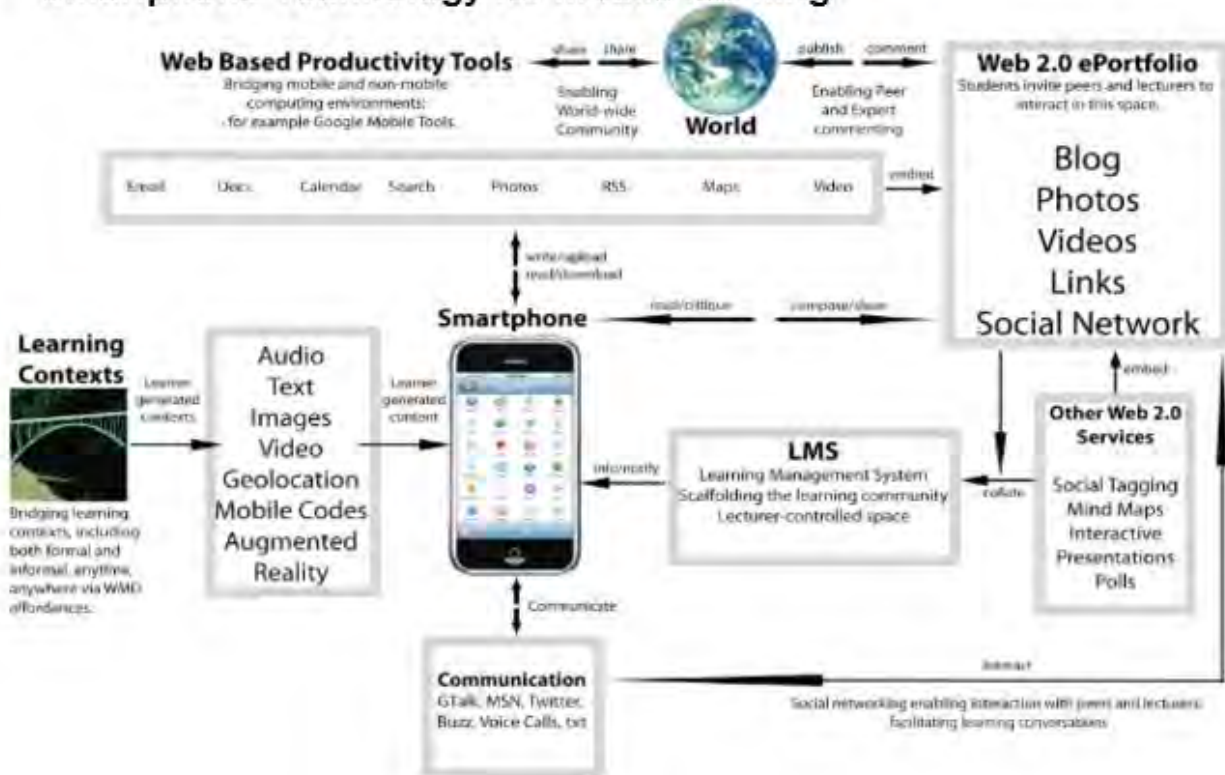
Speed

Awareness

Thank you

8.8 Mobile learning Technologies

Smartphone Technology for mobile learning



PDA



- ✦ PDA – Personal Digital Assistant
- ✦ It is a computer that fits in your hand.
- ✦ Handheld computer that is also known as a palmtop computer.
- ✦ Today, the vast majority of PDAs sold are Smartphones, and sell more than the stand alone PDAs.
- ✦ Typical features include:



- ✦ Touch screen
- ✦ Wireless connectivity
- ✦ Synchronization
- ✦ Wired connectivity



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8.9 Focus group Transcript – Aston I

8.9.1 Participant Demographics

Ten participants took part in the focus group:

Males	Females
6	4

Number of students	Age brackets
2	18-20
4	20-22
4	23-30

8.9.2 Focus group transcript

Teacher: To make it easier to analyze it later on. To start with, we will show you a video quality of very high quality and just to get a baseline opinion. So if you want to view, we will now show you a clip.

Recording voice: Hi. I have been in Google for the last 7.5 years, working as a global director for the environment. I have also worked with tech companies for 20-25 years. I think there is a perfect storm in the organisations. On one hand, there is a lot of frustration, digital approaches, mentoring and training approaches within organisation. We had a problem perhaps last 6 to 7 years ago in Google that was related to product training. The challenges were around pace and contact as they had changed very, very rapidly and also around distribution levels. Knowledge is always locked up in the heads of organisation and finding mechanisms that operate in the world. They are certainly the key determinants that contribute to the success of the functions. We want to run conventional tackles to use line based people as other employees that are beneficial for the training process systems and the learning process system. We came up with a model for G to G

(Googler to Googler) and used You-Tube as a model for internal learning. We can also upload videos that could be used in the learning process. So initially, we have been listed or originally we will be assigned as trainers on a line on the basis of individuals according to their expertise who can learn from one another through live delivery or through remote media and also through instruction design and program management. This will help in grooming its capabilities through a learning network. We still didn't do conventional things, Of course. Community values are how fostered or encouraged through a learning climate for an organisation. So for us at the time that was around some kind of threat to the organisation far from it actually that was a relatively cooler and progressive and end to end approach that was used for driving and facilitating an organisation. G to G (Googler to Googler) now covers pretty much all the main areas that are related to training and coaching support. I think in upwards of about 80% of all the internal educations delivered are done through the G to G network.

Teacher: Now. Feel free to say whatever you want to say. There are now right or wrong answers or anything like that. So, basically, what you just saw was what we call a talking head video which is a kind of that quite often you on things like V-Play any other kinds of media. So thinking about that video that you just had a look at, we were having problems with it in terms of seeing everything clearly and hear everything clearly and pictures of good quality. What do you think?

Respondent C: Yes the presentation is pretty good and very clear and the flight actually followed it but the piston hanged.

Respondent A: Did anyone have any problem in following with what was being said or was it unclear or did anyone.....

Respondent D: Well the slides were clear but I don't like how interactive it is like consuming it too much in hand and sliding in and out, in and out.

Respondent C: It was like they were trying to squeeze in a lot of information.

Respondent E: I think they were trying to squeeze in everything that he was saying. It was like that there was pictures or animation for everything because it was like looking at pictures rather than what he was saying.

Respondent A: Yes. It was like doing it so much that it does lose its impact. Do we all agree with that?

In chorus: Yes

Respondent A: Ok. So now we will show you the second clip. It is exactly the same thing but created at a relatively much lower quality. So that it is easy to be viewed in a mobile phone or on a portable device.

Same clip showed again but at a lower quality

Respondent A: Ok, so a similar question about this clip. Did you have any problem with this clip in terms of clarity or quality of the audio? Did you see everything clearly? Were there any issues with following it, watching it and understanding it?

Respondent D: So the outcome that I come to is that after watching it for a few minutes I feel like it was quite vague.....

Respondent C: I was also like a bit confused

Respondent A: Ok. So that's quite interesting. So would any of you do the same?

Respondent F: I think that their interaction is still of the top mode and would have been fine in terms of quality. But since they use a lot of information and there were large and small texts, the small texts were not visible to read.

Respondent E: And although it was worst quality like it was not easy to watch. I am sure that if I had watched it on You-Tube, I would have switched the channel or moved on to some other video as well. But vividly it made me kind of listen to what he was saying because I was focusing on the image so much as it was not clear. I picked up more on this video like listening to it rather than watching it.

Respondent A: So we got two points of view here. On one hand, it would put you off so much that you would click away. Anybody else feels like click away and gets put off?

Respondent F: I think like to that point you listen to the person more but without the pictures and without the animation like you would be put off.

Respondent A: Ok. So it is like that if there are no pictures or animations you would like to focus more on the audio. What do you think?

Respondent F: No. But even if you listen to the audio, the pictures in the animation have to make sense. Because if you don't get that then there is no point in listening to the audio alone.

Respondent A: Ok. So why would you choose a high res one to a low a res one? What helps you to choose and decide upon that one?

Respondent G: It is all about clarity.

Respondent E: I think it is also about like whenever I see a video, I don't know about you guys but I judge how good the video is by the quality of the video. So if it is a low-quality video I assume that it is not good, a bit like the content. I use You-Tube a lot for understanding the lectures sometimes but if the lecture is unclear and blurry than I have to switch. He might be a great lecturer and he might be teaching me very well but I would not be satisfied because it is not high quality.

Respondent B: So it is general assumption that if the video quality is not good then you kind of assume that content is not good. Yeah? It is quite interesting. Ok, so what do you think is missing from the second video? What do you think is lost when you reduce the video quality of it?

Respondent H: All words missing. Total blurry to read.....

Respondent A: So all the visual on the screen? Is there anything else?

Respondent A: If it was smoother in terms of how it runs and how we watched it but it was still a bit blurry, would it make any difference?

Respondent F: I think it also depends on the context of the video. For example, even if it had lots of texts but if it was blurry than it won't make sense. But if it had someone talking over and if the quality was blurry with some texts, I won't mind watching a blurry video.

Respondent C: I think the fact that I have to go a bit deeper. If the uploader is the original creator of the video and if the video comes directly from the creator, it is certainly going to be a video of good quality.

Respondent A: Ok. If you thought the video was important, would you try to find a better quality. So you have made that effort?

Respondent F: Yes. I would like to find alternatives to that video.

Respondent A: Ok. So if you have to study for a specific module and even though if you to study it, you kind have to go and long for something else? Would you still do that?

Respondent F: For example, if I can't understand the lecture or if it is blurry and of poor quality, then I would rather try to find it on You-Tube and get it from other lecturers if they are of good quality.

Teacher: Did anyone have any problem listening to the clip in terms of quality or was there any background noise that was distracting or was it anything that made it difficult.

Respondent F: Surprisingly, it is very clear.

Teacher: Ok. So no issues or problems at all, right? Ok. So if you have to listen to it as a part of your module or something like that, would you be fine with that?

Respondent E: It is also due to the way the guy speaks because he is not like going super fast and he pauses and it is easy to understand what he is saying along with the quality it is really good but the way that he speaks like very slowly and.....

Respondent A: Ok. So the content here is very important? Would you agree?

Respondent C: Yes, especially for the type of content. For instance, if he is explaining financial concepts or equations than he would need visuals or media and they would be helpful.

19:01 min to 19:54 min as an audio lecture is being played so cannot be heard

The transcript resumes from 19:54 min

Teacher: Ok. So were there any problems with the quality? Could you hear it clearly? Could you understand what was being said?

Respondent F: The background noise was annoying.

Respondent D: The voice was clear but it was so annoying due to the background noise. I wouldn't mind watching it if it was 2 minutes but wouldn't bear if it was an hour long.

Respondent C: Well. Just the same thing that the first audio clip was clear but the second clip was unclear. Like the Aston replays usually are a little bit better than the second clip but not better than the first clip.

Teacher: If you are using the speakers or the headphones, is it because you turn the volume on? Is it what you do to make the things more sensibly?

Respondent D: I did the same when I got the phone but I realised it was already maxed. Another thing I want to add is that when it sounds like that, it makes me feel like it is too old. It makes me feels like it is not up-to-date maybe.

Teacher: So how easy was it to spot the differences between the two videos? Does the quality of the voice change?

Anonymous respondent: The quality and the volume definitely.

Teacher: Do the voices of the same person sound different?

Respondent D: I think it was quite clear but you still have to listen very carefully to focus on like it was still the same kind of clarity in the voice.

Respondent C: If the second video is done by a known speaker he will be struggling too.

Teacher: Ok. So the adopted accent is of a standard British English like a reader from CNN, would it be the best thing of all?

Chorus response: Yes

Teacher: Ok. Let us move onto some general questions. Does anyone of you use mobile learning in any way at the moment?

Respondent D: I use V-Play on my phone.

Teacher: Do you use it a lot or a little?

Respondent D: If I am going home or I am on a flight or I have a train to catch up, I will use it.

Teacher: Ok. If you have half an hour, would you bother listening to the lecture?

Respondent D: It depends on the length of the lecture. So I would skip the introduction and go on to the main content I need.

Respondent F: I am against mobile learning. I would rather use my laptop and do my academic subjects, for instance, computing and accounting. I won't be able to use calculators and other helping tools in my mobile.

Teacher: Would you consider re-watching the lecture on your mobile to understand it?

Respondent F: No I won't because the screen is too small.

Respondent C: I usually mobile-learning for webinars and for downloading fixed documents as it is easy to access Power-Point. But If I have access to Wi-Fi or to the onlinelibrary, then I would certainly use mobile learning regularly.

Teacher: If the internet data or Wi-Fi was free, what would you prefer?

Respondent C: I would prefer fixed notes. It would be easier for me to pause and go back and forth to the lecture video if I am unable to understand any of the points. I can also use PDF's for studying the lecture notes through my mobile.

Teacher: Ok. So you all have got mobile phones but how many have you got tablets?

Chorus answer: Two

Teacher: Howmany have you got laptops?

Chorus answer: Everybody

Teacher: Ok. So how many have you got the desktop machine?

Teacher: Ok. So what can I take away from it is that should we force mobile learning on people to use it?

Respondent D: Mobile learning is beneficial as it allows interactivity. The user can get group percentages of who got the answers correct. He can also check the wrong answers and explain the correct answer.

Teacher: Ok. So you are saying that rather than forcing, it should be integrated with the study program?

Respondent C: Yes. It is the difference between forcing and encouraging people to use it. Basically, it should be designed in a manner that makes it more interactive for users.

Teacher: Another question asked to shed light on the fact that usually mobile phones are used more than laptops, but the fact is that mobile phone is used to communicate. All the applications in mobile areconvenience, and it is one of the ways to communicate, however, if the students are working together or in a module, and the mobile has become an essential thing what if they don't have all the facility in the mobile phones in order to study. Some have fewer facilities, what if we

make something essential and induce them to use and help them and all does not have same cell phone or application that can be used by everyone.

That is a good point, for u as a learner what are the benefits of the mobile, to do whatever you want, it's affordable. You don't have to carry a big laptop along with you. It's like a personal library for me, rather than having emails and lectures, we can have information rather than physically going to the library. Mobile learning can be a lot more. Accessibility, affordability, and convenience are some of the factors that are to be considered in mobile learning. Books can be in the e-book form that is why I think it is convenient, you don't have to carry books that are why it is portable. Use of mobile phone is in the form of texting, Whatsapp, Facebook and calls. The introduction of 3g and 4g is also one of the uses of mobile phone. You can download any of the files with the help of Wi-fi when you visit any of the area which lacks the availability of the internet. One of the students highlighted that I don't download lectures on a mobile phone, but yes, I do prefer laptop too because I can open various links at a time, at the same time reviewing my lecture. For tutorials, they are often available in the computer lab and hence, for this purpose, I use my mobile phone in order to record the lectures with the help of voice recorder. The teacher responded that students use their device for learning results. With the help of phone, it's easier to navigate through video. If the mobile phone and using it is difficult then you are less likely to use it. Which place is most likely which will enable you to use mobile phones like mentioned earlier that you will use it during long hours of journey. One of the students responded that yes I will use it during my holidays. Anywhere outside, like on campus, or in my room like anywhere, I can make the use of mobile phones. One of the student highlighted that, she was learning for driving test last year, one of the application helped me in learning through which means it is not just necessary to use the laptops, we can use mobile phones as well as the application contained everything. The teacher inquired the students that whether or not the screen size is important for the activities that you conduct or learn via the use of the device, is it effective? The students were of the view that yes, the size of the screen is important, as it depends on the interface of the application. The clarity of the application is defined with the help of screen size. Instead of learning and effective an application is, do you think that learning through a video clip on laptop and mobile is effective, which one is effective. The student responded that the video clip in the laptop is more effective. Small screen size harms my eyes that are why I don't prefer. The teacher then asked that, does it helps in learning or not. One of the students exemplified that yes;

the small screen affects the way we learn. How do you think that can you read your documents on the mobile phones, like long documents, for instance, a 50-page paper? It depends on the application you are using, responded one of the students, another student responded that I don't like being distracted by reading the document on my phone unless I can read properly and the application has such features. Reading a long document on the phone is not feasible, with the help of a laptop, it can be done appropriately. With the help of mobile, you cannot make any notes, and you can make notes so that we can revise later. Of you have a choice among laptop and Pc, which one will you use, the students responded that I will use a laptop. The teacher then discusses how doing editing for the long documents, the students were of the view that specifically no for editing via mobile as it takes long. Teacher highlighted that do you think that fonts can be changed, with the help of mobile phone. Student answered that no that they would use their laptop. Do you think that your mobile device can ever replace your laptop? The students responded that no they cannot replace.

Thank you so much for taking part, it has been really interesting.

8.10 Focus group Transcript – Aston II

8.10.1 Participant Demographics

Nine participants took part in the focus group:

Males	Females
3	6

Number of students	Age brackets
3	18–20
4	20–22
2	23–30

8.10.2 Focus group transcript

TEACHER: while my sheets getting ready very briefly, umm you are free to say whatever you want to say. This not some kind of high ground academic kind of stuff, basically we are looking today to find out what things would work if we start creating some mobile learning so part of that is working out whether high quality video is worth the extra effort of creating and sending over the network that kind of thing or maybe if we have terrible audio is that worth giving to you or would you just switch them off these questions line up or some broader questions about how to use your mobile, so nothing controversial or something that is a difficult area so anything you contribute so please feel free to say whatever you like. And another thing I will tell you very briefly about

So the first thing about today we have shown you two video clips so I'm gonna pass around a mobile phone and tablet with the first video clip which is a very high-quality one and this is just to kind of get a baseline so you can see the kind of quality we would consider being the best quality and from there we will show you a lower quality one and we are gonna talk about it.

Do you know _____ by any chance (2:03)

RESPONSE: yes I do know her

TEACHER: can you tell her I'm gonna kill her.

RESPONSE: I'm gonna tell her that.

TEACHER: she's very reliable

Recording: I think it's interesting it's a perfect storm now in organisation on one hand there is a level of frustration with tradition approach that is conventional and training, and they have been marked. And from six years of training and also the distribution and expression of the audience. And finding mechanisms according to the world pays success contribution. We want to conventional time for lying and pleasing other to the learning process, we came up with the google to google up. (4:08)

Stopped from 3:00 till 4:20

4:27

TEACHER: ok so a really simple question was does anybody have a problem hearing that video was it clear enough could you hear it? Could you follow what he said? And could you read anything in the clear? Did you have any issues?

RESPONSE: NO NO

Teacher: so everything thinks that is good quality?

Response: yeah yes.

Tea: ok let's play exactly the same clip but with much lower quality.

Recording: oh Hi, last a half year, the director the company 20 to 25 years and I think I am a perfect student, on the one hand, there is little frustration, we have a problem six 7 years ago, there were challenges around training.

Stopped from 5:00 to 6:10

Tea: did anyone have any problems in term of the screen, quality and so on.

RESPONSE: yeah the text wasn't clear enough

TEACHER: so is that a general thing everyone feels like it was blurry and too small

RESPONSE: it's blurry

TEACHER: okay is there anything else any other problems?

RESPONSE: yeah it was distracting because of the lower quality

TEACHER: so you are saying it distracts you because of the quality?

RESPONSE: I can easily see because that was not much long

TEACHER: So did anybody feel that if looking the video or feeling to switch it off?

TEACHER: So you still feel it

RESPONSE: I think it depends on you if next time I did not want to switch it off

RESPONSE: The faces were not clear; it is something should be better in text

TEACHER: so I guess videos have the talking head, so if you see such video that you just saw in this video, so do you find any quality issue

RESPONSE: if you want somebody watches the slide so he would get the idea, and if somebody only listens unnecessary he would find the difference

TEACHER: so anyone feel the same way?

RESPONSE: I listened to my two lectures, I noticed this year, one of my lecture called "loud" so it really hard to listen to it, and I struggle hard and it was lustrous to attend the lecture, and it had a defensive material and I took ten minutes to understand it. It was quite annoying to me because this defensive material so I only listen to lustrous lectures.

TEACHER: So the problem was with more with the sound of individual

TEACHER: What do you think about the video we were chosen was good in animation and stuff like that? How did you find them distracting?

RESPONSE: I think it was easier to like and remember because it has good visualisation

TEACHER: So imagine you got to watch a video and you got a choice over high-quality version over low-quality version

TEACHER: The high-quality version takes long time and consideration, it requires a plan, while the low-quality version downloads were very quality and takes low time, so what would you prefer?

RESPONSE: we would prefer high-quality version

TEACHER: So you will be willing to pay the long day for downloading high quality one

RESPONSE: I would prefer low-quality one

TEACHER: you pay for the low

RESPONSE: I don't want to waste my time on downloading

TEACHER: you pay for the low-quality one?

RESPONSE: low-quality one, because I can see and I can also read in the lectures

TEACHER: and you?

RESPONSE: I would go with the high-quality one because I like to see good quality video

TEACHER: anyone else

R, I wanna go for high-quality one because the lectures should be in good quality. It also depends on how much it costs

TEACHER: what about if you have a device so would you download high quality one

RESPONSE: Yes

TEACHER: so high-quality version, you would experience, or you feel better about the video that high-quality version contains? And what if it happens in the movie case? Basically, this was not the question, is there some element missing in the video you look at high quality or low quality, or something missing in elements in the video, or what happens that you want to go for high-quality one. Is anything else that low-quality loss?

RESPONSE: I think the size is smaller in low quality

TEACHER: I don't think it makes any difference but difference in animation and it contains good

TEACHER: or you just talk size and animation?

RESPONSE: Yeah

TEACHER: okay

TEACHER: Now I'm gonna play some audio clips so the first one contains very high quality and then we will play the second one.

Recording: so it, not a problem so sometimes the fall of the tree, I have to say that being a **Teacher** I faced the key problem how to help my students, in describing the whole concepts, how to explain the pieces, a lot of people wondering why he is engaged in mobile learning, end...

TEACHER: The same question is like in the video case, is everyone find it clear, or it distracted?

RESPONSE: It was clear

TEACHER: ok now let me play the low-quality version of the audio

Recording: : so it, not problem so sometimes the fall of the tree, I have to say that being a **Teacher** I faced the key problem how do I help my students, in describing the whole concepts, how to pieces fit together, a lot of people wondering why he is involved in mobile learning, what is that end...

TEACHER: so the same question again that, is anyone find it the same, fine?

RESPONSE: it had blurry sound

TEACHER: so anyone can tell me the difference between the two, what was the difference between that?

RESPONSE: because it was really noisy especially if you listen to speakers,

TEACHER: So it was like hissing?

RESPONSE: Yeah I would need earphone to understand it?

TEACHER: So what was the difference between it?

RESPONSE: the hissing sound in the low quality

TEACHER: If you had to listen one more, would you play on the speaker or headphones?

RESPONSE: I would probably use headphone because I want to hear more of concentration, so I just don't need speakers

TEACHER: How many you feel annoying to switch it off or reset

RESPONSE: It depends on how long it takes

TEACHER: if say it is a lecture

RESPONSE: I would miss it

RESPONSE: I would listen to it for two or three days only

RESPONSE: I would only go through the important parts

TEACHER: So what about the replay, including its hissing sound? Is anybody to switch it off?

RESPONSE: I have the experience in the first year when I used to listen to the lectures whose I find a good sound, but this year I found low quality and lustrous I could not doing that because it was quite annoying and I could not engage to. It was quite annoying so I could not feel like engaging to. So

TEACHER: So what was the main important thing in the video quality or the sound quality, whether it was a picture or sound quality?

RESPONSE: Sound

RESPONSE: sound

TEACHER: That's interesting

TEACHER: I have some general questions, I just want to know about the pavilions of mobile learning, m delivering you not telling what I mean by mobile learning, but I want to ask you what mobile learning is.

TEACHER: so the first question gonna ask is? Does anyone of you use mobile learning at present, in any way?

RESPONSE: Yeah

TEACHER: So what do you use in it?

RESPONSE: I usually use groups and I use it for friends inviting so I can answer it from phone regarding any query

TEACHER: Anything else

TEACHER: So anyone wants to replay what is mobile

RESPONSE: Sometimes I go through the slides and I do use it for lectures

RESPONSE: It is continuous and I used it for lectures

TEACHER: So do you have any particular reason why you would not use mobile

RESPONSE: I think the size of the screen as laptop one is bigger in size

RESPONSE: Yeah I agree with it

TEACHER: Ahan, you feel good using facebook in the background

TEACHER: How many you do not use phones for facebook

RESPONSE: I use laptop

TEACHER: Oh sorry I mean how many of you more use Facebook on mobile

RESPONSE: I use it Facebook more on mobile and WhatsApp, I do not feel to start laptop for using Facebook and all

TEACHER: That's interesting to know

TEACHER: Very interesting actually

TEACHER: So if you thinking to bring mobile learning by using your phone, tablet or laptop, so what do you think is the biggest differences between using a laptop, Pc, mobile or tablets etc.

TEACHER: I mean what mobile technology gives you that your laptop and tablet does not?

RESPONSE: I think it's more concentrate, sometimes you use it on PC like mobile cannot access all details due to size and if I am in office document so I would use on PC

TEACHER: so in general, what are benefits or what do you think about disadvantages of using mobile learning? So I would start with the benefits? What do you get and good about mobile learning?

RESPONSE: I supposedly say, mobile can be used anywhere if you are in a long journey and any lecture in pending so you can use it. Phone is with you every time

RESPONSE: I believe it is easier to use

So you come up with the fact that mobile is more portable and easy to carry

RESPONSE: I do not like carrying a laptop every time so mobile is more convenient if it is a good quality so it is easier to use. Some like options like if your laptop is not supported by phone then you can go online

TEACHER: So your answers bring two ideas, first you said was you can something on laptop which are not supported on phones, the second thing is that most people keep their phones in anyway and everywhere., so you rare coming with anything extra

TEACHER: So anything else?

TEACHER: if you gonna listen to a lecture on a mobile so what is the long guess will be willing to spend

RESPONSE: With me, I would play and use WhatsApp, so on the way I do not use my Ipad, I would be pretty comfortable and I like to use my phone. I find distraction when I use laptop and Ipad

TEACHER: What about the length of time you can spend on the phone?

RESPONSE: I think I spend a lot of time because it distracts a lot as many people get distracted due to notification on the mobile phone regarding updates.

TEACHER: So what is a long time per hour?

RESPONSE: I think we cannot calculate the exact time, and I think watching a lecture on the mobile phone is not easy due to its small screen

TEACHER: Ok

TEACHER: Let me ask you slight different question, what hassle you gain on the phone while watching lecture on phone

TEACHER: If you have only 15 minutes so would you use it or

RESPONSE: I use it for 1 hour

RESPONSE: It is not necessary that long to click on the lecture, I can watch it for half an hour.

TEACHER: If I am going to watch a lecture so I can only watch half of a lecture (29.37)

RESPONSE: or would anybody complete half of the quiz on the phone?

RESPONSE: I like being fully attentive so like in lecture I just get really get tired at times so i just like to take breaks and go back to it later

TEACHER okay so we have got two massive divided in the middle some people like to do it an hour at a time and you say 20mins so it's kind of a big gap in the middle isn't there?

RESPONSE: it depends on the lecture like I wouldn't if would have 20mins left but if it was a quiz I would do half of it then half later

TEACHER see that makes it even more complicated like in the middle there. Okay so some people it needs to be worthwhile and it's gotta be an hour worth's of video and for other people, they don't mind.

TEACHER okay umm what are the disadvantages that you think that can be associated with you in mobile devices for learning

RESPONSE: my battery

T okay would your battery last yeah?

RESPONSE: yeah it would well it should this why I hate like downloading stuff I don't get battery life.

TEACHER does it mean you agree that at the end of the day you agree that your mobile phone is a ----- 31:50 (don't know what he said)

RESPONSE: yeah that's why my battery doesn't last

TEACHER okay so does anyone else have phone problems cause you said that battery

RESPONSE: I don't get it why you're saying battery because if I have got like 40% left in thinking oh it's down the only problem I have is that I always leave my charger at home I forget it so that would just put me off looking at my battery

TEACHER so two of these of the many things rather than things like the quality of the video these are more like of practical things such as screen size you forget your charger at home like all that

RESPONSE: yeah yeah battery life is definitely one of the big disadvantages and then another one is the screen size like I just cannot imagine watching because when you're just watching you won't be able to understand that slides people watch that on a tablet or on a laptop what's the need to watch is on your phone

TEACHER yeah so given the choice tho would you use some mobile phone to do some kind of mobile learning activity or would you always chose something else that's available always so you don't need \

RESPONSE: something else. I would prefer laptop but if it at someone else's place I w3ould use my phone so I could catch up on my lectures so I wouldn't need to revise i would just have to hear it

TEACHER okay so if there is a choice there if you got a phone for instance and a laptop would you always go for the laptop or

RESPONSE: depends on what you're doing most of the time I would go for the laptop but if there is some type of quiz I think I would use the mobile phone and it would be quick as well cause it takes time to turn on the laptop and stuff

T alright so if it is more convenient to use the phone most of the time it would be the phone does that sound right?

TEACHER half of you would go for laptop why is it just the screen size? \

RESPONSE: it's just everything you're more into the work when you're on a laptop than on your phone so I think a laptop would be better

TEACHER okay so from what you're saying it sound likes the laptop can do more compared to the phone

RESPONSE: yeah yeah

TEACHER okay so we will come up with these technical questions now like some of them I think you have already answered but just to kind of like confirm so thinking about how you take your information and how you learn does the screen size have a big effect or not

RESPONSE: I think it does

TEACHER so if you had to watch the two videos we had earlier on exactly the same screen would it make a difference would it matter? Or if we had one of those videos on a projector one of them on your mobile phone would it make a difference?

RESPONSE: yeah because when you said you said u were gonna show us the video I naturally looked at the projector but I saw nothing was connected then u said on the phone I was like okay cause of the size of it I would rather watch it on the projector because if you watch is on a small screen it's not necessary clearing but on big one we can visualise it's clearer but on the phone cause it's quite small it's like everything is concentrating there on a small screen

TEACHER okay so you're saying that you can learn better if it's a bigger screen does everybody feel that way?

RESPONSE: yeah

TEACHER so would it be a big difference or a small difference

RESPONSE: it wouldn't be a huge difference.

TEACHER is it just because of things like convenience and umm and feeling more comfortable or is this something else

RESPONSE: comfort is one There is a point mentioned about quizzes I wouldn't ever watch a lecture on my phone but if it's like a quiz or something interactive with stuff like that you wouldn't mind using your phone but if it is something like that quite long you would most likely want to watch it on a laptop

TEACHER okay let me come to that now actually like for example you have got like an academic paper lets say 30 pages would you feel comfortable reading that on your mobile

RESPONSE: no. (everyone)

TEACHER so does anyone know that at the moment

RESPONSE: no.

TEACHER so if you got a document that long what would you use it on

RESPONSE: laptop

TEACHER okay thinking about the same sort of document if you had to write an essay lets say about 20 pages would you even try to work on it on your phone

RESPONSE: nope

TEACHER okay why is that?

RESPONSE: if I had to do an essay on it I would print it out and work on it

TEACHER would it make a difference it was a tablet? Would you be willing to try it?

RESPONSE: no

TEACHER so everyone thinks it has to be a laptop why is that? Because of the keyboard?

RESPONSE: I think it is mainly about the keyboard if I had a tablet and mini keyboard I would definitely use the tablet

TEACHER: is it much more relax yeah?

RESPONSE: when you are using like a keyboard on a screen the documents size is obviously less I would rather type it on a keyboard

TEACHER would you try to make a small change lets say u noticed a typo in the assignment and just before you are about to submit it would you even try to do that on your phone

RESPONSE: I would

And at the same time when you're about to submit it I would go on a laptop to submit it

TEACHER you wouldn't risk submitting on your phone?

RESPONSE: no

TEACHER what about a tablet would you use a tablet to make small corrections

RESPONSE: I would yeah.

TEACHER how about let's say if you got a mobile device do you think u could use that to replace your laptop or PC

RESPONSE: no never

TEACHER I'm guessing everyone has a phone

RESPONSE: some do

TEACHER how many have a laptop

RESPONSE: everyone

TEACHER okay how many have a desktop machine as well

TEACHER okay seems like everybody is happy with the laptop and you wouldn't think about doing certain things with your mobile or tablet

RESPONSE: yeah

TEACHER if your paying for your data says your paying for 2 gigabyte worth of data how much would that affect you to download videos emails or whatever that come with your studies

RESPONSE: my data runs out so quickly I would use my laptop

TEACHER lets imagine you have something like a quiz or activity which isn't that important but you have to study that thing and you would you still download it if your paying for your data or would you not and make things work without it

RESPONSE: I would definitely download it it's important

TEACHER okay

TEACHER so you have to be convinced

TEACHER if you weren't convinced you're not prepared to download it because of the cost what would you do?

RESPONSE: call someone ask them to download it

TEACHER one more question if you're going to start using mobile learning and it becomes a part of your regular study routine what you think u need to have to allow you to do it

Obviously, u need your mobile phone do you need any specific type of training or not

RESPONSE: nooo

TEACHER would you be confident to do something on a whiteboard you could access it and use it without any extra help

RESPONSE: yeah

Response: I think if mobile learning was coming to our like ease of access to a big deal like we could use easily u don't need to sign up for anything u don't need to do anything literally just put 6 digits in and do an interactive thing you wouldn't have to like text a mobile and nobody could be bothered to do that so in terms of how easy it is that is like a big thing

TEACHER so that's your like uh key point there is there anything else that anyone wants to add that mobile learning is a good idea or a bad idea would you think it should be a compulsory thing do you think you have to have it to use it

TEACHER so if there were mobile learning activities that somebody created and they say you got to do them would that be a good idea

RESPONSE: no not like its forced I don't like to do it

TEACHER so do you think it should be a part of the daily course so you can do extra there?

RESPONSE: yeah yeah

RESPONSE: the option is not that good you got some people here who want to use their mobile and some people just don't want to use it so saying its compulsory will not help

TEACHER so you think it should be voluntary

RESPONSE: yeah

TEACHER and would it be good on some modules on some topic some then others

RESPONSE: I don't think everyone would want to do it it would be good for quizzes

TEACHER that's kind of difficult does anyone here ever actually prepare for a tutorial

TEACHER I get the idea I think one of the problem in the last 10 years in my days you would have to prepare for your tutorials because you're going to be delivering part of it yourself whereas nowadays where the tutor kind of does it all so lets say 20 of you have and 20 of you haven't

RESPONSE: there is a elder sibling who goes to this uni there they always do this seminar work so when i came here like in my first day i use to always prepare but the seminar **Teacher** use to do it all so i slowly slowly stopped preparing for it and now i don't prepare for it at all when they found out they said u don't? Its very important for me though its very like casual

TEACHER so the question is would mobile learning help with this?

RESPONSE: yeah I think it would t

T; so if you had something like a quiz or something or case study u have to do before the tutorial would that be good

RESPONSE: yeah i think it would

TEACHER before you had to study 40 hours a day now you have to balance living with studies
Paying bills and that kind of stuff

8.11 Focus group Transcript – Jordan I

8.11.1 Participant Demographics

Ten participants took part in the focus group:

Males	Females
7	3

Number of students	Age brackets
1	18–20
7	20–22
2	23–30

8.11.2 Transcripts

Question which was the starting point of the focus group study was to study what actually is the concept of mobile learning.

Student B1 (Male): For me mobile learning is one of the effective ways of learning as it offers various short cuts in extracting out information and here in Jordan, it is regarded as one of the best way for the progress in the education.

Student B2 (Female): Mobile learning I think will be the most convenient way of learning and it affects the quality of the education. For me, this is the most convenient and portable way of learning.

Student B3 (Female): Mobile learning is the best possible way of learning conveniently. It is a portable form of learning for me, as I can learn very easily and surf every piece of information that is just one click away.

Student B4 (Male): The use of mobile learning has now becoming very common in the contemporary eon, due to this fact, the Jordan is also taking sufficient amount of efforts in encouraging the use of mobile learning as compared to other regions like UK etc.

The discussion then switches towards a question which sheds light on the fact, that what will be the challenges that might be associated with the mobile learning in the region of Jordan. The respondents under discussion put forward various views in order to discuss this very issue so that the views can be enlightened. The teacher was of the view that the use of mobile learning also includes some of the challenges in the form of installing it as well as the negative and positive usages of mobile learning is also equally important. The teacher added that he think one of the negative aspect linked with mobile learning is the use of mobile phone other than studying which will be in the form of using social media sites continuously which are the demerits of the mobile learning. Moreover, it can be deliberated that this all decreases the likelihood of adding mobile phone for the learning purposes.

Student B4 (Male): One of the challenge I think is the fact that excessive use of everything is very dangerous that is why the user must know every single aspect of the technology they are using. In Jordan, I believe that mobile learning will be the reason for the future development

Student B5 (Male): The use of mobile learning will be linked with various challenges and there is no doubt about it. Moreover, I think that apart from all the challenges I would request you all to keep an eye on the pros of the mobile learning as it is considered as one of the best mechanism for learning.

Student B6 (Male): I would like to highlight one point in this regard, is the fact that the mobile learning leads to the change in the learning strategies as well as the way and the tactics used by the teachers.

Student F7 (Female): I think that the use of mobile learning will be challenging, however, it is one of the best way according to me. Despite this fact, I am also a student but this technology can be missed use even. Moreover, it will help us in listening to the lectures whenever needed. There is no doubt is the best technology no matter what are the negative aspects linked with it. I think that the use of mobile is feasible as compared to laptops and PCs, as they are not portable.

Another question which is also discussed during the discussion is regarding the distance learning in which mobile learning is also one of the concepts, which can be contemplated. Teacher was of the view that mobile learning is the type of distance learning that is why is considered as one of the most easiest and convenient way of learning. That is why, it is contemplated that the use of these decreases the likelihood and illustrates that distance don't matter.

Student B1 (Male): Mobile learning is the type of distance learning that is why I think it is the easiest way of learning. Moreover, this concept itself illustrates that this can be used by the user, regardless of distance.

Student B2 (Male): Yes, I too agree with you guys, distance learning is one of the terms used for mobile learning. Similarly, I want to say that the use of mobile learning proved to be very effective that is why the use of this very technology leads to the elimination of distances

Student F3 (Female): Like once I travelled out of city and I want to listen to the lecture as my exams were to be started after few days. So, I carried my lectures in my mobile phone and studied in my spare time. The reason for highlighting this point is the fact that mobile is a useful invention which is being used in the contemporary eon.

Student F4 (Female): Yes, I agree with her, this is one of ease which also enables me to make the use of mobile learning. This is for me is the best invention.

Another question which has been discussed was regarding the point that mobile features matters or not, like if you want to watch movie or listen to any of the audio file, will you prefer laptop over mobile phone or you will go for choosing mobile as the mode of doing all these activities. Well teacher was of the view that “I will for sure make the use of that gadget which is very effective and will deliver high quality of whatever is needed, whether it is mobile phone or laptop”.

Student F1 (Female): I agree with you sir, that yes the quality is important like picture quality and other such feature. What I believe is the point that the technology is changing continuously which is why the mobile learning and its implication in the Jordan will be backed by the range of smart phones as well as more features will be introduced in the laptops as well which increase the competition.

Student B2 (Male): My selection among the gadgets will be based on the quality of the audio, picture quality as well as the portability. This will be the reason on which my decision will be based.

Student B3 (Male): Hmmm, Yes, I will also have for the mobile as I have a fond of studying while roaming around. I can't study sitting at a single place that is why for people like me can make the use of mobile phone for doing so. Although there will be some of the flaws linked with it as well but for me, this option is best and I appreciate the concept of mobile learning.

The students were also presented with the question to highlight their views regarding what will be the future of mobile learning or why they will prefer its use. The teachers explained that the use of this very concept of mobile learning is being accepted very positively in the Jordan. He also explicated that mobile learning is one of such concepts which will significantly contribute to the success of education in Jordan as students can access their university and college databases, via mobile phone. However, universities and colleges should even develop their own for providing ease to their students that live far or which will help them during travelling. You don't have to carry a big laptop along with you. It's just like a personal library for us, rather than having emails and lectures, we can have information by not physically going to the library.

Student B1(Male): Well, as far as the future of mobile learning is concerned, it can be said that the mobile learning in Jordan sounds an effective way for encouraging the learning for those that live at distance or to offer ease to the students. Similarly, it can be enlightened that I will surely prefer this form of learning because it helps in learning from various sources like we can surf any web page at any point of time. We can even use 3g and 4g for surfing web page. Mobile learning can be a lot more than just specified

Student B2 (Male): Well, yes I think that the use of mobile learning will be suitable and yes will contribute to the future of mobile learning as universities and college students would be able to access information, lectures etc. Accessibility, affordability, and convenience are some of the facets that are to be contemplated in mobile learning.

One of the questions that were the centre of attention was regarding the screen resolution of the laptop in comparison with mobile phone.

Student B1 (Male): I would prefer laptop if the screen resolution is concerned. In case of mobile phone, there is a lot of harm associated with it as the screen is smaller in size which might affect the eye sight.

Student F2(Female): I already carry glasses, that is why I will prefer laptop over mobile phone as far as screen resolution is concerned. There are other options available as well, like tablet pc etc. in order to shed light on the quality of screen being offered.

Student B3 (Male): I don't prefer for opting any such gadget that have low screen resolution or the screen is smaller in size. That is why I will go for contemplating laptop. Small screen can harm my eyes. And conversely, the size of the screen also imposes an impact on the way we learn because everything will not be clearer on the small screen.

Student F4 (Female): the resolution of the screen even affects the size of the document which affects the way in which it is to be read. Moreover, if the document is of 30 pages in length than it is essential to use the application that is being used for the reading purposes, obviously I won't proof-reading while sitting in front of the laptop and reading constantly.

Teacher: With the help of mobile notes can be made or not?

Student F1 (Female): I usually prepare notes with the help of mobile as I carry tablet Pc, which helps in preparing my notes. In addition to this, yes the use of mobile I think is good for as it is small and portable which we can carry anytime.

Student F2 (Female): no, I don't think that the notes should be prepared with the help of mobile phone, it is a small device which I don't think will help more in preparing notes. The reason for making the notes is to revise them later or prepare for the exams, which is not possible at least with the cell phone which is my view, yours might differ.

Student B3 (Male): I will prefer preparing handwritten notes as I need to revise them later and cannot take any of the risk in terms of losing any important notes other than lectures.

Student B4 (Male): I will make notes using laptop if I am allowed to carry it in my university or college premises. As mobile phone is the smaller device it can be used when we have to cover a long distance so during that time listening to lectures can be made easier.

Teacher: being a teacher as well I use laptop and mobile both because they both are useful to me and I am quite satisfied. There are various applications available on the cell phone which I use in order to get my tasks done. It is portable and has many features which help me in various ways.

Question 1 Do you think mobile learning become successful if implemented in Jordan? The entire focus group contains 7 male students 3 female student

Student **B1** (male): I don't think mobile learning can be successful because of the fact that mainly people prefer to work on their laptop and desktops because the battery life on the phone is very bad.

Student **F9** (female): Well I think mobile learning could be useful in the sense of using it for listening to online lectures you could lie down and comfortably listen to lectures on your phone but only if the quality of the video and audio is good.

Teacher: okay so the quality of the video is something important?

Student **F9** (female): yes I think it is very important because if its blur or you are able to see pixels in it then it will become very hard to understand.

Student **B2**(male): I highly doubt it, because like when I'm on my phone I never use it for a productive purpose I mainly use it for things like whatsapp and Facebook and twitter and all those social media apps and games so it basically distracts me.

Teacher: okay. Is there anything else anybody wants to say?

Student **B5**(male): I think mobile learning could be successful but not a large scale because for example I could use my phone for studying for a very short period of time but I usually prefer studying on a book or something like that it helps me concentrate more and I understand better what I am trying to learning

Teacher: Alright so that is one of the key issues. Anyone else

Everyone: no

Question what is your feedback on mobile learning do you like it? Would you consider using it? You don't like it? What?

Student **F10** (female): I would use mobile learning but only when I don't have access to my laptop mainly I prefer to study on my laptop as working with a mouse and keyboard is very

convenient compared to using a touch phone to write your assignment etc. but it would be definitely useful when you have to listen to a lecture or read something.

Teacher: okay so you would consider using your phone if u were to listen to a lecture but when it would come down to writing an assignment or completing an assignment on your phone you would prefer your laptop instead.

Teacher: okay what if I were to say you have to do an assignment on your tablet instead of your phone since it's a bigger screen and all would you consider it

Student **B(6)** male: I don't think it would make much of a difference I mean yeah the screen is going to be bigger that would definitely help but it still wouldn't be as convenient as a laptop as the keyboard is separate from the screen

Student **B3** male: yeah I completely agree that using a tablet instead of a phone wouldn't really help much. But I would use it if I had to make last minute changes and I'm feeling lazy to open my laptop to fix a small typo in my already done assignment then I would prefer to open it up on my tablet and fix it

Teacher okay so you would prefer using your tablet if you had to proofread your work

Teacher so majority of you would prefer your laptop instead of a phone or tablet to do your assignment?

Majority: - yes

Teacher Okay now I'm going to pass around this phone with two videos one with higher quality and the other one with lower quality first off I will show you the lower quality one tell me if you are able to understand it

Everyone watches the lower quality

Teacher: so please tell me what you thought of it in terms of video and audio quality would you prefer this or would you go for better was it understandable or not do you think you can listen to lectures etc. in such quality

Student **B4**: I could understand what was being said in the video but the video was very blurry and all I couldn't understand what he was trying to show us at all. It was very unclear. I would prefer better quality

Student F8 (female) I agree first off it was not understandable for me but if I had no other choice and there was no way out I would make things work with this but if there is better quality available I would definitely go for it

Student **B2**: the issue with this for me is that is when I'm not able to pay attention to it and I easily divert to something else so the quality of the video really matters to me

Teacher: so it's a mutual understanding that quality is priority everyone agree?

Everyone: yes

Teacher 'shows everyone the video with high definition quality' so now that everyone has seen the video what did you think do you prefer the higher quality or the lower

Student **B3** (male): well for me I would still not prefer using my phone as it has a lot of things that are distracting for example I have a group of friends on whatsapp who are constantly talking and I'm getting the notifications for it and I can't avoid because I have to know what is going on, which will most likely distract me from my work

Teacher: okay so you are saying that you don't think you can use your phone because of all the social media that's on there

Student **B3**: basically yes.

Teacher okay what if on the night of the exam your laptop stops working and you have a lot to revise and memorize for would you use your phone then? Would you be distracted?

Student **B3**: no I would definitely use my phone then and I wouldn't pay attention to all the messages because I would be under a lot of pressure and my main goal would be to pass the paper and somehow be prepared for it.

Teacher: okay does everyone agree here?

Student **B5**: well I think that mobile learning is a great idea its more portable way less fuss of wires and etc. and I don't think the battery life is an issue for me since I always have portable power bank with me to back me up with battery life.

Teacher: okay let's move to some general questions does anyone use mobile learning at the moment?

Student **B9**: I do sometimes when I have to read articles and stuff it's convenient

Teacher: do you use it often or sometimes

Student **B9**: rarely just when I have to read something I use my phone when I can't be bothered to use my laptop or turn it on

Teacher: okay

Teacher if I were to say that you could use separate wireless mini keyboard with a tablet would then prefer to do an assignment on your tablet?

Student **B6** well yeah I think I could consider it then but I still think that laptop would be more convenient

Student **B7**: I disagree I think that is a great idea I would definitely do it as it would take lesser space and be more convenient

Teacher okay so some of you would be willing to try it?

Half of the students said yes.

8.12 Focus group Transcript – Jordan II

8.12.1 Participant Demographics

Ten participants took part in the focus group:

Males	Females
5	5
Number of students	Age brackets
5	18-20
5	20-22

8.12.2 Transcript

Teacher: To begin with, we would be showing a video of relatively high quality, to make it easier to be analysed and focused upon and to get an opinion. If you want it to be viewed, a clip would be showed to you.

(Recording Voice plays in the background)

Teacher: Ok. Now feel free in saying whatever you want to say. There would be no wrong or right answers. Basically, what was just being seen by you is called a head video. This is kind of that video that is similar to V-Play or other types of media. By thinking regarding the video that we just had a look at, we did have problems with it by viewing everything in a clear manner and to hear pictures of things in a relatively good quality. What are your views on it?

Respondent B5 (Male): Indeed. The presentation is highly good and it is clear that the flight did follow it. However, the piston changed.

Respondent F8 (Female): I agree. The presentation is indeed of excellent quality and it could be easily heard.

Teacher: Did any of you face any problem in following what had been said or was there any discrepancy in the audio?

Respondent M2 (Male): I do agree that the slides were certainly clear. However, I don't like it to be highly interactive. This certainly consumes a lot of time for sliding across.

Respondent G9 (Female): I also agree with it. This does consume a lot of time.

Respondent M3 (Male): It did look like that they had been trying to get in a lot more information, most of it was irrelevant.

Respondent G7 (Female): I also agree that the data was only being squeezed in. I seemed like that there were animations and pictures for almost everything. It seemed like looking towards images and ignoring other essential scripts.

Teacher: So you guys are saying that it will lose its impact. Am I right?

Respondents in chorus: Yes

Teacher: All right. So now I will show you the second clip. This is indeed the same thing. However, this has been created at a significantly lower audio quality. The benefit of this low quality is that it could be easily viewed in a portable device such as tablet or mobile phone. Ok, so now let's play the clip.

(Same clip showed again but at a lower quality)

Teacher: Ok, a similar question for this clip. In terms of quality and clarity of this audio, did you face any problem? With regards to watching, following and understanding it, did anyone of you had to encounter any problem?

Respondent M1 (Male): After watching the video for a few minutes, the result that I come to is that it is certainly quite vague and unclear. I am finding it highly difficult to follow the main contents of this video. It is extremely difficult to follow the main content of the clip and it is almost impossible to understand what is going on.

Respondent G8 (Female): I agree. Even I was highly confused and was unable to understand about anything that had been said in the clip.

Teacher: Hmmm. No this seems to be quite interesting. Now would any of you like to do the same action?

Respondent M3 (Male): I believe that their interaction is certainly of the top mode and would certainly be relatively fine with regards to quality. Due to the fact that they use a plethora of

information, there had been small and large texts. The small texts were certainly not visible to be read upon. This is certainly highly difficult for me to understand it.

Respondent M4 (Male): It was of a relatively low quality and it was certainly not easy to watch. If I had to watch it on any online website, I would have certainly switched it off the channel and would have certainly moved on to any other video. It certainly made me listen to what it was being said. Personally, I had been focusing on the image so much that it made it impossible for me to understand the concept. I have picked more on this video and have certainly listened to it and have not merely watched it.

Teacher: So now we have got two points of view in this regard. On one hand, this would certainly put you off in such a manner that it click away. Does anyone else feels like clicked away and gets put off?

Respondent M2 (Male): I do think like to the point you have listened to the individual more. However, without any animation and pictures, an individual would certainly be put off.

Respondent M1 (Male): I totally agree with it. Any individual would certainly be put off with it.

Teacher: Ok. If there are no animations, images, videos or pictures, would you seem to emphasize more on this audio. I would like to hear you responses?

Respondent G8 (Female): Well I don't really agree with it. However, even if one can listen to the audio, some of the pictures that have been showed in this video certainly make some sense. There is certainly no sense in listening to this audio if one is able to understand it.

Respondent M3 (Male): If there is an audio clip and no pictures here than my viewpoints would certainly be changed.

Teacher: Ok. If you are unable to understand the voice of the clip, would you consider re-watching the lecture on your mobile to understand it?

Respondent M1 (Male): I would not. The main reason is that the screen is very small and I would not be able to understand it.

Respondent M3 (Male): I would certainly watch it again though mobile or other portable device. Moreover, if I have access to Wi-Fi or to the online library, then I would certainly use mobile learning regularly.

Teacher: Ok. In terms of learning, if the internet data or Wi-Fi was free, what would you prefer?

Respondent G8 (Female): Certainly. Use of Wi-Fi would make it easier for me to understand the core contents. I can use external references in this regard. I can also use PDF's for lecture notes by the way of free Wi-Fi on my mobile phones.

Respondent G7 (Female): Yes. I would prefer to use Wi-Fi if it was freely available for me.

Teacher: Ok. So what can I take away from it is that should we force mobile learning on people to use it?

Respondent M1 (Male): I personally believe that Mobile learning would be highly beneficial as it allows interactivity. A user would be able to get significantly larger amount of group percentages that would analyse pivotal answers. People should not be forced but they should evaluate the benefit of this feature.

Respondent M5 (Male): Well I believe it depends on the difference between encouraging and forcing people to learn. It is important that it has to be designed in a manner that would make it interactive for potential users.

Teacher: Ok. So now discuss what will be the challenges that would be interlinked with mobile learning in Jordan region. I personally believe that use of mobile learning does comprise of some of the biggest challenges with regards to installing and even the positive and negative usages of mobile learning is certainly highly important. I personally think that one of the biggest consequences of mobile learning is use of mobile phone rather than studying. Do you think that mobile learning is used solely for educational purposes or is it used for entertainment and other irrelevant purpose?

Respondent M2 (Male): I personally believe that one of the challenges that I have observed is the fact that consistently excessive use for everything is highly dangerous. That is that reason why a potential user should know the various important aspects of technology. Specifically in Jordan, I have experienced that mobile learning would be the pivotal reason for development in the future.

Respondent G7 (Female): Various challenges could be used with mobile learning. I personally believe that regardless of all the challenges faced, I would certainly request individuals to assess the consequences of mobile learning. It is considered as the best learning mechanism.

Respondent M3 (Male): Well, personally I would like to make a very important point. It is a fact that mobile learning does lead to certain changes with regards to learning strategies due to the strategies and tactics have been used.

Respondent G9 (Female): I personally think that the use of mobile learning would certainly be highly challenging. But I also agree that it is one of the best learning methods. Irrespective of this fact, I also believe that technology could be misused.

Teacher: Ok. Now we shall come to some basic questions. What do you think actually is the main concept of mobile learning?

Respondent M1 (Male): I personally think that mobile learning is one of the most efficient and effective method for learning because it does offer short cuts for extracting various sources of information. Even in Jordan, it is considered as one of the most important ways for success in consistent learning and development.

Respondent G8 (Female): I do think that mobile learning is highly convenient and it indeed does effects the education quality. It is indeed one of the best ways of learning for an individual.

Respondent M4 (Male): No doubt mobile learning is the best way of learning due to its adaptability and convenience. I can indeed learn very easily from this method and without any problem.

Respondent M3 (Male): I personally believe that use of mobile learning has become quite common. It has gained prominence in USA and UK to a great extent.

Teacher: Ok. Now let us discuss how distance learning can be incorporated in mobile learning. I am personally of the view that mobile learning is highly convenient for distance learning. Do you people believe in that?

Respondent M1 (Male): I do personally that one of the most convenient and best forms of distance learning is mobile learning. Moreover, it is one of the most convenient and easiest modes of learning. Apart from that, this mode of learning can be used by any user, anywhere in the world irrespective of time or distance.

Respondent M3 (Male): I totally agree with it. Distance learning is certainly one of the most important terms that are effectively used for the purpose of mobile learning. Similar to this, I do want to state that utilizing mobile learning does prove to be highly efficient and effective.

Respondent G8 (Female): Without doubt distance learning is highly effective. I have used these distance learning lectures when I have travelled to various cities or countries. Moreover, I have carried several of my lectures in my mobile and have even studied whenever I get free.

Respondent G7 (Female): I also agree that distance learning through mobile is a blessing for me. It enables me to learn effectively and with efficiency at my own pace.

Teacher: Ok. So now I want to raise another important question. Do the features of mobile matters or not? For instance, if you want to listen or watch movie, would you prefer laptop or mobile phone?

Respondent G9 (Female): I totally agree. Some traits are highly important including size, picture quality and other features. Due to the fact that technology has been consistently evolving, mobile learning along with its implication within Jordan would certainly be backed due to the wide variety of smart phones available.

Respondent M3 (Male): My preference would also be on the basis of video and audio quality along with its portability. It will certainly be the core reason on which my preference would be based upon. This makes my viewing experience better and helps me to understand the core content of the video.

Respondent M4 (Male): Indeed. I would also prefer mobile learning as it is the best mode for distance learning. I prefer this mode of learning as it is highly flexible for me. Though there are some issues with resolution and picture quality. However, this option is certainly the best and I highly appreciate this method of distance learning due to its convenience.

Teacher: What we have observed so far is that mobile phones are highly helpful for learning. Do you think notes can be made through mobile learning?

Respondent M1 (Male): I certainly do make notes. I tend to prepare the notes by the help of mobile phones or tablet Pc as this does help me a lot.

Respondent G6 (Female): I don't agree with it. Notes should not be prepared by the help of mobile phones. It is merely a device that cannot help in the preparation of notes.

Respondent M4 (Male): I won't use mobile phones or any other portable device for notes preparation. I would prefer preparing handwritten notes as I would need them for revision. I won't take any risk to lose critical lectures as they would have a negative impact on my learning.

Respondent M5 (Male): I would certainly be making notes by using my laptop only if I am allowed to carry them out in my college or university premises. Due to the fact that mobile phones are relatively smaller, they can be used whenever it is convenient for a user. It can be used easily when we have to travel for some long distance. During lost travels, listening to audio lectures or viewing video clips on various educational topics makes it very easy.

Teacher: So does mobile learning help in learning or not? I mean is it really effective?

Respondent G8 (Female): I totally agree. Although the small screen does affect our ability to learn but it is still very effective.

Respondent G10 (Female): I agree on that. It all depends on how you are able to use the technology. This also results in how your learning has processed.

Teacher: Hmmm. So how do you think that you will be able to read your documents on the mobile phones, like long documents, for instance, a 50-page paper?

Respondent G6 (Female): Well. It would all depend on the application being used by the potential user. If he is comfortable with the particular application than I don't think the size of the screen, irrespective of mobile phone or tablet, would really matter.

Respondent G9 (Female): Honestly, it would matter a lot to me. I would not like to be any way being distracted by document reading on a phone unless I am able to properly read and understand the main contents of it. I personally don't think reading a long document, such as a journal article or any other publication would any way be feasible for any potential reader or user in any way.

Respondent M1 (Male): I agree. Mobile and tablets would certainly not be in any means helpful from reading long documents. One can only make notes and can revise them later on. However, reading them in continuity will certainly be highly cumbersome.

Teacher: Okay what if on the night of the exam your laptop stops working and you have a lot to revise and memorize for would you use your phone then?

Respondent M2 (Male): Yes. I would definitely use my mobile phone in such a situation. I would certainly not pay attention to any call or messages on my mobile or other social media tools. I would be under a lot of stress as I have focus upon passing my exam and have to be certainly be prepared for it.

Respondent G10 (Female): Even I would use mobile phone or any other portable device in such a situation. Mobile learning is certainly highly portable and it has less utilisation of wires. Moreover, there won't be any issue regarding battery life for me as I will have portable devices with me for backing up my battery life.

Teacher: Ok. If you have choice among mobile, tablet, laptop and Pc for the purpose of learning or reading your documents, which of the equipment's would you choose?

All respondents in chorus: Laptop.

Teacher: Ok. So how would you do the editing for the long documents? Would you choose mobile phones?

Respondent M5 (Male): I would not prefer editing through mobile phones for editing. It takes relatively long time and wastes quite a long while for editing.

Respondent M3 (Male): I totally agree with that. It does waste quite a lot of time. I would certainly not prefer mobile or any other portable device for editing.

Teacher: So do you think you would use mobile phones for changing the fonts?

Respondent M2 (Male): Not at all. I would rather use my laptop for doing this pivotal activity. Changing fonts through laptop is certainly much easier and quicker.

Respondent M4 (Male): Me too. I would only use laptop for editing fonts.

Teacher: Do you think that your mobile device can ever replace your laptop?

Respondent G10 (Female): No. Laptop is a highly comprehensive device that has numerous essential features for a potential user. Any portable device such as mobile or tablet would never be able to replace it.

Respondent G9 (Female): Laptop can never be replaced by mobile. The flexibility provided by laptop along with its comprehensive features would always be unmatched.

Respondent M5 (Male): I agree with all of the responses. Laptop can never be replaced by flexible devices such as mobile or tablet.

Teacher: Ok. So now what do you perceive regarding the screen resolution of the laptop in comparison with mobile phone?

Respondent M4 (Male): On a personal level, I would prefer laptop whenever the size of the screen is concerned. When it comes to mobile phone, a lot of harm is directly associated with it because the size of the screen tends to be small and this can negatively affect my eye-sight.

Respondent G6 (Female): Due to my weak eyesight, I would prefer laptop over mobile phone when there is concern regarding screen resolution. Various options apart from mobile are certainly available including tablet pc as they have large screen and are more comfortable.

Respondent M1 (Male): No way. I would never prefer any gadget that is low in size and has low screen resolution as it would be detrimental for my eye. For this reason, my preference would be laptop. Apart from that, screen size also has a significant impact on the learning ability. So I would never use mobile for learning or any other educational activity.

Teacher: Ok. Now what do you think will be the future of mobile learning?

Respondent G10 (Female): I think that use of mobile learning has been widely accepted in Jordan. The important concept of mobile learning is an important concept as it contributes heavily to growth and development of Jordan in terms of education. Students would be able to access their university database through their mobile phone.

Respondent M2 (Male): I personally believe that the future of mobile learning does seem to be very bright. Colleges and universities must be able to develop their courses and online portals for providing ease of use to their students that are living in far flung areas as it would help them in their travelling.

Respondent M3 (Male): I would be able to carry a big laptop or any other portable device along with me. From a student perspective, it is generally like a personal library. One can access information by not having to move physically.

Respondent G8 (Female): In my point of view, the future of mobile learning in Jordan does sound to be highly effective, specifically for the individuals that are living in far flung areas and

have no direct access to universities. I would prefer this form of learning to other sources as it allows me to access any information at any point of time.

Respondent G7 (Female): No doubt the use of mobile learning is highly beneficial. The use of mobile learning would certainly be highly beneficial and educational institutes would certainly benefit from them. In particular, College and universities would be able to access information to university lectures, video tutorials etc. Apart from that, the flexibility and accessibility is another key feature of mobile learning.

Thank you so much for taking part, it has been really interesting.