The reality of using smartphone applications for learning in higher education of Saudi Arabia

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Abstract

The smartphone has emerged as one of the most important educational tools in today's digital era due to its ability to facilitate access to learning materials without the traditional time and locational limitations. Smartphones and their associated applications also have the potential advantages of enhancing communication between learners and educators as well as simplifying the research process. However, there have been concerns over the extent to which college and university students use smartphone apps for educational rather than non-educational purposes. Moreover, there are concerns over the real usefulness of smartphone devices in the learning process. Therefore, this study focused on the perceptions of students and their faculty staff concerning the reality of smartphone apps usage and their value regarding the learning process and collegiality in the context of higher education in Saudi Arabia. The study also sought to determine the major challenges that students and faculty members face in the use of smartphone apps for educational purposes within a particular e-learning environment that using the Blackboard system and associated resources. In order to study the usage of smartphone apps in Saudi Arabia's higher education sector, this study adopted a mixed methods research approach within a case study university; the Saudi Electronic University. Quantitative research was conducted involving a survey of 324 students from the Saudi Electronic University (SEU) using self-administered questionnaires that assessed the patterns of smartphone apps usage. In addition, a qualitative study was conducted using semi-structured interviews with 13 faculty members. Survey data was subjected to statistical analysis while interview data was analyzed using thematic content analysis.

The findings of this study reveal that smartphone apps are extensively used for learning purposes as part of a wider e-learning environment in the Saudi Electronic University in Saudi Arabia. It emerged that 70% of all learning is delivered through digital platforms while 30% of learning takes place through face-to-face interactions. Most faculty members in the case study agreed on the usefulness of integrating smartphones in the learning process. In this context, faculty members believed that the use of smartphone apps in education is a necessity today. Furthermore, smartphone apps were viewed as being useful in enhancing skills of learners and faculty members as well as promoting communication between educational stakeholders. From the students' perspectives, the findings of this

study revealed a positive engagement with smartphone apps for educational purposes. Most students used smartphone apps to check their emails (73.5%), the students were browsing the internet for learning purposes (59.3%), communicate with other learners and instructors (53.1%, access learning materials (37.3%), and engage in general learning activities (35.5%). The study showed a wide acceptance of mobile learning and positive perceptions on the usefulness of smartphone apps in learning. However, there was variation in students' views and understanding among students about the role of smartphone apps for certain learning purposes. Factors that were seen to influence the students' attitudes towards smartphone apps usage for learning included class standing, age, and brand of smartphones, mobile operator ($P<0.05$). The qualitative findings highlighted that the use of smartphone apps as part of a broader mobile learning environment contributed to online communities of practice involving staff and students. Finally, the findings of this study revealed that students and faculty members experience several major challenges in the use of smartphone apps in learning. These include slow internet connections, incompatibility with certain devices, small screen sizes of the smartphones, low battery life, high costs, technical failures on the university learning app, and distractions on students' attention, among others. Therefore, the findings of this study suggest a need for Saudi higher education institutions to reflect on the practical and technical challenges affecting mobile learning platforms that can inhibit the use of smartphone apps in the mobile learning environment and students' awareness of the benefits of mobile learning.

In addition to revealing the areas of potential improvement for optimization of mobile learning in Saudi Arabia, the present study also makes important contributions to the theoretical and conceptual understanding of aspects of e-learning using the Saudi context as a focus for the study. The study findings revealed that the Technology Acceptance Model (TAM) as well as the situative and cognitive learning theories are useful models to help explain the behavioural intentions and processes of technology use among students and faculty members in the Saudi higher education sector. Based on the study findings, and in line with the TAM theory, it may be concluded that perceived usefulness and perceived ease of use of the technology have a strong influence on the learners' evaluation of the appropriateness of e-learning systems in Saudi Arabia. While the Technology Acceptance Model highlights the importance of physical aspects of e-learning

technology, the Cognitive and Associative theories are also helpful in understanding the social processes involved in this context and the role of online communities, respectively for higher education learners in Saudi Arabia.

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Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Name: Abdullah Awadh M Aljaber

Signature

List of Abbreviations

(Apps)	Applications
(M-learning)	Mobile learning
(E-learning)	Electronic learning
(PDAs)	Personal digital assistants
(GOTEVOT)	General Organization for Technical Education and Vocational Training
(GAET)	General Administration for Educational Technology
(ISU)	Internet Service Unit
(KAUST)	King Abdullah University for Science and Technology
(QS)	Quacquarelli Symonds
(ARWU)	Academic Ranking of World Universities
(NCEL)	National Center for e-Learning
(OER)	Open Educational Resources
(LMS)	Learning Management Systems
(OIC)	Organisation of Islamic Cooperation
(SEU)	Saudi Electronic University
(OCR)	Optical Character Recognition

Chapter 1 Introduction

1.1 Background

The 21st century has been characterized by rapid growth and development of the mobile phone technology. Today, the mobile phone has become an indispensable component of the contemporary society as an essential form of communication and human interactions (Abeele et al., 2018; Campbell et al., 2017; Ibrahim et al., 2018; Ling, 2017). The mobile phone has undergone a series of technological innovations that have transformed the device from a simple communication device to a technology with multiple uses and functions. Therefore, the mobile technology has become a crucial part of the modern society with the number of users increasing by the day. The falling prices of mobile devices and the increase in disposable incomes are the two major factors that have led to the accelerated growth of mobile phone use across the world. In addition, the convenience and portability of mobile devices have made them acceptable alternatives to the traditional methods of communication such as landline telephones (Iqbal et al., 2017). Moreover, the innovativeness associated with mobile phone technology has contributed to the growth in the technology adoption particularly because users perceive mobile devices to be consistent with their needs (Deegan and Rothwell, 2010).

One of the major technology innovations in the mobile phone technology has been the convergence of mobile telephony with digital capabilities to produce the smartphone. Smartphones have additional functionalities in addition to the cellular phone call and short messaging service capabilities to include internet access and capacity to access downloaded apps. Smartphones offer a large spectrum of communication possibilities such as phone calls, text messaging, video conferencing, social networking and email communication in addition to having numerous downloadable apps and high computing power (Godwin-Jones, 2011). The smartphone has emerged as a highly popular device because of its capacity to facilitate high-quality communication in addition to being portable, interactive, user-friendly, and highly customizable. When used in the learning environment, the smartphone has the additional advantage of facilitating learners to access a variety of apps for creation and review of learning content from any location and at any time of their convenience (Sharples, 2013). The smartphone

also acts as a good alternative to the bulky laptops and computers. Within the research context, smartphones facilitate the research process by allowing access to research materials. These features make them suitable for use in education and learning. Smartphones have achieved significant growth in the past few years with an estimated 10% growth rate since 2014. According to Tao and Edmunds (2018), there are over 2.5 billion smartphone users in the world today. Smartphones have enabled users to download and access apps for numerous purposes (Iqbal et al., 2017). In 2017, there were an estimated 200 billion mobile apps that were downloaded from smartphones by users worldwide (Tao and Edmunds, 2018).

The widespread adoption and usage of mobile phones in the world has motivated the interest of mobile phone apps in the education sector. In the education sector, mobile devices such as smartphones are now widely used to facilitate both independent and collaborative learning (Burden and Kearney, 2016). Mobile learning facilitates learners to engage in knowledge acquisition outside the confines of the classroom. Not only are students able to interact with fellow students and their educators but also able to obtain learning materials from external sources. In higher education, mobile learning has the advantage of fostering innovation and cultivating authentic learning since learners can obtain help anytime, anywhere. Mobile learning also promotes student-centered learning (Iqbal et al., 2017).

The Smartphone is useful as an educational tool as it allows users to access multiple apps that could facilitate the creation, access, or review of learning content in any time of the day and in any location (Vinci, Cucchi, and Vinci, 2007). Smartphones facilitate the access of eBooks and conduct of numerous educational tasks such as reading research articles, accessing research notes, and communicating with their tutors and therefore the smartphone is a useful tool for students today (Lam et al., 2009). Moreover, smartphones provide a platform for instructors to share knowledge with learners. According to Vaughan (2014), smartphones provide online collaborative apps that facilitate innovative interaction between students and their peers as well as the students and their teachers.

One of the important aspects of the smartphone is the capability to download and operate a variety of apps (Alqahtani and Mohammad, 2015). Mobile apps are small

programs that run on mobile devices allowing users to perform a wide range of functions. The proliferation of mobile apps and the growth in smartphone penetration has led to a significant growth in app usage globally. In 2017, for instance, there were 200 billion downloads of mobile apps in the world. The popularity of mobile apps have also led to an increase in the amount of time that users spend of mobile apps with some estimates showing that users spend up to 82% of mobile activity on apps and only 18% on web browsers (Tao and Edmunds, 2018). Mobile applications are now widely used in education to support the learning process. These apps have been shown to be useful in enhancing the performance of learners and the satisfaction with the learning process (Tao and Edmunds, 2018).

Smartphone apps help to breach the barriers of time, place, and distance in the learning process. Smartphones and other mobile learning devices support individualized learning by allowing students to engage in learning at their own pace, speed, and convenience (Alfawareh et al., 2017). They also facilitate situated learning where students use the mobile devices to learn within their real contexts. In addition, mobile learning facilitates collaborative learning where students are able to interact and communicate with other learners and instructors. Finally, smartphone apps support allow informal learning by facilitating students to access materials outside the confines of the classroom (Ansari and Tripathi, 2017). However, despite the learning opportunities presented by mobile apps for learners, there is a big concern over whether college and university students actually use the smartphone technology for educational purposes. Some studies suggest that students are more likely to use smartphones for noneducational purposes such as social networking, viewing and watching videos, and chatting with friends rather than in learning (Wang et al., 2009; Park, 2011; Tindell and Bohlander, 2012). Moreover, some concerns have been voiced over the usefulness of mobile devices in the learning processes with opponents suggesting that these devices could actual have a distracting role and hinder student concentration (Ansari and Tripathi, 2017). Therefore, there is a need to investigate the adoption of smartphone apps in order to determine their usage as well as the challenges that could hinder their usefulness in the learning process.

The higher education sector in Saudi Arabia has achieved a significant growth in the past few decades. Today, there are 25 public sector universities in the

Kingdom and many other private universities (Aljaloud, et al., 2018). The growth of the education sector has come at a time when technology-based learning is playing a critical role in the learning process among Saudi students. Saudi Arabia has one of the highest smartphone penetration rates in the world with over 50% of the Saudi population owning a smartphone (Alfawareh and Jusoh, 2017). In Saudi Arabia, smartphones are widely used by the young people for educational purposes. Learners in Saudi Arabia use smartphone devices to look up information in the internet, access online learning materials, communicate with peers and educators, or take online tests (Alenezi 2018). The role of smartphones in the education sector of Saudi Arabia has attracted significant scholarly interest. Most of the studies have explored the topic from the perspective of the students to determine the acceptance of smartphone in Saudi Arabia (Badwelan et al., 2016). In a recent study, Badwelan, Drew, and Bahaddad (2016) have demonstrated that students in higher education institutions in Saudi Arabia have high acceptance of smartphone usage. However, according to Alharbi et al. (2017), little attention has been directed towards the perspectives of the educators on the use of mobile phones in learning. Moreover, most of the prior studies in the area of mobile learning have not explored the specific contribution of Smartphone apps in the educational sector. Therefore, the aim of this study is to develop an understanding of the nature of using smartphone apps in in higher education within Saudi Arabia and its role in the learning process by exploring the perspectives of both the students and the faculty members within a case study university; the Saudi Electronic University. In addition, the study seeks to explore the main challenges that students and faculty members in this higher education institution encounter in the use of smartphone apps for educational purposes.

1.2 Significance of the Study

The significance of this study may be viewed from two perspectives: contribution to the academic knowledge and impact on policy and practice directions for higher education in Saudi Arabia. From an academic perspective, this study seeks to fill an existing gap in literature on the realities of smartphone apps regarding the learning processes and systems in higher education in Saudi Arabia. Saudi Arabia and Iran are considered the largest markets for mobile devices in the Middle East (Al Hosni et al., 2010). In Saudi Arabia, the usage of mobile phones is very high among college students who carry their smartphones everywhere they go. The

widespread use of smartphones among young people in Saudi Arabia has motivated renewed interest in the potential use of these devices in facilitating learning. The benefits of smartphones in learning and education have been well documented. Prior studies on smartphone usage in Saudi Arabia in higher education have explored the benefits and challenges associated with mobile learning (Altameem, 2011; Chanchary and Islam, 2011; Iqbal and Qureshi, 2012) while others have focused on the acceptance of mobile learning among higher education students in Saudi Arabia (Nassuora, 2012; Badwelan et al., 2016). According to Alharbi et al. (2017), mobile learning practices encourage greater engagements between the learner and the educator through facilitation of enhanced communication. Through mobile learning, learners and educators engage in greater interaction in the learning process rather than the traditional passive delivery of knowledge (Badwelan et al., 2016). Moreover, mobile devices facilitate more convenient and easy methods of knowledge acquisition in addition to reducing the cost of accessing learning materials. However, despite these benefits, several challenges have been documented with regard to the use of mobile devices for educational purposes. Constrained processing power, low battery life, small memory size, and technical difficulties have been cited as potential challenges associated with mobile learning (Alharbi et al., 2017).

Most of the prior studies in Saudi Arabia on the use of smartphone devices in higher education have explored the subject from a broader perspective of the mobile device usage without specific focus on how the smartphone the apps influence the learning process and contribute to the learning environment. This study builds on the prior studies to enhance an understanding of the perspectives of the two most important stakeholders in the education sector namely the student and the educator on the importance of the use of smartphone apps for learning in the tertiary sector. In particular, the focus of most of the previous studies has been on exploring the usage of mobile learning from students' behaviours and perspectives with little attention being accorded to the perspectives of the educators. This study, therefore, seeks to explore the both students' own perspectives of usage of smartphone apps in learning and also the perspectives of faculty members on the extent to which students use smartphone apps and the benefits and challenges associated with this.

With respect to the practical significance of the study, the findings may be useful in informing the policy directions of the Saudi Ministry of Higher Education by providing insights into ways of resolving the current challenges encountered by students and educators in adopting mobile learning to enhance the learning process. While the challenges associated with mobile use in the education sector have been explored, there is very little research in Saudi Arabia on the challenges associated with smartphone apps usage in the educational sector. This study seeks to develop an understanding of the challenges encountered by students and educators in the use of smartphone apps for educational purposes. The findings of this study will therefore have important policy implications for actors in the education sector as well as developers of smartphone apps on ways of improving the apps for enhanced usability by students. The study findings may also have important implications on the design of e-learning programs among Saudi Arabia universities and other institutions of higher education. Instructors in the higher education sector in Saudi Arabia are increasingly adopting IT-based tools in their teaching practices in line with the initiatives of the Ministry of Education under the National Plan for Information Technology. The plan was aimed to promote technology-based educational systems in institutions of higher education as well as the promotion of e-learning and distance learning in Saudi Arabia (Aljaloud et al., 2018). Therefore, the findings of this study may be relevant in informing the policy directions of the Ministry of Higher Education with respect to e-learning and distance education.

In addition to informing the policy directions in Saudi Arabia's higher education sector, the findings of this study may help college and university administrators in designing learning programs consistent with the students' needs and technology use practices. As the rate of smartphone usage increase in colleges and universities, it has become necessary for educators to adopt the new technologies in order to facilitate improvements in the learning process. The opinions of faculty members interviewed in this study provide rich data that could give useful insights for improving the mobile learning environment in Saudi Arabia. College and university administrators may find the findings of this study useful in strategic decision-making on ways of harnessing the opportunities presented by technology in the education sector.

1.3 Aims of the study

The main aim of this study is to explore the use of smartphone apps and their articulation with the case study University's Blackboard e-learning system, with particular reference to the impact on the learning process. The research seeks to pursue the following research objectives:

- To review the literature about the use of smartphone apps for learning in higher education with leading theories and models
- To explore faculty members' engagement and related perceptions regarding the use of smartphone apps within the Blackboard educational environment
- To explore faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purpose within the Blackboard educational environment
- To explore students' perceptions, attitudes and engagement in using smartphone apps for educational purposes within the Blackboard educational environment
- To explore the impact of the use of smartphone apps on the learning process and collegiate working within the case study University
- To determine the main challenges confronting students and faculty members in use of smartphone apps for educational purposes within the Blackboard educational environment
- To make recommendations based on the findings that has a heuristic value to Saudi Arabia's higher education sector

The Blackboard Learning Management System (Blackboard app) is an e-learning solution that is available as a downloadable mobile app that supports various learning and teaching service. It is the most widely used

e-learning app in the world with over 70% of American colleges and universities using the app. Blackboard has been in use at the SEU since 2012 SEU and is now widely used at the university. At the SEU, the app is used to support collaborative learning and course management. In this study, only the usage of the Blackboard app was examined since it was the most widely used app at the case study institution. Within this context, the wider scope of this study was the examination of usage, perceptions, and attitudes of learners and faculty members regarding Blackboard for educational purposes as well as the challenges involved.

1.4 Research Questions

Smartphone apps, like other mobile phone technologies, have an important role to play in the higher education sector in Saudi Arabia. Consistent with this expectation, five research questions were developed to guide the research process to explore the use of smartphone applications within the Blackboard educational environment in the higher education sector of Saudi Arabia. This study seeks to investigate the following research questions:

1. In the research context, what are faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?
2. In the research context, what are faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purposes within the Blackboard educational environment?
3. In the research context, what are students' attitudes toward the use of smartphone apps for educational purposes within the Blackboard educational environment?

4. In the research context, what is the nature of the use of smartphone apps on the learning process and collegiate working within the case study University?

5. In the research context, what are the main challenges that confront the students and faculty members in using smartphone apps for educational purposes, within the Blackboard educational environment?

1.5 Purpose of the Study

The purpose of this study is to explore the use of smartphone apps for educational purposes within a particular e-learning environment, namely the Blackboard app, by researching the perceptions of students and faculty members of a higher education institution in Saudi Arabia. By exploring the perceptions of faculty members, this study will help to develop an understanding of how educators perceive the usage of mobile technologies by students. The research includes a focus on whether the use of smartphone apps influence the learning process and collegiate working within the case study University. The study also seeks to determine the main challenges that confront students and faculty members in use of smartphone apps for educational purposes. By addressing these questions, this study will enhance the current understanding of the use and value of smartphone apps for learning in higher education institutions.

1.6 Contribution of the Study

The research findings contribute to our knowledge of how an aspect of a relatively new type of technology enhanced learning, smartphone apps, can contribute to the learning processes and systems in higher education. Since research is a critical element of higher education, it is important to develop an understanding of how modern mobile technology contributes to research. Most of the prior studies in the area have investigated the usage of mobile technology in the general learning environment (Beddall-Hill et al., 2011; Chanchary and Islam, 2011; Iqbal and Qureshi, 2012; Alharbi et al., 2017; Hinze et al., 2017). Therefore, the current study contributes to the literature by exploring the issue from a research perspective. The research is sensitive to the cultural and contextual issues of the case study and draws out those findings that have wider relevance, as well as those relevant to Saudi higher educational establishments. These findings also offer notable insights to inform policy and practice in the Saudi higher education system.

An important contribution of the research is the insights provided on how smartphone apps are used within a wider technology enhanced environment; namely the Blackboard system, in a higher education institution and, importantly how this technology can contribute to supporting learner and professional communication and communities of practice.

The research also contributes to academic knowledge regarding how cultural and societal dynamics can influence the use of smartphone apps and other technology enhanced learning approaches. This includes factors of gender and age that can influence perceptions and take up of smartphone apps and associated technology enhanced learning opportunities.

The study also contributes to the development of mobile learning theories by facilitating an understanding of the factors that influence the adoption of mobile technology in the learning sector. The study explores the applicability of certain theories to the understanding of mobile learning in the particular context of higher education in Saudi Arabia. In particular, this study helps to expand the technology acceptance model (TAM) within a Saudi context. The technology acceptance model explains the reasons, attitudes, and beliefs that influence the adoption of information technology (IT) systems (Davis, 1989). The acceptance of information technology is primarily influenced by the perceived usefulness and perceived ease of use of that technology. Studies in other countries have shown that the acceptance model could be used in explaining the reasons behind the adoption of mobile technology in education systems (Alrajawy et al., 2018; Chang et al., 2012; Park et al., 2012). However, the TAM theory was used to explain technology adoption in organizational settings rather than the context of mobile learning. In the present study, the technology acceptance model and other theoretical models are used as analytical tools to help understand the processes involved in student and staff use of smartphone technology within their e-learning context. This affords insights on the applicability of these theories for the focus of this study.

This study also contributes to the knowledge on mobile learning by investigating the contributions of smartphone apps to learning systems and processes within the context of a developing country. Literature in the field of mobile learning suggests that the use of mobile devices in higher education may be valuable in facilitating learning processes and activities such as information gathering, promoting

communication, accessing content, and facilitating collaboration (Beddall-Hill et al., 2011; Alharbi et al., 2017). In addition, mobile devices provide an extended capacity to conduct research outside the traditionally possible locations within the university in addition to facilitating the collection, manipulation, and sharing of data in real time (Hinze et al., 2017). Most of the prior studies have investigated the role of the mobile devices and therefore the current study goes deeper into developing an understanding of the contributions of smartphone apps as an integral component of mobile device technologies.

With respect to the usage of smartphone apps in a developing country, the study also contributes to the body of knowledge by exploring the usage of this mobile technology from the perspectives of both the students and faculty members. Prior investigations on the usage of smartphone by students in higher education institutions have explored the students' own perceptions of their usage of mobile devices or mobile apps. However, faculty members directly involved in students' learning activities can offer useful insights into the students' smartphone usage behaviors (Alharbi et al. 2017). A few studies exist on the perceptions of faculty members on mobile technology use, but no research has specifically investigated how smartphone apps contribute to e-learning systems in higher education in Saudi Arabia. For instance, Gruzd et al. (2012) investigated the use of social media as an educational tool by interviewing 51 university instructors. Tandi and Questier (2014) examined the factors that influence the use and adoption of open access technology in Tanzanian universities by surveying a sample of 415 faculty members. The results revealed that the usage of the technology in the Tanzanian universities was influenced by students' personal characteristics, existence of favorable conditions, and students' behavioral intentions. In Saudi Arabia, Alharbi et al. (2017) examined the acceptance of mobile learning tools in Saudi Arabia by surveying a sample of 80 university instructors. The current study extends these investigations by adding the dimension of exploring students' usage of smartphone apps from the perspectives of the faculty members.

The findings of this study are useful to academics, policymakers, and teaching staff since they help to elucidate how smartphones within mobile learning can be used to enhance students' learning experiences. The research helps to identify the challenges and limitations of using smartphone apps for learning and, therefore, key players in the higher education sector could use the findings to evaluate ways

of improving the learning experiences of the students. Developers of learning apps could also use the findings to improve software developments.

1.7 Paradigms and Limitations of the Study

This study adopts Pragmatism as a philosophical stance and research paradigm. The selection of research methods adopted in this study is, therefore, guided by a methodological pragmatism perspective. This paradigm has a lengthy philosophical history that has influenced many fields, but its relevance here is that it provides a justification for the use of research methods that are best suited to address the research questions that are the focus of a study such as this (Tashakkori and Teddlie 1998). Indeed, this rationale often underpins mixed study research (Biesta 2010; Creswell and Clark 2011; Johnson and Onwuegbuzie 2004; Maxcy 2003; Morgan 2014a; Teddlie and Tashakkori 2009). This paradigm argues the importance of the outcomes and app of the research, rather than adherence to one particular perspective. Indeed, while this is a contested viewpoint, it can be argued that adopting pragmatism as a paradigm helps synthesise aspects of positivistic and more constructivist perspectives (Creswell 2013; Creswell and Clark 2011).

In this study, both positivist and interpretive paradigms were seen as useful, therefore, a pragmatic, mixed-methods approach was adopted, accepting that knowledge may be obtained objectively as well as being socially construed. This is a contested stance. Interpretivist and positivist research philosophies do present two contrasting worldviews in research. Hull (2013) notes that combining quantitative and qualitative methods is limited by the incompatible paradigms that underpin them. Quantitative research methods are based on the positivist paradigm and objectivist epistemology, which focuses on app of methods of natural sciences. In the positivist paradigm, reality is deemed to be measurable and subject to evidence support (Hammersley, 2013). The philosophy of this paradigm is that knowledge exists in the real world and may be examined only through empirical tests and methods that involve the use of statistical methods in data analysis. It also holds that the researcher exists independently of the research phenomenon and that knowledge may be generalized to larger settings (Johnson & Onwuegbuzie, 2004). In social sciences, the positivist paradigm is typically applied in survey-based research.

On the other hand, the interpretivist paradigm is based on the understanding that knowledge in human and social sciences is not best understood by directly using the same methods of natural and physical sciences. Thus, it assumes that human beings interpret their world as they interact with it, thus participating in generation of knowledge (Hammersley, 2013). The interpretivist paradigm adopts a relativist ontology that assumes that a single phenomenon may have multiple interpretations rather than a single truth that can be determined through measurement. The paradigm helps to develop deeper understanding of the phenomenon and its complexities rather than trying to generalise it to a wider population. It is also based on the subjectivist epistemology, which accepts that subjective knowledge can constitute reality (Creswell, 2007). While the interpretivist paradigm offers the advantage of enhancing the understanding of social phenomena, it has been criticised that its findings cannot be generalized to other contexts and populations (Cohen, Manion, & Marison, 2011). Positivistic critiques of interpretivist perspectives also question its ability to verifying the validity of the qualitative findings due to the variability of social phenomena. However, interpretivists counter such criticism, noting that while the diversity of qualitative research approaches means there is no single procedure to check the validity of findings, there are a range of appropriate techniques that can be used to check the validity and reliability of findings. These either focus on methodology (e.g.: Dixon-Woods et al 2004; and Meyrick 2006), or the rigor of interpretation of findings (e.g.: Lincoln et al 2011). The former advocates using particular methodological standards and approaches to ensure the transparency, rigour and appropriateness of the research design and process. The latter emphasises the importance of rigour and cross-checking of coding and theme development in the analysis process.

So, in this study, both qualitative and quantitative research methods were used. This could have resulted in conflicting perspectives emanating from the mixing of two opposing research philosophies. However, this is justified by adopting a pragmatic approach in which the research methods were guided by the research question data requirements. Thus, the understanding of the perceptions of faculty members regarding the use of smartphone apps was deemed to require qualitative methods while a survey design was considered most practical in investigating the usage characteristics among students.

This research has a strong emphasis on qualitative methods because the research questions focus on the perceptions of key staff at the case study University to understand their role in the use of smartphone technology and apps and how this influences the learning and teaching processes, interactions and systems. Indeed, much of the strength of the findings in this research rests on the insights gained from the qualitative accounts provided by the faculty members interviewed. Their perceptions of the topics covered by this study's research questions shape the nature of the learning and teaching practice and policy in the case study University. This information is, therefore, essential in understanding how smartphone apps are perceived by these stakeholders and how this shapes their constructs and is reflected in the practice and policies in their establishment.

The views of students on the same research topics could have been elicited using qualitative methods; making for a completely qualitative approach. However, the decision to use a survey method to gather the views of students reflected a rationale to gather data from as large a purposive sample as possible to obtain a meaningful, but non-random, cross-section of the target population in order to provide data relevant to the research questions. While the research topics are not covered in as much depth as the interviews with the University staff and the findings are not statistically representative to all students, it does allow possible variations and associations in relevant perspectives and behaviours to be robustly explored.

Therefore, the methodology adopted for the study can be defended against an overly positivistic critique. Rather, the pragmatic stance underpinning the methodology is appropriate to obtain the necessary data and information to address the research questions and the methodological triangulation affords key insights that enhance the analysis. However, while the research methods and underpinning paradigm are appropriate regarding the research questions, there are important caveats and limitations of the research to be considered and borne in mind during the analysis.

For the survey data, given the number of responses and the nature of the questions used in the questionnaire, the statistical analysis of the survey responses was limited to descriptive statistics and chi-square. The nature of the data meant that there were limitations to the extent to which statistical techniques could be

applied. However, the findings from this level of analysis were appropriate to explore findings emerging from other data sources in the research and to address the research questions.

1.7.1 Limitations of the study

Assessing the limitations of this study must be done in relation to the paradigm adopted by the research as well as any related methodological implications regarding the methods chosen. As the preceding section argued, adopting a methodology framed by the Pragmatist Perspective was appropriate to address the research questions. However, the research does have a number of potential limitations that need to be considered. Looking at the qualitative information gathered. it is possible that key informants' accounts might have been influenced by the nature of the interaction during the interview, including informants' perceptions of the interviewer, power and/ or gender dynamics and potential sensitivities or implications regarding what is being discussed.

While the author believes that the research questions and topics were not sensitive or controversial in nature and informants were honest in their responses, it is possible that some were concerned about not providing a positive and unproblematic account of the use of smartphone apps and technology enhanced learning in their University. Given that the University policies place an emphasis on using ICT to provide an effective e-learning system, it is possible that some interviewees would have been uncomfortable with saying something that countered this. However, the fact that some interviewees did provide frank criticism of aspects of the University's e-learning system suggests that any reticence to critique was not prevalent.

It is also possible that some informants could have provided responses that they believed were appropriate in order to be consistent with the perceived expectations of the researcher, rather than providing an accurate account of the reality of their experiences. For example, interviewees and even survey respondents might have thought that since the focus of the study was on the use of smartphone apps in the e-learning environment, it would be polite to provide a generally positive account of their experiences with smartphone apps in the

learning process. Again, the themes and findings that emerged reveal a range of views and perspectives that suggests that any such effect was not common.

On reflection, it is not possible to check with absolute certainty the accuracy of interviewee accounts, however, looking across the interviews, there was consistency and a level of corroboration that would support the assessment that the information being provided by interviewees was a robust account of their reality.

While not a limitation as such, the methodology, analysis and development of findings from this study has to consider cultural factors, perceptions and the context of the research that could influence the opinions and views of respondents and participants in the study.

According to Aljaloud et al. (2018), the use and adoption of new media and technologies is highly influenced by cultural factors. Aljaloud et al. (2018) observes that culture comprises of the norms, beliefs, and customs that determine how education, family, and other social systems are construed. Arabia is heavily influenced by the Islamic culture that permeates almost all aspects of individual life for most people and this may have important implications on the perceptions of issues explored in this study. The collectivist nature of human interactions and the concepts of power and authority could, therefore, influence the interaction of interviewees and respondents from Saudi Arabia with the methods and the interpretation of meanings during the research process (Badwelan et al., 2016).

In addition, given that most ICT systems originate from western or non-Arabic societies they can contain certain assumptions in relation to the cultures salient in those societies. Subsequently, the cultural constructs within some mobile technologies may be incompatible with Saudi and Arabian assumptions regarding communication norms and conventions.

Research has shown notable cultural differences between non-Arab and Arab countries that should be taken into account when considering using TAM as an analytical tool (Rose and Straub 1998). Such research emphasises the importance of culture in mobile technology take-up and use (Rose and Straub 1998; Loch et al 2003; Rouibah and Hamdy 2009; Straub et al 2001; Emdad, et al 2009) and

highlights that culture in Arab countries can facilitate or inhibit such technology use and specifically, the use of smartphones (Rouibah and Abbas 2010; Rouibah et al 2011). Ameen and Willis (2015), applying various TAM models including Unified Theory of Acceptance and Usage of Technology (UTAUT1) Venkatesh et al (2003); the Unified Theory of Acceptance and Usage of Technology2 (UTAUT2) Venkatesh et al (2012), have researched the impact of Arab culture on smartphone use. While not specifically focusing on educational and learning contexts, Ameen and Willis (2015) have shown that there is a "preference for face-to-face meetings rather than technology mediated meetings", however this appears to decrease as people continue to use smartphones. Again, this refers to the population as a whole and is not specific to educational contexts and communities. Also, as Ameen and Willis (2015) warn, we need to be careful not to put all Arabic cultures together when applying such findings and country specific variations should be taken into account.

There are also other cultural factors that could have potentially impacted on the research and its methods. For example, for cultural-religious reasons, some female faculty members can be reluctant to video record lectures or participate in video meetings and prefer to use audio recording only. However, this issue did not appear to impact on university staff's willingness to participate in the research or negatively influence the quality or amount of data collected.

The fact that the researcher for this study is a native Saudi Arabian citizen has likely helped in sensitising the research to the possible social and cultural factors that might influence the data gathering. On reflection, the potential cultural factors do not appear to have impeded the research process. Also, where cultural factors might have been an important factor influencing interviewee or respondents' engagement with the research and openness, this has been taken into account in the planning and conduct of the research and in the analysis of data.

Regarding the quantitative aspect of the methods, the number of responses and the non-parametric nature of the survey data meant that the statistical analysis of the survey responses was limited to descriptive statistics and chi-square. However, this is not strictly a limitation, as the analysis was sufficient to produce

findings that could be triangulated, where appropriate, with the findings emerging from other data sources in the research to address the research questions.

While the mixed-method approach provides robust evidence to contribute to an understanding of how smartphone apps are used in the case study University, the findings cannot be generalised to all higher education students and faculty members in Saudi Arabia. Indeed, this was not the aim of this study, rather, the strength of the approach is that it has provided detailed findings and insights, informed by wider research and theory that can be used to address the research questions within a particular context. These findings can then be used to inform other studies, including those that could produce more generalisable findings.

1.8 Organization of the study

This study is structured into eight key chapters. The first chapter provides an introduction to the study by tracing the development of the mobile and smartphone technologies and their subsequent adoption in supporting higher education. The chapter further highlights the significance of the study from the academic and practice apps of the findings. The first chapter provides a general direction of the study with smartphone apps being the focus within the research context by highlighting the research questions, aims, and purpose of the study.

Chapter Two discusses the research context in details and therefore helps to develop an understanding of the context within which the study is set. The chapter discusses Saudi Arabia as a country including the general country profile and economy of the country. The chapter further explores the development of education technology in Saudi Arabia and the contributions of the Development Plan (Vision 2030). The education policy in Saudi Arabia and the higher education sector are also explored. The chapter concludes with an overview of the National Center for e-learning.

Chapter Three of this thesis reviews the relevant literature related to the use of mobile devices and smartphone apps in higher education. The chapter begins with a review of the relevant theories including the theory of innovation diffusion and the technology acceptance model. The chapter further reviews the existing research on mobile learning and use of smartphone apps in learning in various

parts of the world and Saudi Arabia in particular. The review of literature helps to identify the existing gaps, which the current study seeks to address.

Chapter Four of this thesis describes the research methodology adopted in investigating the realities of smartphone apps for learning in higher education in Saudi Arabia. This study adopts a mixed methods research design incorporating quantitative research through a survey of Saudi college and university students as well as a qualitative research involving in-depth interviews with faculty members. Therefore, chapter four of the thesis provides details on the rationale for adopting the mixed methods research, philosophical foundations of the researcher, and the research design. The chapter further describes the research procedures for collecting, processing, and analyzing data.

Chapter fifth explains the method of qualitative dataset analysis used in the study and its stages. It presents the qualitative data results derived from the semi-structured interviews, focus groups and open-ended questions within the questionnaire.

Chapter sixth explains the type of quantitative dataset analysis used in the study and the test used to examine the differences in stakeholders' perceptions. It presents quantitative data results based on the questionnaire conducted with a large sample of stakeholders.

The seventh chapter of the thesis gives a detailed account of the findings from the survey of Saudi students on their perceptions of smartphone apps usage as well as the outcomes of interviews with faculty members on their perceived usage of the apps by the students. The chapter also discusses the perceived challenges among students and faculty members in the use of smartphone apps in higher education learning. As part of the research discussion, the findings of the current study are compared with those of previous studies in order to place the findings in the right context in the existing body of knowledge.

Finally, this thesis contains an eight chapter (conclusion and recommendations) where the main findings of the study are reviewed and summarized. In the conclusion chapter, the main findings are revisited in the context of the research questions and theoretical frameworks. The recommendations arising from the

study findings are highlighted in this chapter as well as the limitations and suggestions for future studies.

1.9 Key terms and definition

Applications (apps): These are small computer software or programs that run on mobile phones and that perform a wide range of functions (Tao and Edmunds, 2018).

Blended learning: An education method where learning takes place through electronic and online media platforms as well as the traditional teaching style of face-to-face interactions (Mortera-Gutiérrez, 2006)

E-learning: Any form of teaching or learning where knowledge and instructions are delivered through electronic media such as mobile devices, computers, internet, and video tapes among others

Higher education: This is any form of education beyond the secondary or high school level that is typically offered by colleges and universities.

Long-distance education: Institution-based, formal education where learners are geographically separated and various forms of interactive telecommunication technologies used to connect learners with instructors as well as facilitate the sharing of resources (Simonson and Seepersaud, 2019, p. 1). The important elements of distance education are: institution-based as opposed to self-study or other non-academic learning models, geographical separation between learners and instructors, use of interactive telecommunication (most often electronic channels), and an established learning group comprised of learners, teachers, and instructional resources (Simonson and Seepersaud, 2019).

Mobile devices: These are portable and lightweight devices that typically connect to the internet and include cell phones, laptops, smart phones, tablets, iPads, iPods, and e-readers (Franklin, 2011)

Mobile learning (M-learning): This refers to any form of learning that takes place through wireless devices and portable handheld computing devices such as mobile

phones, tablets, personal digital assistants (PDAs), and similar handheld devices. It may also be defined as any form of learning where the learner is not in a fixed predetermined location and where mobile technologies are used to facilitate the learning process (Narayanasamy and Mohamed, 2013, p. 34).

Personal computer: A desktop computer, tablet, notebook, or laptop that is used for personal computing purposes

Perceived ease of use: The extent to which a student believes that the use of smartphone apps in learning will be free of cognitive effort (Davis, 1989)

Perceived usefulness: The degree to which a student believes that using the smartphone apps will enhance their performance in learning (Davis, 1989)

Smartphone: This is a mobile phone that possess integrated computer functionalities that are absent in other telephone devices such as web browsers, operating systems, and ability to run software apps (Alwraikat, 2017, p. 114). Smartphones have advanced features such as cameras, MP3 players, email-synchronization, internet access, access to Microsoft Office files, and full-keyboard capabilities among others (Alwraikat, 2017).

Vision 2030: A plan by Saudi Arabia that seeks to reduce the country's dependence on oil as a primary source of national revenue and instead diversify the economy as well as achieve highly developed public service sectors including health, infrastructure, and education by the year 2030. The plan is centered on three key themes of that includes making Saudi Arabia a vibrant society, an aspiring nation, and a prosperous economy (Saudi Vision 2030, 2019).

Chapter 2 Research Context: Saudi Arabia

2.1 Introduction

The Kingdom of Saudi Arabia has a long history. However, its establishment as a modern state may be traced to the unification of the two regions Hejaz and Najd in the post-World War I era following the rivalries between the rulers of the two regions. In 1932, King Abd al-Aziz Al Saud united Hejaz and Najd to formally establish the Kingdom of Saudi Arabia. However, the newly formed Saudi state suffered financial and political problems. The Kingdom initially depended on revenues from Hajjis but the economic depression and the political turmoil following the Second World War reduced the number of Hajjis significantly causing a severe financial crisis in the new state. Following the discovery of oil, the Saudi state achieved significant economic growth in the following decades. Today, the Kingdom of Saudi Arabia is a leading player in the economic, social, and political spheres of Middle East (Barrett, 2015). Part of the country's socio-economic development has been the establishment of a vibrant education system. Currently, Saudi Arabia has numerous institutions of higher education including 25 public universities and many other private universities (Aljaloud, et al., 2018). This section reviews the research context of the study by providing an overview of Saudi Arabia including the economy and higher education sector in the kingdom.

2.2 Profile of Saudi Arabia

Saudi Arabia is officially referred to as the Kingdom of Saudi Arabia (KSA). The state was founded in 1932 following a 30-year campaign by Abd Al-Aziz Al Saud for the unification of the Arab Peninsula (Foster, 2017). The kingdom is a constitutional monarch that is ruled by a male descendant of Al Saud. Since 2005, Saudi Arabia has achieved accelerated modernization under the leadership of King Abdallah Al Saud who introduced various social and economic reforms such as the expansion of opportunities for women, expanding the role of the private sector, and attracting foreign direct investment. More reforms have been initiated under the leadership of the current monarch King Salman Al Saud including the lifting of a ban on women driving, allowing women to participate in elections, and efforts to reduce dependency on oil. In 2016, the government of Saudi Arabia announced

the establishment of Vision 2030, a set of socio-economic reforms that are expected to guide the country's strategic directions in the next decade.

The Kingdom of Saudi Arabia is the largest Arab state in western Asia that constitutes the bulk of the Arabian Peninsula with a land area of about 2.15 million square kilometers. The Kingdom is the second largest Arab country in the world after Algeria. Saudi Arabia occupies approximately 80 per cent of the Arabian Peninsula. Geographically, the Kingdom of Saudi Arabia share borders with Iraq and Jordan to the north. The kingdom also borders Yemen to the South while Oman is in the southeast of the Kingdom's border. Saudi Arabia borders Kuwait to the northeast. On the eastern side, it borders the United Arab Emirates, Bahrain, and Qatar (CIA, 2019). Saudi Arabia's climate is mainly characterized by harsh, dry desert temperatures and a mostly sandy desert terrain.

Figure 2:1 A map of Saudi Arabia (Source: CIA, 2019)

Saudi Arabia has a population of 33 million people of whom 37% are immigrants. The main ethnic groups in Saudi Arabia are Arabs making up 90% of the population and Afro-Asians who make up 10% of the population. Arabic is the official language in Saudi Arabia although English is also widely spoken in formal settings. Islam is the major and official religion in Saudi Arabia. Saudi Arabia has a population growth rate of 1.63% and a relatively high life expectancy rate of 75.7 years. The

Kingdom has a high literacy rate with 94.7% of the total population being literate (CIA, 2019).

Saudi Arabia is one of the largest oil producers of oil and natural gas in the world. The kingdom currently holds over 16% of the total world oil reserves. Oil, natural gas, and mineral ores remains the main natural resources for Saudi Arabia. Low oil prices in the global oil markets have significant impacts on Saudi Arabia's economy. Subsequently, the country has made efforts to reduce its dependence on oil revenues through diversification of the economy.

The capital city of the Kingdom of Saudi Arabia is Riyadh, which is also the country's biggest city. Administratively, the Kingdom comprise of 13 regions with the largest being Medina, Jeddah, Riyadh, and Mecca. The country's constitution is the Basic Law of Government (1992) that serves as the country's constitutional framework. The legal system in the Kingdom of Saudi Arabia is based on the Islamic Sharia legal system (CIA, 2019).

2.3 Economy of Saudi Arabia

Saudi Arabia a high-income economy with an estimated net gross domestic product of $686.7 billion and a GDP per capital of $54,500. Crude oil production and petroleum refinery are the main industrial activities in Saudi Arabia as well as other industries such as industrial gases production, caustic soda manufacture, cement production, and ammonia production. The GDP (purchasing power parity) in 2017 was estimated at $1.775 trillion ranking 16th globally by purchasing power parity. Saudi Arabia has a low public debt rate currently estimated at 17.2% of the GDP. The inflation rate remains low and was negative (-0.9%) in 2017 (CIA, 2019).

Saudi Arabia is largely an oil-based economy. Currently, the Kingdom is the largest oil producer and exporter in the world. The country's oil sector accounts for about eighty-seven per cent of the total revenues and ninety per cent of all export earnings. The state-owned company Aramco is the largest oil producing and exporting company in the world. The high oil revenues have given Saudi Arabia substantial budget surpluses over the past decades enabling the Kingdom to invest heavily in healthcare, defense, infrastructure, and education. However, the

government has a net budget deficit of 8.9% of the GDP in 2017 when government amounting to $241.8 billion exceeded the government revenues of $181 billion. The Saudi economy is largely dependent oil exports for financing of its national programs. Therefore, fluctuations in oil revenues due to various geopolitical and macroeconomic factors has significant impacts on the government revenues and capacity to finance development projects as well as the overall impacts on the stability of the economy (El Mallakh, 2015; Wilson and Douglas, 2016).

The bulk of the exports from Saudi Arabia comprise of petroleum and petroleum products. In 2016, for instance, mineral fuels and oil products accounted for 79% of the country's total exports or an equivalent of $163.5 billion. Plastics account for the second largest source of export revenue accounting for 7.0% of total revenues while organic chemicals account for 3.7% of the export revenue. Ships and boats account for 1.1% while aluminum accounts for 0.9% of the country's total exports. Japan and China are the major exports partners for Saudi Arabia accounting for 12.2% and 11.7%, respectively of the 2017 exports. Other important exports partners are South Korea, India, the United States, United Arab Emirates, and Singapore, which accounts for 9%, 8.9%, 8.3%, 6.7%, and 4.2%, respectively of all export commodities from Saudi Arabia in 2017 (CIA, 2019). With respect to imports, the country mainly exports equipment and machinery, food products, chemicals, motor vehicles, and textile products. In 2017, the country imported goods and products valued at $119.3 billion, a 6.65% drop from the previous year's exports of $127.8 billion. China and the United States remain the largest sources of goods for Saudi Arabia, accounting for 15.4% and 13.6%, respectively of the total imports in 2017. Other major partners are the UAE, Germany and Japan where total imports accounted for 6.5%, 5.8%, and 4.1%, respectively of total Saudi imports in 2017. In the same year, Saudi Arabia imported 4.1% of its imports from India and another 4.1% from Japan and 4% from Saudi Korea (CIA, 2019).

The Saudi government initially assumed that the oil revenues would continue to flow consistently in the economy. However, the global oil glut of the mid-1980s caused a significant reduction in oil revenues causing the government to borrow heavily and become a net debtor for the first time in the Saudi history. Declines in global oil prices have had severe impacts on the economy of Saudi Arabia. In 1997, for instance, oil prices declined by more than one-third causing significant declines in government revenues. In realization of the risks posed by heavy

dependence on oil revenues, the government of Saudi Arabia has launched various programs aimed at diversifying the country's economy and sources of national revenue. The Saudi government has launched various programs for economic reforms including the expansion of the role of the private sector in non-oil sectors. One of the major sectors that the government has focused on in its reforms programs is the tourism sector (Almutairi, 2016; Yamada, 2018).

The Saudi tourism sector is categorized into the Hajj, commercial visitors, and the leisure tourists. Most of the leisure visitors are the local tourists as well as visitors from other GCC countries. The majority of visitors in Saudi Arabia are pilgrims visiting Mecca and Medina or citizens of neighboring Arab countries. The tourism sector has seen a significant growth in the hotel industry in Saudi Arabia. In 2017, an estimated 8 million pilgrims visited Mecca for the non-obligatory pilgrimage Umrah, generating approximately $4 billion for Saudi Arabia. The Mecca Chamber of Commerce and Industry projects that between 25% and 30% of the incomes for the private sector in Mecca and Medina comes from pilgrimage. In total, the Hajji brings annual revenue of around $16 billion for the Kingdom every year (Cochrane, 2018). Projections show that the Hajj and Umrah will bring about $150 billion to Saudi Arabia by 2023 while creating at least 100,000 permanent jobs (Cochrane, 2018).

In addition to tourism, the Saudi government’s diversification efforts have focused on industrialization. The country’s industrial products currently contribute over 90% of the non-oil exports. These products include plastics, construction materials, metals, and electrical appliances as well as petrochemical and oil-based products. Saudi Arabia has a number of industrial plants that manufacture various products. The Jubail Industrial City and Yanbu Industrial City are important centers for industrial facilities and factories. Diversification of the Saudi economy has also seen the government seek greater participation of the private sector in the areas of education and healthcare (CIA, 2019).

2.4 Development of Educational Technology

In Saudi Arabia formal education can be traced to the 1930s when the Kingdom was established. King Abdulaziz Al-Saud began an ambitious program in 1945 that helped to open schools and other learning institutions in the country (Alqarni,

2015). However, the education sector faced numerous challenges that negatively affected the quality of education. During this time, the country had few qualified teachers and illiteracy rates were high. According to Rugh (2002), the country also faced a problem of lack of educational facilities. In 1953, the Kingdom established the Ministry of Education, which spearheaded a number of reforms in the education sector. Since the 1960, education has improved significantly in terms of infrastructure, quality, and quantity of education including the expansion of female education (Mahboob and Elyas, 2014). In the heart of education reforms in Saudi Arabia has been the development of educational technology. The 1980s was a period of significant growth in technical and vocational education with the opening of the General Organization for Technical Education and Vocational Training (GOTEVOT) (Alqarni, 2015). The development of education technology in Saudi Arabia may be categorized into three broad eras: pre-internet technology, post-internet technology, and the E-Learning technology.

2.4.1 Pre-internet technology

The pre-internet technology era was characterized by the development and adoption of audio-visual technology in education. The Ministry of Education established a unit for offering audio-visual program in 1959 that was involved in the development of audio-visual learning materials for students. The 1960s and 1970s saw the Saudi education sector introduce a graphics and illustrations unit that was involved in the production of advanced audio-visual materials. The Kingdom started the broadcast of educational programs in 1979 over radio channels. This was facilitated by the Ministry and Education and Ministry of Higher Education. These programs were the earliest forms of distance learning programs in Saudi Arabia. Correspondence education started in the 1980s where Saudi students pursued courses offered by international universities through correspondence. In 1985, the Kingdom of Saudi Arabia in collaboration with other Arab countries launched two satellites known as the ArabSat to serve the telecommunications, information, and education sectors particularly by facilitating the setup of educational TV programs (Alqarni, 2015).

The government of Saudi Arabia has initiated various programs to promote educational technology in the Kingdom over the years. In 1985, the government established the General Administration for Educational Technology (GAET). The

unit was administered by the Educational Development Department and its functions included providing in-service training in educational technology, producing instructional materials for technological education courses, and providing instructional materials, equipment, and films for science laboratories. The institution was also involved in provision of computers and software programs to schools. It also facilitated the establishment of a unit where schools would obtain audio-visual materials (Alqarni, 2015). Between 1976 and 1982, the government spent SR 281.6 million on instructional material, media, and equipment.

2.4.2 Post-internet technology

The development of the internet technology played a key role in shaping the development of technology in Saudi Arabia. King Fahd University of Petroleum and Minerals connected to the internet in 1993 becoming the first Saudi institution to do so (Alqarni, 2015). In the following year, state institutions in the fields of research, academic, and medicine got access to the internet. The state-owned institution Saudi Aramco became the second institution to connect to the internet in 1995 while public access to the internet through commercial providers happed in January 1999 (Ulrlchsen, 2018).

The Internet Service Unit (ISU) was the government institutions that managed the internet service in the country. The Internet Service Unit acted as the internet exchange center for Saudi Arabia in addition to raising public awareness for internet services. The ISU was also tasked with the responsibility of formulating the rules and regulations that would govern internet use in the Kingdom. In the next few years, internet access slowly moved from government and academic use into the mainstream use. The asymmetric digital subscriber line service was introduced in 2001 under the auspices of the Saudi Telecom Company and it significantly reduced the cost of internet in the Kingdom. Following the development of the ADSL technology, most universities began implementing web-based learning. By 2001, there were 275,000 internet subscribers in Saudi Arabia (Alqarni, 2015).

Despite earlier government efforts to open up the public access to the internet, initial usage was initially low. The main difficulty associated with earlier internet

usage was that the Arabic language was not initially available on the internet and early computers in general and this restricted access only to those who English language skills. However, the number of users has increased steadily over the years. The number grew from from 200,000 in 2000 to 6.4 million users in 2008, representing 26% of the population (Alshehri and Meziane, 2017). In 2017, 70.49% of the Saudi population had access to the internet with the penetration projected to grow in the coming years and reach 73.45% in 2022.

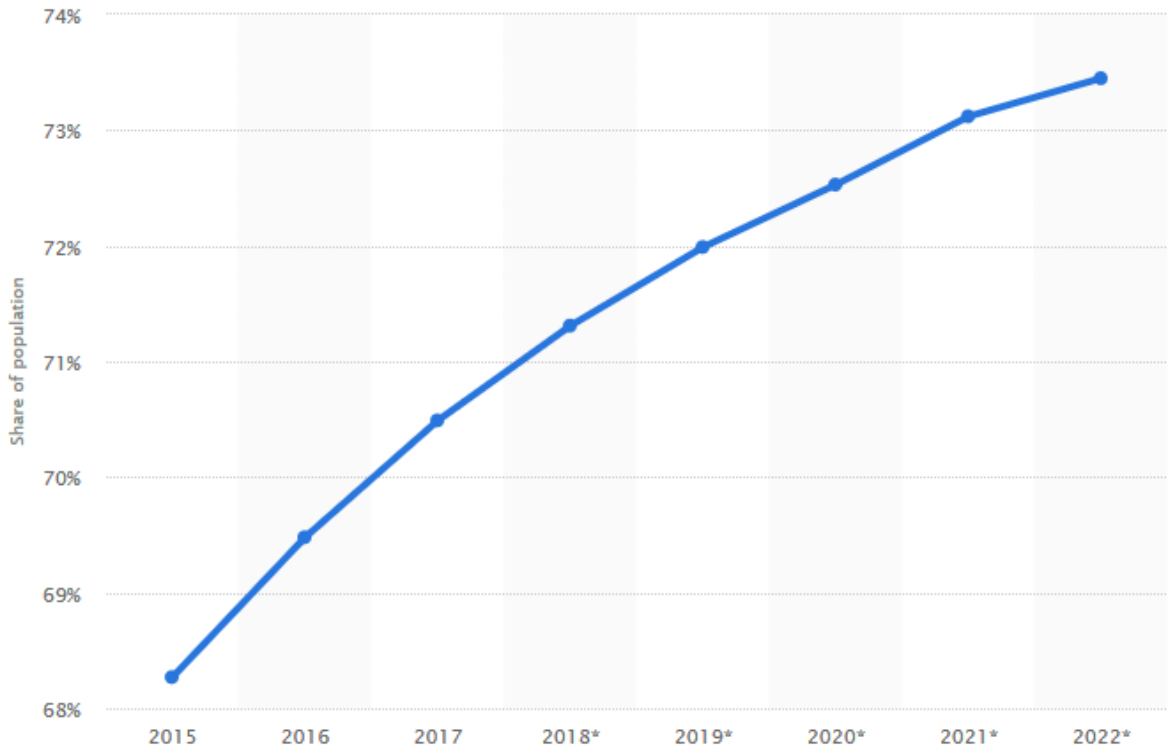

Figure 2:2 Internet user penetration in Saudi Arabia for the period 2015 to 2022 (*Projections) (Source: Statistica, 2017)

Today, Saudi Arabia has one of the highest percentage of mobile phone users in the world. An estimated 95% of Saudi citizens have access to a mobile phone. This has contributed to internet penetration growth since most Saudi citizens access the internet through mobile devices (Alshehri and Meziane, 2017). The growth of internet usage has led to a significant growth in the usage of the internet for educational and learning purposes in Saudi Arabia.

2.4.3 E-Learning Technology

The next phase of educational technology development involved the development of e-learning. The first efforts towards the development of e-learning began in 2003 at the Aum Alqura University where plans for establishment of an e-learning

center were initiated. In 2004, the King Abdulaziz University established an e-learning and distance education program. Programs for development of e-learning accelerated since 2007. In 2007, the government founded the National Center for E-Learning and Distance Learning (Ally and Khan, 2015). While e-learning technology developed, broadcast of educational materials on television and radio channels continued. In 2007, King Saud University established an e-learning program with a full deanship (Albalawi, 2007). In 2009, the NCEL organized the first conference for e-learning and distance education while in 2010, the ministry of education published a list of higher education institutions that were accredited to offer distance education in the country. In 2012, Saudi Electronic University was established after approval by the Higher Education Council. The Saudi e-University was mandated with providing undergraduate and graduate degree programs as well as lifelong education based on e-learning and distance education. In 2012, King Abdulaziz University graduated a group of students who had pursued distance education (Alqarni, 2015).

Technology continues to play a key role in the education sector of Saudi Arabia today. With the growth of internet technology and smartphone device proliferation, students are able to access learning materials anytime and anywhere on their own (Godwin-Jones, 2011). Today, learning in Saudi Arabia may be described as blended learning where multiple technologies and approaches are used in the learning process. Learning tools such online courses and virtual learning systems are now used to support learning particularly in the country's higher education levels. New approaches have been used to blend these technologies with the educational system (Lopez-Perez et al., 2011). Today, the traditional face-to-face methods are blended with online activities (Al-Asmari et al., 2014).

2.5 The Development Plan (Vision 2030)

The Vision 2030 is an ambitious vision for political, social, and economic development in Saudi Arabia. The vision was launched in 2016 by the then Deputy Crown Prince Mohammed bin Salman (Ministry of Foreign Affairs, 2017). The blueprint is built around three key pillars. The first pillar is to position the Kingdom as a regional and global leader particularly in the Arab and Muslim world (Neil and Sprusansky, 2017). The second pillar is to make Saudi Arabia a global investment

powerhouse, which is achieved through efforts such as the transformation of the Public Investment Fund to be the largest in the world. The floating of the shares of the Saudi Aramco was part of this economic expansion drives. Other strategies include expansion of local production and manufacturing as well as enhancing the efficiency of private and public sectors. The third pillar is based on the goal of establishing Saudi Arabia as the connector of the Asian, Europe, and African continents by leveraging on the Kingdom's strategic location. The Saudi Vision 2030 is also geared towards reducing the reliance of the Kingdom on oil (Mitchell and Alfuraih, 2018).

The Vision 2030 blueprint is organized around three major themes. The first theme of establishing a vibrant society encompasses the promotion of citizenship and healthy lives through provision and facilitation of access to social services and healthcare. It also involves development of cities, empowerment of the society, promotion of cultural heritage, promotion of education, environmental sustainability, and promoting the family unit. The theme of a vibrant society is underpinned by Islamic principles and values (Mitchell and Alfuraih, 2018). In order to achieve a vibrant society, Saudi Arabia hopes to increase the number of UNESCO-registered sites in the Kingdom as well as expand the capacity to accommodate Umrah pilgrims to 30 million annually. The Kingdom also hopes to increase the national life expectancy from the current 74 years to 80 years as well as increase spending of entertainment and cultural activities (Ministry of Foreign Affairs, 2017).

The second theme under the Vision 2030 blueprint is to have a thriving economy. The central motivation for the establishment of Vision 2030 was the realization by Saudi senior leaders that Saudi Arabia could not meet its socioeconomic and political goals through reliance on oil revenues alone. According to Foley (2017), the goal of Vision 2030 is simply to replace the basic economic model of Saudi Arabia from one where oil exports define everything. The current model has been characterized by cyclical patterns of government expenditure where spending increases as oil prices increases while decreasing with drops in oil prices. For the larger part of its history, Saudi Arabia has created a society that is dependent on generous government subsidies. While addressing the problem of the current economic model, Crown Prince Mohammed bin Salman observed that Saudi Arabia had been under "oil addiction" and that the Kingdom had been at the mercy of

commodity price volatility and external markets (Foley, 2017). Therefore, a key element of the theme of developing a thriving economy is the diversification of the Saudi economy.

In order to produce a thriving economy by 2030, Saudi Arabia has established several goals under Vision 2030. These include expanding the contribution of the private sector in the economy, increasing foreign direct investment, increasing the asset base of the Public Investment Fund to over $2 trillion by 2030, and improving the Kingdom's global competitiveness index. Vision 2030 also recognizes the role of women participation in the workforce and therefore one of the goals is to expand the participation to over 30%. The Kingdom also hopes to expand the share of non-oil exports from 16% to 50% of non-oil GDP by 2030. Other goals include reducing the unemployment rates and expanding the role of the small and medium sized enterprises (Ministry of Foreign Affairs, 2017).

The achievement of a vibrant economy is highly dependent on education. In order to lower the unemployment rates, the government needs to invest in education and training in order to boost the employability of the young people. In addition, education particularly at the tertiary level will greatly contribute to the growth in innovative private sector players and entrepreneurs in the SME sector (Mitchell and Alfuraih, 2018). By 2030, Saudi Arabia hopes to breach the gap between the outputs of higher education and the demands of the job market by modernizing its curriculum. The Kingdom also hopes that its universities will be among the top ranked international universities in the world (Ministry of Foreign Affairs, 2017).

In addition to modernizing the education sector, Saudi Arabia has launched several other programs in order to build a thriving economy. These include building a regional logistical hub, localizing the defense industries, expanding the mining sector, generation of renewable energy, restructuring of King Abdullah Financial district, and programs aimed at regional and international integration (Ministry of Foreign Affairs, 2017).

The final theme under Vision 2030 is that of being an ambitious nation. This theme recognizes the need for the government to keep up with the citizens rising expectations. In order to achieve this, the government needs to be dynamic and have continuous improvement. The theme of an ambitious nation is centered on

the government's ability to manage the ambitions of its nationals. Vision 2030 recognizes the need for transparency and accountability particularly in areas of finance management, performance of public organizations, and performance of the government itself. As part of achieving an ambitious nation, Saudi Arabia has set out several goals. These goals include improving the ranking of the Kingdom on online service delivery to be among the top five in the world, improving government effectiveness, and increasing household savings. The Kingdom also hopes to have one million people as volunteers by 2030. In order to achieve these goals, Saudi Arabia has initiated several programs such as the Qawam program that seeks to make public spending more efficient and effective with minimal wastage. The government has also ensured that most of its services are accessible online with the number of services expanding significantly in the last decade. Saudi Arabia is also striving to achieve shared services across government agencies in order to streamline service delivery, improve quality, unify government efforts, and cut down on costs. Another important program recently launched in Saudi Arabia is the King Salman Program for Human Capital Development program. The program seeks to develop human resource centers of excellence for training of government employees. The program aims to expand the talent base, leadership capabilities, knowledge sharing, and general professional development (Ministry of Foreign Affairs, 2017).

Vision 2030 also focuses on creating energy efficiency in Saudi Arabia, increasing the usage of renewable energy, and promoting foreign direct investment (Rehan et al., 2018). The Kingdom aims at encouraging research agencies in development of new technologies for energy efficiency and reduction of environmental impacts of carbon emission. As part of this goal, Saudi Arabia has set a target of injecting 9.5 gigawatts of power into the Kingdom's grid by 2030 through renewable energy sources such as wind and solar (Cowan, 2018).

2.6 Education Policy

The education policy in Saudi Arabia is developed by the Ministry of Education in collaboration with other government such as the Ministry of Civil Service and the Royal Commission for Jubail and Yanbu. The policy is usually guided by the government's national development plan. The Tenth Development Plan for Saudi Arabia (2015-2019) recognizes education as a key pillar for the achievement of

socio-economic and political prosperity. The focus of the current education policy is to harness the opportunities in technology to improve the quality of education. Vision 2030 seeks to close the gap between the education output and the market expectations by 2030. To this end, the education policy in Saudi Arabia seeks to ensure that the education system is competency-based (Ministry of Foreign Affairs, 2017).

The Ministry of Education supervises the education system in addition to ensuring the implementation of government policy of education. The education policy in Saudi Arabia recognizes two types of education categories: general education and higher education. General education consists of primary (6 years), intermediate (3 years), and secondary education (3 years). General education in Saudi Arabia is free to all students. Higher education comprise of vocational education and tertiary education. There are over 150 vocational training centers in Saudi Arabia whose main focus is on training in the areas of automotive engineering, manufacturing, and metal processing. Tertiary education comprise of the 25 public and 10 private universities and numerous colleges. There are also specialized training institutions that offer nursing education, teacher training, and military education (Alahmari, 2017).

The education policy in Saudi Arabia also focuses on providing financial assistance to students in higher education institutions primarily in public universities. Undergraduate students in most Saudi universities receive financial assistance and free housing from the government (Alahmari, 2017). The government has also maintained a policy of offering large-scale scholarships for Saudi students to obtain education abroad. The United States remain the major destination for Saudi nationals pursuing university education abroad (PwC, 2017).

2.7 Higher Education in Saudi Arabia

Higher education in Saudi Arabia has historically been supervised by the Ministry of Higher Education with the exception of vocational colleges. The Ministry of Higher Education was established in 1975 with the mandate of implementing the Kingdom's higher education policy. The Ministry of Higher Education was also tasked with the responsibility of creating and administering the Kingdom's colleges and universities. The Ministry of Higher Education was a centralized

authority that directed university education in accordance with the government policies. In 2015, the Ministry of Higher Education was merged with the Ministry of Education to a single ministry. The higher education system comprise of public and private universities and colleges (Saeed et al., 2016).

The first university to be opened in Saudi Arabia was King Saud University in 1957. In the next six years, another six universities were established in Saudi Arabia. The Islamic University and the King Fahd University for Petroleum and Minerals were founded in 1961 and 1963, respectively. In 1967, two public universities were established in Saudi Arabia, King Abdul-Aziz University and Um Al-Qura University. The Imam Muhammad Bin Saud Islamic University and King Faisal University were established in 1974 and 1975, respectively (Smith and Abouammon, 2013). Over the next few decades, the Kingdom has witnessed a significant growth in the higher education sector. Currently, there are 25 universities in the Kingdom of Saudi Arabia. The universities may be categorized into five groups. The first category comprise of comprehensive universities with a research focus and include institutions such as King Saud University, King Abdulaziz University, and Umm al-Qura University. The second category comprise of specialized universities with a research focus including King Fahd University of Petroleum and Minerals. The Kingdom also has specialized universities that include Imam Muhammad ibn Saud Islamic University that specializes in Islamic studies, Islamic University that also specializes with Islamic studies, and King Saud Bin Abdulaziz University for Medical Sciences whose area of specialization is medicine and health sciences. General comprehensive universities in Saudi Arabia include King Khalid University, Qassim University, Taiban University, and Taif University. The other group of universities in Saudi Arabia comprise of teaching universities that include Majmaah University, Dammam University, Kharj University, Tabuk University, Najran University, Northern Borders University, ShaqraUniversity, Hail University, Al Baha University, Princess Noura Bint Abdul Rahman University, Jazan University, and Al Jouf University (Smith and Abouammon, 2013).

Public universities dominate the higher education sector in Saudi Arabia. Currently, 94% of all students enrolments in universities are in public universities with private universities only accounting for 6% of the total enrolments. However, the Kingdom of Saudi Arabia is projected to achieve a 12% student enrolment in private universities by 2020 (PwC, 2017). King Saud University is the oldest

university in Saudi Arabia having been established in 1957 (Smith and Abouammon, 2013). Today, KSU is the largest university in terms budget, academic programs, students, and faculty members. The university has a student population of over 70,000 students, over 150 academic programs, and more than 8,300 faculty members. King Abdullah University for Science and Technology (KAUST) is a specialized science and technology university. In addition to the public universities, there are 10 private universities in Saudi Arabia. The Arab Open University has the highest annual student enrollment among the private universities. Other key private universities in Saudi Arabia include A-Ghad International Health Science College, Dar Al-Uloom University, Prince Mohammed Bin Fahd University, and Prince Sultan University (PwC, 2017).

In terms of international rankings, the Kingdom of Saudi Arabia is yet to achieve good international standing for its universities. The universities ranking platform Webometrics placed KFUMP among the bottom institutions globally causing a major concern to policy makers. In the next few years, international ranking for Saudi Universities improved. King Fahd University was ranked 164th globally in the 2010 ranking. In 2016, King Saud University was ranked first in Saudi Arabia and 189 globally by Quacquarelli Symonds (QS) World University Rankings while King Abdulaziz University and King Saud University were ranked in the top 101-150 institutions in the world by the Academic Ranking of World Universities (ARWU). The international ranking of Saudi universities has consistently improved over the years (PwC, 2017).

The Saudi higher education has been characterized by a high number of Saudi students studying abroad. The main destinations for Saudi students have been the western countries such as United States, Canada, United Kingdom, and Australia (PwC, 2017). Saudi students also study in as other Arab and Asian countries. In 2014, there were 110,423 students studying in US universities with 88% of them being on scholarships. In the same year, 17,451 students from Saudi Arabia were studying in the United Kingdom while 8,775 students were studying in other European universities. In 2014, 14,721 students were studying in Canada while 14,917 students were studying in fellow Arab countries. Australia also has a significant population of Saudi students with 10,517 studying in the country in 2014 (PwC, 2017).

2.8 National Center for E-Learning

In recognition of the role of modern technologies in supporting traditional education, Saudi Arabia set up the National Center for e-Learning (NCEL) in 2005 with the purpose of implementing the national plan that sought to develop information technology in the Kingdom (Zhang et al., 2014). The center is tasked with the responsibility of implementing education and ICT technologies in order to improve the efficiency of education and training programs in Saudi Arabia. The center is financially and administratively independent although organizationally it is linked to the Ministry of Education. The National Center for e-Learning has the primary objective on controlling the quality of e-learning in Saudi Arabia. The center achieves this program by setting the regulations and standards for e-learning and controlling the quality of e-learning programs. In addition, the center is involved in giving licenses to companies and institutions that offer e-learning programs in Saudi Arabia as well as the government entities that offer accredited certificates for e-learning programs. The center also supervises the Open Educational Resources (OER) program in addition to offering consultancy services on e-learning. The NCEL is also involved in research activities in the field of e-learning in addition to organizing e-learning conferences and workshops. Finally, the NCEL represents Saudi Arabia on e-learning matters abroad (National e-Learning Center, 2016).

The services offered by the National Center for e-Learning are grouped into four broad categories: training services, digital content services, technical services, and advisory services. In training, the center offers educational and training programs on e-learning. The center has over 40 training programs that are presented by local and international experts. The NCEL also runs the Center of Excellence for Digital Content, which is an innovative project for providing digital learning content on e-learning. The NCEL offers consultations and expertise in supporting universities to design e-learning content. The Center of Excellence for Digital Content provides training materials in form of CD-ROM, training designs, and brochures as well as presentation materials on e-learning.

With respect to technical services, the National Center for e-Learning is involved in provision of technical services on e-learning. The center offers a range of Learning Management Systems (LMS), which are in form of a portal that allow

students to interact with their trainers at any time and at any location. The NCEL's learning management system known as *Jusur* LMS comprises of integrated software that manages the learning process including registration, scheduling, delivery, communication, tracking and tracking (Alturki and Aldraiweesh, 2016; Gasaymeh, 2017). The system allows the trainer to manage student data, schedule the course, and develop a teaching plan. The trainer may also provide content to learners through the system as well as administer e-exams and follow on their performance (NCEL, 2016). In addition to the *Jusur* LMS, the NCEL also provides other technical solutions including the Virtual Classroom Systems that facilitate trainer-student interaction through the internet. The Virtual Classroom Systems also allow interaction through video and audio broadcast, chat, and smartboard. These platforms allow the users to participate and interact with their trainers (NCEL, 2016).

The Saudi *MAKNAZ* is another technical solution offered by the NCEL as a digital repository for storage of data in digital format. *MAKNAZ* allows education institutions to develop and manage content as well as make learning modules accessible to users. It also helps Saudi universities to develop high quality digital curricula at low cost. The NCEL also provides the *MASAR* tool for instructional design. The *MASAR* is an authorship tool that facilitates the development of e-courses as well as the use of course content as a standard Scorm package for LMS. Another technical service provided by the National Center for e-Learning is the support service *SANEED*. The SANEED is a link provided by the NCEL that allow beneficiaries to benefit from support services through various support and communication channels such as emails, phone, and e-Tickets as well as a self-service platform on phone (NCEL, 2016).

Finally, the National Center for e-Learning is involved in provision of advisory services. The organization offers consultancy of various aspects of e-learning and distance education. The consultancy services of the NCEL are broadly grouped into two: strategic planning consultations and project management consultations. On strategic planning consultancy, the NCEL offers consultancy services on strategic planning for e-learning and distance education to allow organizations develop clear visions, manage change, identify strategies and alternatives, and engage in evaluation of operational plans. The NCEL also offers consultancy on project

management to help organizations effectively manage e-learning projects (NCEL, 2016).

2.9 Conclusion

The Kingdom of Saudi Arabia has attained significant progress over the past few decades in both economic and social progress. A major concern for the current leadership remains the reduction in the dependence on oil as the sole source of national revenue. Cyclic fluctuations in global oil prices and geopolitical dynamics are real threats to the Saudi economy in the future. The Saudi Vision 2030 offers a good opportunity for the Kingdom to achieve the much needed reforms in the socioeconomic spheres of the country. However, Vision 2030 cannot be achieved without enhancing the quality and relevance of education and training in order to build a human capital that will spearhead the exploration of other economic sectors. Educational technology will be important in enhancing the quality of education in Saudi Arabia. Currently, ICT and e-learning are already part of the national policy in education. The Kingdom has one of the highest smartphone ownership rates in the world and this presents a good opportunity for Saudi Arabia to exploit in enhancing professional capacity. Current efforts by the government through the National Center for e-Learning will help in enhancing the capacity for web-based learning and professional development of the Saudi human resource. Therefore, the current study is relevant in the context of the ongoing developments in educational technology in Saudi Arabia as it helps to understand how smartphones are used in learning institutions in the higher education sector and the potential challenges that users face. The findings will be useful in informing future education policies on e-learning and distance education.

Chapter 3 Literature Review

3.1 Introduction

The objective of this study was to explore the usage of smartphones in Saudi Arabia's institutions of higher education by exploring the perceptions of faculty members as well as the students themselves. The study also sought to investigate the challenges associated with the use of smartphone apps in learning. The education sector has been a major adopter of information technologies. Mobile devices such as smartphones are increasingly being adopted in institutions of higher education as part of the continuation of the e-learning technology. When used in the education sector, smartphones facilitate the learning process by allowing the students to access learning materials remotely as well as encouraging greater collaboration between learners and teachers. Saudi Arabia has one of the highest rates of smartphone ownership in the world and therefore these devices could play a significant role in the education sector.

This study was guided by five research questions.

- What are the faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?

- What are faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purposes within the Blackboard educational environment?

- What are the students' attitudes toward the use of smartphone apps for educational purposes within the Blackboard educational environment?

- What is the nature of the use of smartphone apps on the learning process and collegiate working within the case study University?

- What are the main challenges that confront the students and faculty members in using smartphone apps for educational purposes, within the Blackboard educational environment?

These research questions address the perceptions of faculty members on the use of smartphone apps in education. In line with this research question, the literature review section includes a discussion of globalization and development, background of mobile learning, and e-learning. The literature review section also includes an analysis of mobile learning and smartphones, the use of smartphones in education, the Blackboard app, and the key to success and lessons learnt in the use of smartphone apps in education.

In line with this research question, the literature review section analyses the major challenges associated with e-learning. These research questions guided the literature search and review strategy. This chapter provides a critical analysis of the existing literature on issues of e-learning, smartphone apps, and the associated challenges. The chapter also reviews some of the key theories relevant to educational technology and pedagogy.

3.2 Globalization and Development

The concept of globalization is generally understand to mean the increase in world trade and exchanges in an economy that is increasingly open, integrated, and borderless. Over the past few decades, the amount of trade and exchanges in the world in terms of capital movements, currencies, technology transfer, information flows, and people movements have grown significantly (Intriligator, 2017). Friedman (2006) defines globalization as the process of interaction and integration among individuals, companies, and governments of different countries. Globalization has impacts on culture, political systems, environment, economic development, and social aspects of societies. Globalization is considered as a complex process that unifies all spheres of life including social, economic, political educational, and cultural aspects (Castells, 2001; Grinin, 2005; Robertson, 2003). The World Bank (2013) defines globalization as the integration of economies and societies across different nations of the world.

The association between globalization and development is well-established in literature. Dreher (2006) studied how globalization influences economic growth by examining a sample of over 100 countries and measuring the KOF index of these countries. Their study examined the period between 1970 and 2000. Their study results showed that globalization had a positive impact on economic growth. The

results of Dreher (2006) social and economic dimensions had a positive impact on development and growth while globalization of political systems had no impact on growth. In a later study, Rao and Vadlamannati (2011) validated the findings of Dreher (2006) by examining data from a sample of low African countries. Their study investigated the relationship between globalization and economic growth. In the study, development was measured in terms of social, economic, and political sectors. The findings of the study revealed a positive association between development in these sectors and globalization. In another study, Samimi and Jenatabadi (2014) investigated the impacts of globalization on economic growth by examining a sample of Organisation of Islamic Cooperation (OIC) countries. In the study, the generalized method of moments (GMM) estimator was employed to estimate the effect of globalization on development from an economic perspective. The study findings showed that within the OIC countries, economic globalization led to economic growth thus providing evidence of the positive impact of globalization on development. Mutalemwa (2015) investigated the role of globalization on the development of SMEs in Africa. In the study, Mutalemwa (2015) defined globalization closer economic integration due to advances in technology, economic liberalization, as well as growth in global trade and competition. Using a review of literature, the study findings revealed that globalization is beneficial to development of SMEs in Africa. However, the capacity to benefit from globalization was hindered by problems such as barriers of institutional and policy environments.

In addition to economic development, globalization has led to a growth in technology and information exchange in the world. According to Lee et al. (2018), globalization has led to the convergence of high-tech industries, which has subsequently facilitated technology transfer in the world. Technology transfer has been a key driver of development in less developed countries (Lee et al., 2018). Moreover, globalization facilitates development through promoting global partnerships between businesses. Such partnerships facilitate technology transfer in addition to facilitating the advancement of national skills that contribute to development (Tan et al., 2017). According to Intriligator (2017), globalization contributes to development because corporations have a wider market reach mainly due to advances in communication and technology. Such corporations

contribute to development in the foreign countries where they direct investment in addition to facilitating technology transfer.

While globalization has numerous benefits and contributions to development, it has also attracted negative criticism. First, the interdependencies of economies on the global scale could result in global instabilities that could erode the potential benefits of globalization. Fluctuations in the economic and social systems of one nation could spill over and have negative consequences on regional or global players (Intriligator, 2017). For instance, the financial crisis of 2007/2008 in the United States spilled over to most of the other countries in the world (Potrafke, 2015). Globalization has also been criticized for creating negative impacts on employment in developed countries when corporations shift their production facilities to low wage countries. Moreover, globalization could increase global insecurity, and therefore accelerate global conflicts and subsequently hamper development (Intriligator, 2017). Intriligator (2017) argues that free movement of people could evoke negative emotions such as extreme nationalism and xenophobia and therefore promote the growth of extremism and violent conflicts. Furthermore, critics of globalization have argued that globalization erodes social security systems, promotes social injustice, and increases poverty through excessive competition between individuals, corporations, governments, and countries (Stiglitz 2002; Stiglitz 2004; Heine and Thakur 2011).

Globalization has also contributed significantly towards the development of the education sector. One of the key features of the modern educational systems is the internalization of education. With growth in globalization, there has been a considerable growth in the number of international students in various parts of the world with the United States, United Kingdom, Australia, and New Zealand being the major destinations for international students globally (Madge et al., 2015). Globalization has also led to the development of global pedagogies where methods of teaching and learning are unified and educational systems have become similar across the world (Zajda, 2015).

3.3 E-learning: General Background

E-learning is broadly considered to be the combination of learning with technology. While learning is the cognitive process of achieving knowledge,

technology acts as an enabler of the learning process (Aparicio et al., 2016). Developments in computer technology and information communication have shaped the education sector in many ways. Today, information and communications technology (ICT) is widely adopted in education through programs such as computer-based training, interactive media, online training, and web-based training among others (Kuimova et al., 2016). Hall and Snider (2000) defined e-learning as the process of learning that takes place through computers via internet and extranets. In their definition of e-learning, Hall and Snider (2000) considered e-learning to be the same as online training, web-based training, or distributed learning. E-learning has also been defined as the use of computer network technologies such as internet, intranets and extranets in delivering learning instructions to learners (Cheng, 2011; Engelbrecht, 2005; Welsh, et al., 2003).

E-learning is often defined by contrasting it with face-to-face learning. The most prominent feature of e-learning is the absence of a physical classroom. Instead, learning space is replaced by various electronic technologies that facilitate out-of-class learning without the restrictions of time and space (Northey et al., 2015). Lee, Hsieh and Ma (2011) define e-learning as an information system that integrates instructional material in text, audio, or video format and delivers then through electronic communication channels such as e-mail, online discussions, live chat sessions, and other online forums. E-learning has become a major development in the education sector in the recent past. E-learning supports the delivery of learning instructions in form of text, audio, images, animations, and video on electronic channels and therefore makes these materials accessible to learners at any time and in any location (Abdullah and Ward, 2016). E-learning systems combine various technologies such as communication technologies, writing technologies, visualization technologies, and storage technologies in the learning process.

E-learning systems are complex systems that involve multiple players and stakeholders. These include students, teachers, educational institutions, accreditation bodies, content providers, technology providers, and relevant government ministries among others (Aparicio et al., 2016). Learners are the ultimate users of e-learning system and are therefore the customers from a stakeholder perspective. The suppliers comprise of technology providers,

teachers, educational institutions, and content providers while government ministries play the role of shareholders. Moreover, e-learning involves multiple concepts and models. For instance, computer-assisted instruction (CAI) involves the use of computers in programming teaching while computer assisted learning (CAL) entails the use of computers in solving problems in educational settings. Learning management systems (LMS) are generally used to refer to support services for registering, tracking, and delivering content to learners. Mobile learning (m-learning) is also considered a form of electronic learning where the focus is on the use of flexible and mobile technologies in supporting learning processes. Learning content management systems (LCMS) are also popular in e-learning as systems that support the management and delivery of content used in learning. Systems blended learning (B-learning) is also an important concept in e-learning, which is used to describe the combination of various learning approaches. Typically, blended learning involves mixing the traditional face-to-face learning with distance and online learning (Aparicio et al., 2016).

E-learning has been adopted by educational systems because it offers several advantages. First, e-learning saves on costs compared to the traditional face to face learning. According to Chang (2015), e-learning may save between 40% and 60% of the expenses used in training by traditional methods. These cost savings are due to reduced travel expenses, reduced administrative costs, reduced demand for facilities and supplies, and reduced salary costs. In addition to cost-savings, e-learning has the benefit of improving the learning process because it has tools that facilitate learning in addition to improving the interaction between learners and instructors (Domingo & Gargante, 2016). E-learning also promotes a more in-depth learning experience compared to face-to-face learning. It also exposes students to better learning opportunities and experiences. Moreover, e-learning helps to solve the logistical challenges of education and training (Gikas & Grant, 2013).

Existing literature shows that e-learning is as effective as face-to-face learning. Reisetter et al. (2007), for instance, compared to the quality of learning of online and face-to-face programs, found that both approaches scored equally in terms of student satisfaction and learning outcomes. In another study, Solimeno et al. (2008) compared the efficacy of online learning with face-to-face teaching with their results showing additional benefits of online learning. Online learning was

shown to boost professional competences. Solimeno et al. (2008) further observed that online learning was the preferred method of learning for students with unique needs such as time management issues. In another study, Wuensch et al. (2008) examined the opinions if students on online learning. Their study revealed that students rated online learning as much superior compared to face-to-face learning in terms of convenience and allowing learning at ones' pace.

While e-learning has been widely adopted in most countries, one of the overarching themes in the literature is that e-learning cannot substitute for real classroom interaction (Stern, 2004). The emotional interaction between students and their teachers as well as between the students themselves is an important part of the learning process because it adds an important social dimension to education. E-learning lacks the emotional component or social interaction between students and their teachers and peers. Interaction in the educational system are part of learning and student development and their absence in online and distance education remains the major challenge of e-learning (Stern, 2004).

A significant body of research on e-learning has focused on the satisfaction of users with e-learning systems. According to Abdullah and Ward (2016), the benefits of e-learning cannot be enjoyed if learners are not satisfied or do not use the systems. Therefore, it is important to determine the factors that influence the students' use of e-learning. Using a modified technology acceptance model (TAM), Abdullah and Ward (2016) identified several factors that influence students' acceptance and satisfaction with e-learning systems. These include the ease of use of the technology, perceived interactivity, e-learning presentation types, availability of technical support, and availability of mobile learning among others. In another study, Al-Samarraie et al. (2017) investigated the factors that influence satisfaction with e-learning systems. Factors such as the quality of the service, information quality, usefulness of the system, and task-technology fit were shown to be important in predicting student satisfaction.

3.4 E-learning in higher education

Higher education institutions have been at the forefront of adopting e-learning. E-learning is changing the way learning takes place in universities and other higher education institutions. E-learning in higher education is used mainly to support or

supplement on-campus classroom-based modules and courses. Most e-learning activities are related to supporting segments or modules of a course as supplementary to on-campus learning. However, fully online programs are now offered by universities where little or no face-to-face interaction occurs (OECD, 2005). The growth of e-learning in the higher education context has been fuelled demand for flexible learning opportunities due to trends in globalization. E-learning is now a major part of distance education.

E-learning in higher education is generally categorized according to the level of interaction between learners and teachers as well as the extent of the use of web-based learning. In a study of e-learning in higher education institutions in Saudi Arabia, Algahtani (2011) has described three modes of e-learning delivery. The first model that relevant in higher education is adjunct e-learning. According to this model of e-learning, electronic learning is considered to play a supportive role in supplementing traditional classroom activities. Therefore, adjunct e-learning provides learners with relative independence in the learning process. The second model is the blended e-learning where course materials are delivered in both e-learning and the traditional learning methods. The third approach is the online model, which involves the full adoption of web-based methods in delivery of course materials and testing of the students' knowledge. In the e-learning model, there is full independence of the learners from their instructors (Algahtani, 2011).

The e-learning model or web-based learning may be further categorized into three major categories. The first category is self-paced independent study where students use their own pace to determine the schedule of study. In this e-learning approach, students are allowed to review course materials as long as necessary and feedback from online quizzes are in form of pre-set responses. The limitation of this approach is that students have no opportunity to ask questions. Self-paced independent study requires a high sense of motivation (Kattoua, Al-Lozi, and Alrowwad, 2016). The second category of e-learning is asynchronous interactive learning where students participate in web-based classes with an instructor together with other students. However, attendance of the web-based classes is not at the same time for all students. The approach is beneficial in that it allows students to obtain feedback and support from their instructors and fellow classmates. Asynchronous interactive learning is also beneficial in that it improves

the depth of learning and capacity for critical thinking. It also encourages social support from group members in addition to creating a learner-centred learning environment (McCombs, 2011). Finally, e-learning may take place in form of synchronous learning where students participate in live lectures where interaction is real-time through live chat. In this e-learning model, there is high interactivity just like in a traditional classroom. Flexibility in synchronous learning is restricted since the lecturer predetermines the lecture schedule (Weimer, 2013).

E-learning has been a growing trend in many parts of the world. Fischer et al. (2015), for instance, examined e-learning trends in academic teaching by analysing scientific discourses at German-speaking conferences. Their study involves an analysis of some 427 abstracts of scientific articles in these conferences for the period 2007 to 2013. Their study revealed that e-learning had increased in the intensity of usage. Specifically, concepts of mobile learning, social media, learning management, and Massive Open Online Courses were found to be important in e-learning among German higher education institutions.

The growing popularity of e-learning in higher education institutions may be attributed to the numerous benefits and advantages associated with e-learning. First, e-learning is student-centred since it focuses on the individual needs learners. Most of the e-learning programs are highly customized and developed with a focus on the development of individual student capabilities (Kuimova et al., 2016). E-learning further facilitates flexible of time and space particularly at the tertiary level where life responsibilities may not allow some students to engage in full time learning. In e-learning, students have a choice of determining the place and time that suit their schedules. The convenience afforded by e-learning remains one of the major attractive factors for e-learning. E-learning in higher education institutions is considered beneficial in enhancing the knowledge efficiency of students by facilitating easy access to large amounts of information. E-learning is also considered advantageous in that it allows self-pacing where students learn and their own speed and pace. This reduces stress and increases student satisfaction (Pande et al., 2016). Institutions of higher education also benefit from e-learning by enabling the institutions to offset for scarcities of academic staff particularly in developing countries where highly qualified staff are few. E-learning may also promote interactivity between students and instructors as well as between students themselves. With modern communication

tools now widely available, students can interact with ease and convenience through instant messaging and chat platforms. E-learning may also intensify the learning activities and therefore improve the educational standards (Kuimova et al., 2016).

The evidence of the usefulness of e-learning in higher education is prevalent in literature. In their study, Ellis, Ginns, and Piggott (2009) examined the key aspects of e-learning in higher education. In the study, 200 third-year undergraduate students pursuing business studies were recruited and supported with online resources that were integrated with face-to-face learning. The experiences of the learners were explored through questionnaires. The findings revealed that students had positive perceptions of e-learning. Enhanced interactivity was also shown to be an important predictor of the usefulness of e-learning systems. In another study, Salter et al. (2014) examined the features and benefits of e-learning for students of pharmaceutical sciences. The study involved a systematic review of literature where articles relevant to the subject were analysed. In total, 17 articles met the criteria for review and were subjected to metaanalysis. In the study, e-learning was shown to be effective in increasing the knowledge of the students studying pharmacy thus suggesting that e-learning could be used in boosting education and learning for pharmacy students.

Other studies show that e-learning improves students' academic achievements (Moravec et al., 2015; Mothibi, 2015). Moravec et al. (2015) investigated the impacts of e-learning on students' achievement in higher education institutions by examining data from 2,000 students, the participants were subjected to learning on an area of law with and without e-learning tools. The study findings revealed that e-learning positively affected students' results. In another study, Mothibi (2015) investigated the effects of e-learning on students' academic performance in higher education institutions. In the study, Mothibi (2015) adopted the Cohen's model in analysing data from relevant research studies that had investigated the impact of e-learning on academic performance for the period 2010 to 2012. The study findings revealed that a positive relationship existed between e-learning and students' academic achievements. The study findings also revealed that ICT positively influenced the students' academic performance.

Recent studies have shown that the successful implementation of e-learning in higher education institutions is not just a technological solution but is a complex process that involves multiple social, cultural, and organizational factors (Sun and Zhang, 2006; Masoumi, 2010; Tarhini et al., 2015). Some studies have shown that the implementation success of e-learning is related to the perceived usefulness and perceived ease of use of the e-learning technology as predicted by the technology acceptance model (Almajali et al., 2016; Scholtz and Kapeso, 2014; Shannak, 2013). Similar findings were reported in another study by Abdullah and Ward (2016) who used the technology acceptance model to investigate the external factors affecting e-learning in higher education institutions. The study revealed that the adoption of e-learning was affected by perceived ease of use and perceived usefulness.

Bates (1995) has developed a model of e-learning showing the external factors that influence successful implementation of e-learning. The model postulates that effective implementation of e-learning is dependent on seven factors of Access, Costs, Teaching functions, Interaction and user-friendliness, Organizational issues, Novelty, and Speed of course development (ACTIONS). According to the ACTIONS model, e-learning should have the properties of easy access to the e-learning system. The e-learning system should also be cost effective and have capacity to enhance teaching functions. The system should also encourage interaction between students and their peers and educators. Organizational issues entail having the right organizational support from the educating institution. Novelty entails having an innovative, creative, and lively system. Finally, the model suggests that the e-learning system should have quick and efficient development of course materials (Bates, 1995).

Some studies have also revealed that the presence of the educator plays a major role in the success of e-learning. According to Gray and DiLoreto (2016), educator presence in online courses may be achieved through regular communication with the students, regular feedback, and discussions. For online courses to be successful, the students must feel connected to the educators, other students, and the course content (Martín-Rodríguez et al., 2015). This connection could be established in a supportive learning environment where educators strategically combine various learning methods such as audio, video, practical activities, online tools, and synchronous and asynchronous discussions in order to enhance students'

engagement. A study by Southard et al. (2015) investigated the role of educator presence in online courses. Their study involved delivery by delivery of undergraduate history lessons where the educator narrated the lessons. The educator's presence was shown to strengthen the students' feelings of connectedness to the course content and the educator. The investigations by Southard et al. (2015) have demonstrated that online courses where educators are featured in instruction videos or course content materials promote the educator presence and students' interests in the topic under study. This is particularly important in pure online courses where there is little or no interaction between the students and the educator.

Research further reveals that the success of e-learning in higher education institutions is strongly influenced by the capacity of a university to build online communities (Beth et al., 2015; Sidebotham, Jomeen and Gamble, 2014). In online courses, learners need to feel as part of a learning community with real human-to-human interactions. In their study, Beth et al. (2015) found that educators could facilitate the development of online communities through encouraging of online discussions where students would be asked to post a minimum number of posts on the discussion forums. In addition, the building of online communities could be encouraged by having blended courses where few face-to-face classes are used to supplement online learning in addition to having synchronous online classroom sessions. These efforts have been shown to contribute to the feelings of students' connectedness with their peers and educators (Sidebotham et al., 2014).

3.5 Challenges of E-learning in higher education

Although e-learning has been widely adopted in many parts of the world, it still faces numerous challenges that have derailed the implementation in many higher education institutions particularly in developing countries. One of the major challenges that has faced e-learning in educational system is associated with technological or technical issues. According to Islam, Beer, and Slack (2015), technological challenges of e-learning are related to technical issues of the e-learning systems such as the presence of errors, bugs, and poor speed of the system. In some cases, the functions and features of the system may not work properly. Technical challenges are a major impediment to the implementation of

e-learning in most institutions of higher learning. Some higher education institutions have implemented e-learning systems that have poor performance or have usability problems while others are unable to develop well-customized systems. Moreover, technical support for students and faculty members is lacking in some cases thus eroding the usefulness of e-learning systems. In some institutions, there is insufficient investment in infrastructure and technology that would make e-learning seamless (Islam et al., 2015). Investigations by Al-Samarraie et al. (2017) have revealed that the technical aspects and quality of the e-learning system is a major determinant of effective implementation of e-learning. Operational features such as system reliability, documentation quality, consistency of the system interface, and speed of response in interactive system are major determinants of the usefulness of a system. Poor systems quality is a major hindrance to the adoption of e-learning among university students. Other technical challenges associated with e-learning in higher education institutions include insufficient systems infrastructures, insufficient network infrastructures, technology implementation problems, and lack of fast internet connectivity (Kenan and Pislaru, 2012).

In addition to technical challenges, e-learning in higher education institutions is faced with the challenge of failure to customize learning according to the students' learning styles (Islam et al., 2015). Gillett-Swan (2017) argues that most institutions of higher education that have adopted e-learning use a one-size-fits-all approach where internal content is converted to electronic content in a form that is assumed to be suitable to a large number of audience. However, different students have different needs and the uniform approach tends to isolate some learners whose learning needs may not be consistent with the approach adopted by a university. According to Islam et al. (2015), the best learning outcomes are obtained when instructors have an understanding of their students' learning styles. However, the learning styles of the individual students may be unclear in online settings. Some students have a preference of learning by watching presentations while others learn best by listening to instructions or reading notes and yet have a preference of learning by interacting with others. Face-to-face interaction helps instructors to use multiple teaching methods thus helping in enhancing the learning outcomes. One of the key challenges for instructors in the e-learning environment is the difficulty in understanding the different learning

styles preferred by their students. This problem may be exacerbated by the existence of different cultural backgrounds of the students. Differences in students' attitudes and cultural barriers make e-learning difficult in a multicultural setting. In the e-learning environment, learning adopts a uniform approach of delivery of course content to the learners with little regard to differences in gender, culture, age, learning style, level of motivation, and educational experience (Islam et al., 2015).

The cultural challenge of e-learning is more problematic for learners in developing countries such as Saudi Arabia. According to Shahmoradi et al. (2018), most e-learning content and systems are developed in western countries and therefore tend to fail in incorporating the cultural needs of students in eastern and African countries. The e-learning platforms and content mainly originate from the United States and Europe where students may be more open to online conversations compared to Asian students. The lack of cultural consideration presents challenges in communication, interaction, and participation. In their study, Shahmoradi et al. (2018) conducted survey of 300 Iranian students from the Tehran University of Medical Sciences in order to determine the challenges that they faced in the use of e-learning systems. The findings revealed that the students faced technical challenges associated with inability to access IT infrastructure, lack of skills, as well as cultural challenges.

E-learning is also associated with the challenge of reducing interactivity among students and the educators and other students. This creates a problem of remoteness in the learning process. Moreover, Pande et al. (2016) has noted that the high level of independence afforded by e-learning could present a challenge to students in terms of time management. Some students prefer prearranged schedules that follow standard rules of the learning institutions. Giving such students the independence to engage in learning at their pace could result in failure in proper time management. Time management has also been shown to be a major challenge on the part of the instructors who face difficulties in managing the demands of speed and quick response required in e-learning. Instructors have to visit discussion forums frequently and check the students' posts and offer feedback and answers to the students (Nandi et al., 2012). Where instructors have large student numbers, e-learning could create huge workloads resulting in lack of adequate time to offer personal attention to each student. The current

literature is inconclusive with respect to whether e-learning reduces the time and effort of university faculty. Some researchers are of the opinion that automation and e-learning helps to streamline administrative duties thus improving communication as well as enhancing content management thus creating adequate time for instructors to engage in quality constant with students (Heinrich et al., 2009; Kotzé and Nageland, 2010). On the other hand, other some researchers consider e-learning to have a negative impact by increasing amount of workload for teachers. Proponents of this position argue that e-learning make teachers to work for long hours and having to discharge greater efforts towards the teaching process when compared with the classroom model (Conrad, 2004; Tomei, 2006). With e-learning allowing learning on a 24 hour-basis, instructors could be working for long hours including nights, weekends, and holidays and this may further increase the work pressure on educators (Islam et al., 2015).

E-learning further suffers from the challenge of the difficulties of controlling or regulating academic malpractices such as cheating. Since the tests are conducted online with little verification of the user activities, e-learning may encourage academic malpractices (Pande et al., 2016). Cheating and plagiarism on online programs has emerged as one of the major challenges that universities and other higher education institutions face when they offer online programs. In a recent study, Mellar et al. (2018) evaluated the perceptions of teachers on cheating in e-assessments at two universities in Turkey and Bulgaria. Data was obtained from two universities in two countries. One of the universities located in Bulgaria had students using the face-to-face teaching and distance education model. The other university based in Turkey had students who were learning through an e-learning system. The study findings revealed that university faculty felt that cheating was a major problem in e-learning compared with face-to-face learning activities. The study further suggests that the problem of cheating and plagiarism led to additional costs and efforts by universities to install technologies for detecting and alleviating cheating. Nevertheless, the faculty members perceived cheating to be a major problem despite the existence of the authentication technologies. Van de Sande (2018) has explained that cheating could be accelerated in online learning environments compared to face-to-face learning environments because of the perceived existence of facilitating context in e-learning. This is consistent with the theory advanced by Brimble (2016) who have explained why students

engage in cheating. Among these predictors are situational factors, changing attitudes, and individual students characteristics among others. In the online context, the situational factors may encourage cheating since students are under less supervision and control.

In comparison with face-to-face learning, e-learning may be less effective with in learning of complex subjects due to lack of a platform for making clarifications and explanations. Moreover, e-learning may not allow students to engage in practical lesson activities. Pande et al. (2016) have noted that while learners may obtain a lot of knowledge and information from the wider content available in e-learning platforms, they may have the necessary skills to apply that knowledge in real-life. E-learning is also a challenge for some highly specialized fields or disciplines where web-based learning cannot be implemented. For instance, in purely scientific fields that require high level of practical activities, e-learning may not take place effectively (Pande et al., 2016).

Finally, the usage of mobile phones in the digital age has been problematic to the higher education institution by diluting the role of the higher education institutions. As mobile phones become ubiquitous and pervasive in every aspect of the human society, it has changed the ways in which people and communities generate, share, and discuss ideas and information. As a result, they have become each other's teachers (Traxler, 2018). Today, the leaner takes centre-stage in the learning process (Kukulska-Hulme & Traxler, 2019). Moreover, Traxler (2016) argues that colleges and universities are no longer the authoritative and credible gatekeepers of knowledge in the digital age. The mobile technology has allowed ordinary people to access better, newer, and faster information than is available to educational institutions. In the digital era, everyone can actively generate, transform, and share knowledge (Traxler, 2016). Thus, the role of the higher-education institution is slowly being diluted.

Within the Saudi higher education sector, e-learning has gained momentum in the past two decades. However, numerous challenges still hinder the capacity of Saudi universities to take advantage of opportunities presented by e-learning. Al-Harbi (2011), for instance, investigated e-learning within the tertiary education in Saudi Arabia by surveying a sample over 500 students. Major concerns that affected students' acceptance of e-learning included the availability of speedy internet

connections and availability of support from the university. In another study, Xanthidis, Wali, and Nikolaidis (2014) have examined the challenges and issues that impede e-learning in Saudi universities. Through a survey of 126 Saudi university students, the authors identified several factors that slowed down e-learning in Saudi Arabia. The respondents identified administrative issues, lack of support from the institutions as well as technical problems as the main hindrances to the adoption of e-earning.

3.6 Theories relevant to E-learning

Several theories and models have been proposed to explain how learning takes place in electronic media. These theories derive their concepts from diverse disciplines including neuroscience, sociology, psychology, and education. One of the most popular theories of e-learning is the Technology Acceptance Model (TAM). TAM was originally used to explain how users accept and adopt a technology (Davis 1989). According to the TAM theory, the adoption of a technology is influenced by the technology's perceived usefulness and ease of use. The Technology Acceptance Model has been instrumental in explaining the mechanisms of technology use and the associated influential factors of classroom adoption of technology (Scherer et al. 13). The TAM theory was useful in the present study because it helped to explain the factors that influence the adoption of mobile learning among Saudi higher education students. At the SEU, the acceptance of the Blackboard app and smartphone apps could be attributed to the perceived usefulness and ease of use of these technologies. Most of the respondents had positive perceptions of the apps and their contribution to e-learning. For instance, the students saw smartphones as beneficial in that they facilitated a convenient access to learning materials. However, technical issues such as incompatibility with devices, limited data storage, and low internet connectivity reduce the perceived ease of use of the apps. Therefore, the TAM was the primary theory for explaining the mechanisms of smartphone usage and adoption in the present study due to its theoretical superiority in explaining the factors of technology adoption in education.

In addition to TAM, understanding the e-learning in this case study was also assisted through the use of situative theory. The situative theory considers the learning process to be a social participation process that takes place through

interpersonal relationships for joint development of knowledge. In contrast to TAM, where learning is deemed to be influenced by factors inherent in the technology, the situative theory holds that learning is influenced by social factors and cultural settings where learning occurs (Meyers and de Freitas 18). In the present study, faculty members and students engaged in joint knowledge development through online communities facilitated by the technology. The situative theory is therefore relevant in the present study because it helps to explain the role of online communities in development of e-learning and their inter-relationship.

The understanding of E-learning in the present study is also facilitated through the variant of Cognitive theory. Cognitive theory argues that learning occurs through a construction of understanding through interactions with material systems, concepts in the domain, and interaction with learners (Meyers and de Freitas 17). Therefore, e-learning occurs through cognitive processes such as observation, attention, interaction, problem solving, and reasoning among others. One of the variants of the cognitive theory is Constructivist-learning theory, which holds that learners' construct meaning from their experience influence the acquisition of new knowledge. The theory further asserts that learners participate in construction of meaning and knowledge acquisition takes place through cognitive processes such as active learning, collaborative learning, contextualized learning, and reflective learning (Clough and Ferguson 1). In the present study, the cognitive and constructivist theories helped to explain the process of e-learning adopted at the Saudi Electronic University and the conceptualization of challenges through interaction with the e-learning platform.

Moreover, the associative theory could be used to explain e-learning in the present study. The associative theory postulates that learning occurs in a systematic process involving structured tasks through behavioral modification and association. The theory further proposes that learning occurs through a series of steps of knowledge build up and skills reinforcement. The associative theory was adopted in this study because it helped to explain the processes of learning adopted at the Saudi Electronic University including the stages of knowledge presentations, practice, and assessment phases in accordance with the model of Huitt et al. (4).

Finally, the social constructivist helps to understand the process of knowledge acquisition in an e-learning environment. The social constructivist approach conceptualizes students as active learners who construct knowledge in two ways. The first one is through the lenses of their personal experiences. The second way of learning is through interactions with teachers and peers (Rock et al. 2-3). Therefore, the learning community comprise of learners and teachers who participate in co-creation of knowledge. This is consistent with the expectations of the situative theory, which places emphasis on learning through online communities. The interaction between learners and faculty members observed at the Saudi Electronic University points to the relevance of the social constructivist theory in e-learning environments.

3.7 Pedagogies in E-learning

Pedagogical models are broadly aligned with three main learning theories: associative, cognitive, and situative learning. The associative learning theory holds that learning best takes place as an activity comprised of structured tasks. The associative perspective of learning focuses on learning through association and behavioural modification. According to the behavioural perspective, the learning process may be deconstructed into components aimed at building up knowledge and reinforcing skills through a series of steps. Merrill's theory deconstructs the instructional learning process as a process that involves activation of students' prior knowledge, demonstration of the skills, app of the skills, and finally the integration of the skills in real-life activities. Huitt et al. (2009) have formulated the transactional model of learning involving the presentation phase, the practice phase, the assessment and evaluation phase, and the monitoring and feedback phase. In addition to the associative perspective, pedagogical models of e-learning are also based on the cognitive perspective. The cognitive theory considers the learning process as the transformation of the learners' understanding. From a pedagogical perspective, the cognitive theory is characterized by activities meant to enhance students' understanding including enhanced communication, use of explanations, inferences and problem solving. In line with the cognitive theory, the constructivist learning approach is widely adopted in e-learning. The constructivist learning perspective views the acquisition of new knowledge as being guided by learners' consciousness (Hubackova, 2014). The constructivist learning theory argues that learning occurs

where there is active engagement of students in constructing meaning. According to Clough and Ferguson (2010), learners engagement in the constructivist theory may be achieved through contextualized learning, collaborative learning, reflective learning, and active learning.

Moreover, pedagogical models of e-learning are informed by the situative perspective, which views learning as a social participation process. Therefore, the emphasis of the learning process is on interpersonal relationships in joint construction of knowledge. The associative theory views learning as a social practice that most effectively takes place through learning communities. One of the e-learning models that is consistent with the associative perspective is the five stage e-moderating model (Salmon, 2003). The model views successful development of learning communities and participation in e-learning as involving a five-stage process of access and motivation, online socialization, information exchange, knowledge construction, and development (Salmon, 2003).

The pedagogical foundation of e-learning is rich with diverse principles and approaches of learning and teaching that link e-learning theory with e-learning practice. Aparicio, Bacao, and Oliveira (2016) have identified several pedagogical models of that are applied in e-learning. One of the common e-learning pedagogical frameworks is the Open University Support Open Learning (SOL) model. The Open University SOL model or distance learning model is a learning model where students learn at their own pace and time. Typically, students read course materials, engage in course activities and write assignments. Collaboration with other students is common in the open university model. Under the Open University model, students receive support from a tutor as well as from university staff. In their study, Jones et al. (2009) compared the open universities in the United Kingdom, Netherlands, and Japan. The open universities were found to be characterized by distance learning, availability of resources online, and systematic support through course instructors and university staff. In the open learning model, knowledge exchange may take place through workshops, seminars, and other open courses. Open learning also takes place over the web in virtual classrooms, asynchronous learning networks, and learning portals. In the distance education model, pedagogy is considered as the facilitation of learning and communication through technology.

Another model used in e-learning is the distributed learning model whose focus is on learning distribution. This model combines multiple channels to facilitate access to education among learners through technology. Another e-learning pedagogy is modelled along learning communities, which comprise of university students who are supported by instructors, their peers, and the institutions. In addition, Aparicio et al. (2016) recognize Communities of practice (CoP) as an e-learning pedagogy. Communities of practice are informal groups of people who share similar interests on a certain subjects. These common interests shared by the communities enhance deep collaboration not only in academia but also in other aspects of life. Quite often, the communities of practice establish best practices and meet regularly. The communities may meet in virtual environments or in face-to-face settings (Liu et al., 2010). Finally, e-learning knowledge creation may take place through knowledge building communities. Knowledge learning communities are groups that have a commitment among members on investing their resources in collective acquisition of knowledge. The knowledge learning communities engage in knowledge sharing in order to achieve learning (Aparicio et al., 2016).

The 3D pedagogy framework developed by Conole, Dyke, Oliver, and Seale (2004) has also become a popular pedagogical approach for teaching in higher education for online students. The framework combined various learning theories to come up with a unified theory that holds that learning may be mapped along three main dimensions: individual learning, reflection, and information. Individual learning takes place through interaction with tutors and peers while reflection involves the conscious reflection about the learning experience, which helps to enhance skills learning and memorization. Finally, information refers to the experience gained through text and other knowledge artefacts (Conole et al., 2004).

The cognitive theory supports the analytical framework of the present study. In this study, mobile learning is viewed as an aspect that enhances learners' acquisition of knowledge. Mobile learning also enhances learners' engagement in the overall learning process by complementing other learning methods. Within the Saudi higher education context, learners use mobile learning in accessing the internet where a large amount of knowledge is available. Therefore, the cognitive process of making sense of this information is useful in promoting overall learning. Learners obtain knowledge through active learning, collaboration with other

students, reflection, and contextualized learning as proposed by Clough and Ferguson (2010). Therefore, the cognitive theory and the constructivist learning approach are suitable for explaining mobile learning in the Saudi higher education sector.

Moreover, the situative perspective is relevant in the analytical framework of this study. In this perspective, mobile learning is seen as a social participation process. The associative theory considers learning as a social practice that takes place through learning communities. In the present study, the process of mobile learning is explored within the context of student learning communities.

3.8 Technology in the Saudi Education System

The Kingdom of Saudi Arabia has witnessed a significant expansion of the education sector. Along with this expansion has been a growth in the adoption of technology in the education sector. According to Al-Shehri (2010), Saudi Arabia's education sector is a major adopter of educational technology in the Middle East. Technology in Saudi Arabia has been integrated in the learning systems for many years. Historically, technological innovations such as computers and engineering systems have been taught in Saudi schools. However, these have been understood as scientific topics delivered by teachers and connected to science subjects only. Technology as a subject has been lacking in Saudi Arabia especially in lower levels of education. In higher education institutions, technology has become a mainstay of education delivery in Saudi Arabia. Today, both students and their instructors use technology at various levels of the learning process. In particular, computer technology has become a critical component of the Saudi education system. Computer technologies are used in the delivery of learning materials such as sharing of learning content and making presentation. Multimedia technologies are now widely used in delivery of learning materials in Saudi Arabia. The internet has also become a powerful communication tool between learners and instructors as well as among learners themselves (Al-Maini, 2011). In particular, King Abdulaziz City for Science and Technology has been at the forefront of offering technical education in Saudi Arabia. The institution has established incubators and accelerators where innovators come to develop ideas in addition to offering technical support to industrial organizations. The organization's Technology Leaders Program has also facilitated collaboration with industrial and research

institutions around the world in the fled of research and development (KACST, 2018).

In the recent past, electronic learning has taken shape in Saudi Arabia. Multiple institutions of higher education have adopted various versions of e-learning ranging from the integration of e-learning with the traditional learning methods to fully online distance learning programs. The Arab Open University is one of the Saudi institutions that offers fully distance education while others such as King Abdulaziz University and Al-Imam Mohammad ibn Saud Islamic University offer a hybrid distance education program involving a combination of on-campus learning with online education. In 2011, the Saudi Electronic University (SEU) was established as a government institution to offer distance education in Saudi Arabia. The SEU has been offering blended learning programs involving a mixture of technology-based interactions with face-to-face interactions. The National e-Learning Center is also a major government initiative to promote e-learning in Saudi Arabia. The development of the e-learning sector has been fast and strong with government efforts being directed towards ensuring the success of e-learning programs. The establishment of the National Center for E-learning was a demonstration of government commitment to the promotion of e-learning in the country (Al-Shehri, 2010).

3.9 Background and Definitions of Mobile Learning and Smartphones

The mobile phone technology has presented numerous opportunities for the education sector due to the large number of activities and tasks that may be supported by these devices (Valk et al., 2010). Mobile learning or m-learning has therefore emerged as a major part of the education process. According to Pechenkina (2017), m-learning is characterized by the use of mobile devices to facilitate learning anytime and anywhere. M-learning allow learners to engage in the learning process through a range of mobile devices from different locations and at their own convenient times. The growth in mobile learning has been facilitated by the growth in the number of mobile devices. Today, the mobile phone is an ubiquitous device that permeates all aspects of day-to-day life for most people. One of the major benefits of mobile learning is its facilitation of access to learning resources at the convenient time and location of the learner.

According to Jones et al. (2013), mobile learning allow learners to make decisions on when, what and where to learn. Moreover, mobile learning creates a unique learning experience through personalized, contextualized, and flexible learning (Pechenkina, 2017). In the UK, smartphones are widely used to support medical education (Bullock et al., 2015; Payne et al., 2012).

There are numerous definitions of mobile learning. However, the general conceptualization of mobile learning is the use of mobile devices to support various learning and educational activities (Pechenkina, 2017). Sharples et al. (2009) defines mobile learning as a method of teaching where various mobile technologies are employed in providing learning materials to learners as well as offering them guidance and support. Similarly, Mcconatha, Praul and Lynch (2008) have defined mobile learning as the learning that takes place through small computing devices such as smartphones and small handheld devices. Al-Hunaiyyan, Al-Sharhan, and Alhajri (2017) consider mobile learning as a learning strategy where students utilize a range of portable computing devices in their learning activities These definitions emphasize the use of mobile technologies in supporting learning activities. On the other hand, Hwang, Tsai, and Yang (2008) define mobile learning as the method of learning in which there are no physical constraints to the learning process. The definition by Hwang et al. (2008) emphasizes on learners' mobility and of the learning equipment. El-Hussein and Cronje (2010) have also defined m-learning as the form of learning where learning environments take into account the mobility of learners, mobility of technology, and mobility of learning. Similarly, the definition of m-learning by El-Hussein and Cronje (2010) puts emphasis on the mobility of learners and learning equipment and not necessarily the use of mobile devices.

Some researchers have developed theoretical models of analyzing mobile learning in education (Koole, 2006; Koole, 2009; Park, 2011). Kole (2006) has developed a framework for classification of mobile learning known as the Framework for Rational Analysis of Mobile Education (FRAME). The framework classifies mobile learning based on three dimensions: the device, the learner, and the social environment. The framework indicates that the effectiveness of mobile learning is influenced by the technical, personal, and social aspects. FRAME provides a comprehensive framework for planning and designing mobile learning environments. It provides a checklist against which institutions can use in

developing mobile learning environments. Koole (2009) argues that mobile learning is effective when the three dimensions are balanced. The device dimension includes all aspects of technology and infrastructure and how they affect learners and performance. Effective m-learning focuses on eliminating all potential technical challenges and barriers. The learner dimension describes the individual characteristics of the learners including their motivation levels, learning contexts, beliefs, and personal experiences. The learner perspective focuses on how to facilitate the learner pedagogically and technologically to take advantage of mobile learning. Finally, the social dimension recognizes that the learning environment is socially construed and therefore various interactions are important in the learning process. These interactions include those between students and other students, students and instructors, and students and the learning content.

Another model suggested by Park (2011) classifies mobile learning into four categories. The first category is the high transactional distance socialized m-learning in which learners have greater levels of communication with their instructors in addition to participating in group learning. The other category is the high transactional distance individualized m-learning where learners are given tightly structured content and have individual control over their learning processes. The third category is the low transactional distance socialized m-learning in which learners engage in less communication with instructors and have loosely structured instructions even though they work together in groups. Finally, mobile learning may take the form of low transactional distance individualized learning where the psychological space and communication with instructors is low and the instructions are loosely structured.

A large body of literature has focused on the smartphone as the major mobile device used in the learning environment. According to Alwraikat (2017), a smartphone may be defined as a phone that is that is run by an operating system and which combine multiple functionalities including telephone capabilities, multimedia operations, and internet access. Quite often, smartphones are operated through touch (Alwraikat, 2017). According to Jubien (2013), a smartphone may be defined as a handheld computing device, which has multiple functionalities such as making phone calls, internet connectivity, and running apps. Similarly, Himmelsbach (2013) defines a smartphone as an electronic

handheld device that integrates the functionalities of a mobile phone with personal digital assistant (PDA) and other information devices. Smartphones are usually optimized for text and voice communication in addition to allowing efficient access to information through internet. According to Himmelsbach (2013), smartphones not only facilitate daily communication but also have other functions that enhance routine operations such as making appointments, calendars, scheduling, playing audio and video materials, instant messaging, managing personal information, and learning among others. Smartphones are typically powered by an operating system such as Windows, Linux, Symbian, and Blackberry or their derivatives. Therefore, smartphones have functionalities similar to those of desktop or personal computers with the added advantage of facilitating telephony functions and being portable. For instance, smartphone users can access Microsoft Office files and enjoy full key-board functionalities just like in the ordinary computer (Alwraikat, 2017).

One of the key features of smartphones is that they allow users to download and install additional apps on the user's device. Mobile apps refer to software programs that are developed for use on smartphones and other personal wireless devices (Pechenkina, 2017). These apps have evolved from simple early apps such as games, calculators, calendars, and text editors to divers and complex third party apps that have advanced functionalities such as social media interaction, mobile banking, and learning among others. Hinze et al. (2017) define apps as software that are specifically designed for mobile devices. In the education sector, these apps have found wide usability in activities such as information gathering, accessing content, communication, and collaboration. Patten et al. (2006) have developed a framework for categorizing the apps used in education. The framework categorizes the apps based on their functions and pedagogies. Patten et al. (2006) defines seven categories of mobile apps. The first category is the administrative apps whose main function is on storage and retrieval of information. Administrative apps include the apps that facilitate course registration, fees payment, attending classes, delivery of lectures, timetabling, and delivery of campus news among others. The second category comprise of the referential apps. These are the apps that facilitate access to content available in learning platforms and include dictionaries, database access apps, and eReaders among others. Another category comprise of collaborative apps whose function is

to facilitate collaboration between learners and sharing of knowledge. Another category of apps is the location aware apps whose function in the learning process is to facilitate the interaction between learners and their environments. The other category comprises of data collection apps whose role is to facilitate the recording of scientific data for research purposes. In addition to data collection apps, Patten et al. (2006) further recognize the interactive apps as those whose function is to facilitate the delivery of content as well as information management through the response and feedback approach. Finally, the microworlds are the apps that facilitate learners in knowledge development through experimentation.

3.10 Smartphone Applications in Education

Smartphones and their apps have found wide usage in education. In many countries, universities and other institutions of higher education have used smartphones for various teaching and research purposes (Al-Emran and Shaalan, 2015; Ebiye, 2015; Kim et al., 2015; Vázquez-Cano, 2014). In Nigeria, for instance, Ebiye (2015) have investigated the use of smartphones in searching for information. The study involved a survey of 500 students as well as faculty members drawn from the Niger Delta University's medical colleges. The results revealed a high level of awareness and usage of smartphones in information search. Similarly, Boruff and Storie (2014) have investigated the use of tablets and smartphones in searching for information among students and faculty members by examining evidence from Canadian medical colleges. Their study involved a survey of a large sample of over 1,200 students and faculty members from the medical colleges of four universities in Canada. The results revealed that smartphones were used widely among students and faculty members with more than half of the respondents having used them in taking notes and accessing scientific journal articles. Nearly half of the respondents reported to using smartphones at least once daily.

In a study of three U.S. universities, Gikas and Grant (2013) have established that mobile learning aids interaction and collaboration particularly when e-learning is integrated with social media. In Spain, Vázquez-Cano (2014), examined the use of smartphone apps and their potential in promoting distance education. The study involved a survey of 388 students studying at the Spanish National University of Distance Education. The study results showed that smartphone and apps helped

to improve learning processes in the university. The apps were shown to play a supportive role as well as enhancing the learning practices. In addition, the smartphone apps were shown to enhance connections and relations between students and the taught subjects as well as promoting collaboration among students as well as between students and their lecturers (Vázquez-Cano, 2014). In South Korea, Kim, Illon, and Altmann (2013) examined the usage of smartphone apps in the learning process. The study involved a mixed methods study involving a survey of 86 students and interviews with 46 students who were drawn from Seoul National University. The findings of the study revealed the trend of the use of smartphone apps in Korean universities. Most of the sampled students had smartphone ownership while the usage of the smartphone apps for learning purposes varied widely. The results showed that 16% of smartphone users at the Seoul National University had 80 smartphone apps that were specifically designed for learning. Additionally, 47% of the respondents who used smartphones for learning had installed 55 learning apps. However, one of the interviews admitted to have never used a smartphone in learning. The most commonly used apps for learning purposes included translation apps, dictionary, scheduling apps, internet searches, email, memos, and social networking.

Smartphone apps have been widely used to support research in higher education. Hahn (2014), for instance, has demonstrated the usefulness of smartphone apps in supporting research among undergraduate university students. His investigations focused on Optical Character Recognition (OCR) apps and their usefulness in supporting library research among undergraduate students at the University of Illinois. The study involved a case analysis of a group of ten first year students who were provided with an Android mobile device with a pre-loaded OCR app. The students' use of the apps was observed in addition to data collection through interviews. The researchers recorded the students' reactions to the software and various functionalities of the app. The results indicated that the OCR apps enhanced library information retrieval and organization. The app was shown to support the research needs of the participants by enhancing self-sufficiency in research. In another study, García, Welford, and Smith (2016) have demonstrated that smartphone apps have an important role in facilitating research. In their study, García et al. (2016) developed an audiovisual technology that incorporated a participant-focused app to collect data. The study involved the collection of

data comprising of photographs and diaries of fans to show the role of football in their lives. The app allowed fans to use mobile phones to capture real time qualitative data. The app was shown to play a major facilitative role in making the research work and data collection process easier. The app enhanced data storage, submission and management in addition to enhancing monitoring and communication with participants. In another study, Hinze et al. (2017) investigated the use of mobile apps in teaching for and research. The study involved a survey of 138 respondents from the University of Waikato. The findings showed that mobile apps were primarily used in communication, storage of data, and collaborative work. About a third of the respondents in this survey reported to not using mobile apps for academic purposes. In teaching, faculty members reported to have used the apps for passing information to students such as distribution of teaching materials. In research, mobile apps were primarily used in self-organization, information storage, collaboration with other researchers, and staying informed of the current research.

Social media apps have also been shown to be useful in supporting academic research in higher education institutions. Beddall-Hill, Jabbar, and Al-Shehri (2011) investigated the use of social media apps in conducting qualitative research in education. The study involved the conduct of several case studies in which smartphone apps were used in the research process to support interviewing, ethnography, and design-based research. Smartphone apps were shown to play an important role in supporting various research functions. For instance, apps such as Smart Recorder, Audio Note, and Dragon Dictation had great functionalities in recording interviews and focus group discussions. The apps also enabled researchers to store and manage research data more effectively through the use of Dropbox and Evernote. Others such as Pin Trip help to record geolocation information in real time during data collection processes. The study demonstrated the wide variety of apps that serve different functions in research settings.

Luna-Nevarez and McGovern (2018) have investigated the use of mobile apps in education with a focus on the role of digital magazines in facilitating student learning. The study assessed the usage of digital magazines delivered through a mobile app known as Flipboard. The results of the study revealed that students who used the app had greater levels of enjoyment with class content. The app was also shown to improve the students' performance in terms of knowledge

assessment compared to those who did not use the app. Similarly, Li, Lee, Wong, Yau, and Wong (2018) have reported beneficial impacts on students learning motivation following the use of mobile apps. In their study, Li et al. (2018) examined how mobile apps influenced the learning motivation, study performance, and learning outcomes through a sample of 200 nursing students. A survey was conducted among the respondents to assess their learning motivation in addition to focus group interviews of 20 students. The findings of the study showed that mobile apps were used to study supplementary learning materials in addition to participation in class activities. The findings further revealed that students who used mobile apps had high learning motivation levels. Moreover, mobile apps were shown to improve the overall performance of the students. The findings of Luna-Nevarez and McGovern (2018) and Li et al. (2018) suggest that mobile apps could contribute to better performance among students in higher education institutions.

In Saudi Arabia, the potential for the use of smartphone apps in higher education is immense. Almutairy, Davies, and Dimitriadi (2015) explored the readiness of mobile learning apps among higher education in Saudi Arabia. The survey results showed that the Saudi students viewed mobile learning as providing unique learning opportunities. The students felt that the use of mobile learning within the classroom environment helped to improve the students' learning skills as well as knowledge acquisition. In another study, Alfarani (2015) investigated how mobile learning influenced learning among Saudi women teachers in higher education institutions. The study findings revealed that the educators perceived mobile learning to have great potential for enhancing various aspects of higher education learning including communication with students even though multiple challenges and obstacles were noted. Moreover, Al-Fahad (2009) explored the attitudes and perceptions of Saudi students towards mobile learning. The study involved a survey of undergraduate students drawn from King Saud University. The findings of the study revealed that the students perceived mobile learning as beneficial in their learning processes. Moreover, mobile learning was shown to improve the retention of undergraduate students by enhancing their learning and enhancing the learning experiences of the students.

3.11 The Blackboard App

The Blackboard Learning Management System, commercially known as Blackboard Learn, is a product of the Blackboard Inc., an American company that offers learning management solutions. Blackboard Inc. traces its history to 1997 when two educational advisors established a consulting firm for offering technical solutions to online learning. The company has grown over the years and today, the Blackboard app is the most widely used online learning system in the world. The app is used by over 70% of U.S. colleges and universities. In 2017, Blackboard Learn reached 100 million users in 90 countries making it the most widely used online learning app (Khosrow-Pour, 2019). Blackboard is available as a downloadable mobile app. The app is also available as a web-based software with customizable learning environment. It supports various learning and teaching services. The app has an interactive teaching environment where instructors can deliver teaching materials to students including making of announcements, delivery of course content such as instructional videos and other learning materials, posting of assignments, and posting of assessments. Learners, on the other hand, can easily access course and reading materials from the app including access to a virtual library (Sarrab et al., 2015). The popularity of the Blackboard app could be attributed to its unique features. For instance, it has an innovative navigation system with features that are easy to use. In addition, the app can run on all mobile devices. The app includes tools that enable learners to collaborate with other learners, communicate with instructors, track their performance, access training, and obtain feedback (Bradford et al., 2007). The Blackboard Collaborate is a virtual classroom of the Blackboard app that provides collaborative learning environment through elements such as chats and discussion features. Another advantage of the Blackboard app is that the educational institution may receive technical support in case of problems. Moreover, the system has extensions that allow educational institutions to add new functions. Furthermore, Blackboard can be integrated with other learning systems and tools (Khosrow-Pour, 2019).

The Saudi Electronic University adopted the Blackboard app in 2012 to support its e-learning activities. The app offers access to online learning to the 10,000 students at the SEU. The SEU access the Blackboard system through license agreements between the Ministry of Education and Blackboard where all Saudi public universities access a permanent license free of charge. The SEU is charged

with the responsibility of managing the project on behalf of other universities (SEU, 2019). The SEU selected Blackboard due to its advanced functionality and enhanced collaborative learning environment. Blackboard has over the years provided a fully online collaborative learning environment that enables the SEU to blend online and traditional course offerings. The SEU's Blackboard app is customized to suit the specific needs of the institution. The Blackboard app provides the institution with a system for course management and student information systems. Instructors post educational materials, assignments, assessments, and course materials for access to learners. Instructors can also make important announcements through the app. The discussion feature allows SEU learners to collaborate with other students and instructors through discussion threads and feedback system. Learners can converse and share ideas through the chat function. The Blackboard app at the Saudi Electronic University has been effective in facilitating blended learning at the institution (Alhussain, 2017).

3.12 Challenges of, and Obstacles to, Smartphone Apps in Higher Education Institutions

The use of smartphone apps in education has been widely studied in different countries. The literature on the challenges and obstacles that limit the use of smartphone apps in higher education institutions is expansive. Among the major challenges that hinder the successful app of smartphone apps in the education sector are technical issues. Like users of every other technology, users of smartphone apps are faced with various technical challenges that hinder their effective apps of the technology (Alhajri, 2016). Qureshi et al. (2012) have noted some of the technical challenges that hinder the use of mobile technology in learning as including lack of fast internet connectivity, electricity supply interruptions, and lack of technical support among others. Park (2011) has also noted that technical challenges of smartphone apps are related to the physical attributed of the mobile devices such as insufficient memory, small screen size, internet connectivity, limited battery capacity, and network reliability among others. In furtherance of the findings of Park (2011), Dhaheri and Ezziane (2015) have demonstrated that mobile learning apps are highly limited by battery life because the apps have high demand for power. Smartphone apps such as those required to access course materials quickly drain the phone battery and therefore prevent users from using the mobile phone continuously. Poor battery life of a

mobile phone has been shown to be a major obstacle to the use of mobile phones apps in learning. In an investigation of the obstacles that face smartphone users in higher education in Jordan, Alwraikat (2017) surveyed a group of 108 students who noted that low battery life was one of the major hindrances to their abilities to use smartphones in learning.

In addition to low battery life, learners who use smartphone apps have consistently cited the small screen size as a limitation to the use of smartphones in learning (Alhalafawi, 2011; Alkhozim, 2012; Alwraikat, 2017; Verhoeven et al., 2014). The small size of the smartphone becomes a burden in learning because the screen display reduces the amount of information accessible. Moreover, users feel that the small screen size limits the capacity to type or edit data in addition to causing physical strain on the body posture and eyes (Alkhozim, 2012). Some learners feel that the traditional desktop computer offers better functionalities for learning compared to the smartphone due to the latter's physical actions limitations. Some modules such as the purely online distance education programs require big screens for streaming tutorials and therefore smartphones become unsuitable for such practices compared to desktop computers. Investigations by Verhoeven et al. (2014) show that the possibility of better understanding of learning materials in mobile learning environments improve with an increase in screen size. Moreover, Prasad et al. (2012) have noted that while smartphones are suitable for making phone calls, texting, emailing, and using social media apps, they are not optimized for certain learning practices such as making presentations.

Slow internet connectivity has also been cited prominently in literature as one of the major obstacles to the effective use of smartphone apps in learning. According to Qi and Gani (2012), mobile network is considered reliable if it facilitates fast and convenient access to information and communication with others with little or no restrictions. When mobile network is unreliable, the learning process is hindered and students fail to find the process enjoyable. Hashim, Yunus, and Embi (2018) have explored the use of mobile devices in learning among Malaysian polytechnic students. The students cited poor internet connectivity as one of the major challenges that prevented the successful usage of mobile devices in learning. Slow Wi-Fi connection and lack of internet access led to frustration among students thus dissuading them from engaging in mobile learning. Other

challenges included the high cost of mobile devices and lack of knowledge on the use of online learning materials. In addition, Sabah (2016) has demonstrated shown that internet connectivity issues are among the major obstacles to the adoption of e-learning. In line with the predictions of the technology acceptance model (TAM) theory, the study revealed that learners perceived ease of use and perceived usefulness were negatively affected by network connectivity issues. The study by Sabah (2016) demonstrated that poor internet connectivity and other technical challenges such as small screen size, limited memory, limited battery capacity, and challenges in navigating smartphone apps resulted in negative behavior intentions and led to poorer adoption of m-learning among students. In line with these observations, Khaddage et al. (2015) have noted that gaining access to high internet speed is often very expensive or impossible in most parts of the world. Low internet speed hinder students from accessing mobile learning platforms such as online libraries. In an investigation of smartphone and tablets usage in Canadian universities, Boruff and Storie (2014) have identified several obstacles that students and faculty members face. These include weak wireless access to the internet and technological problems relating to the use and download of mobile apps.

Some users also lack adequate knowledge of the use of smartphone apps. According to Wu et al. (2012), smartphones have an extensive diversity of features and this makes them confusing to mobile learners while others may not even be aware of the existence of some useful apps. Similarly, investigations by Godwin-Jones (2011) have affirmed that effective utilization of mobile devices in learning require students to have digital literacy skills so as to have the capacity to use and manage the devices effectively. The lack of knowledge on handling of mobile apps limits the usefulness of the device to the users. Alhajri (2016) has identified the lack of knowledge among instructors as a potential obstacle to effective adoption of mobile apps use in learning in Saudi Arabia.

Administrative and managerial issues have also been cited as possible obstacles to the use of smartphones in education. According to Alhajri (2016), implementation of mobile learning require managerial and institutional support from people such as major decision makers, managers, content developers, designers, instructors, and university employees. When this support is lacking, then the implementation of mobile learning becomes challenging. Alinizi (2012), for instance, examined

how smartphone apps were used in learning in Saudi Arabia. The study involved a survey of students at the Taibah University in Saudi Arabia. A sample of 302 students was examined to assess how the students used mobile phone apps and the challenges that students encountered while using the apps. The study revealed that the use of smartphone apps by the university students was moderate. The students also noted several challenges that were associated with the apps use. The students noted that one of the biggest challenges was the existence of rules and regulations that prohibited mobile phone usage in some situations. Moreover, the students felt that most of the faculty members had not embraced the mobile phone as an educational tool. Instead, the faculty members only saw the smartphone as a communication and entertainment device. With respect to technical challenges, the students felt that their phone batteries did not store power for long while others noted that small data display screens was problematic. The study noted that there was statistically significant difference between responses of the male and female students. Statistical significance was also reported on the type of faculty.

Similar to the findings of Alinizi (2012), Alomari (2014) has also reported the existence of prohibitive rules and regulations on smartphone apps in universities. Alomari (2014) investigated the use of mobile learning apps among graduate students in at a Jordanian university. The study also examined the challenges and obstacles to the use of smartphone apps. The study involved a survey 342 students at the Faculty of Education at Yarmouk University who were asked to fill a 43-items questionnaire. The results of the study revealed that there was moderate utilization of smartphone apps among the Jordanian university students. Technical and human challenges were also reported as being major hindrances to the use of smartphone apps in the learning process. The students reported that the policy of banning smartphones usage during lectures, failure by instructors to use mobile learning, and potential distractions during lectures were the major obstacles.

Social and cultural issues have also been shown to be hindrances to successful adoption of mobile learning and smartphone apps in education. One of the major social problems associated with mobile learning is the risk of distraction due to use of smartphones. According to Soon (2011), despite the numerous advantages associated with smartphone devices, there are risks of students' distraction, thus negating the benefits obtained from mobile learning. When mobile phones are

used in the learning process, there is a high likelihood that students could steer away from effective learning and instead engage in non-learning activities. The risk of students getting distracted by mobile phones is one of the major reasons why some learning institutions prohibit students from using mobile devices while at school (Soon, 2011).

Verhoeven et al. (2014) have noted that smartphones have multiple apps such as social media apps, YouTube, and other entertainment apps that may distract students from fully participating in learning activities. A study by Attia et al. (2017) has focused on examining the how technologies such as smartphones and laptops have affected students' concentration among students in Saudi Arabia. The study involved a survey of 265 Saudi undergraduate students in which the students' concentration was measured in the presence of smartphones and laptops. Mobile phones were shown to be major distractors in the learning process. Texting, playing games, internet surfing, and chatting with other students were cited as some of the major distractions in the learning process. Similarly, research by Mendoza et al. (2018) has revealed that smartphone usage in the classroom has a negative impact on the learning and attention of students. Excessive use of mobile phones was shown to lower attention and subsequently the students' academic performance.

Mehdipour and Zerehkafi (2013) have also noted that the use of smartphones in learning institutions could create additional social problems associated with student addiction to the devices, isolation of the students from the teachers, use of the devices for noneducational purposes, lack of student attention, and overall decline in students' academic achievement. Moreover, Mehdipour and Zerehkafi (2013) argue that students' creativity and innovativeness may be negatively affected by overuse of smartphones. Moreover, smartphone usage may increase the incidence of other social ills such as exams cheating in addition to sharing of inappropriate content with fellow students. Other unethical behaviors associated with the use of smartphones in educational institutions include increasing the risk of cyber bullying and data privacy issues (Alwraikat, 2017). The risks of unauthorized access to private information and cyber bullying among young people have increased with the proliferation of mobile phone usage. In consistent with these findings, Jalil et al. (2015) have demonstrated that unethical conduct

such as cheating and security concerns are among the major challenges of mobile learning within the UK context.

3.13 The Keys of Success and Lessons Learned to enhance the Smartphone Apps in education

One of the key success factors for smartphone apps in the education sector is the provision of training to students, staff and faculty members. According to Hinze et al. (2017), training for students and university staff members is necessary if universities are to take advantage of the opportunities presented by mobile apps. It is also important that universities and other higher education institutions establish adequate channels of providing technical and administrative support to users of mobile learning platforms. Research by Alwraikat (2017) has shown that limited availability of support from the university is a major hindrance to the usage of mobile learning in Jordan. Alrasheedi and Capretz (2015) have explored the success factors for mobile learning by examining the opinions of instructors. Their study involved a survey of the opinion of undergraduate and graduate instructors on what they perceived to be the important determinants of successful mobile learning. The study involved a sample of 64 respondents. The instructors identified multiple factors as being critical in the success of mobile learning including internet access, user-friendly mobile platforms, personalization, technical competence of instructors, and technical competence of instructors among others. In particular, the technical competence of learners was shown to be the most important determinants of effective mobile learning thus suggesting the need for enhanced training for students and instructors.

Another important lesson for universities and other institutions of higher education is the need to enhance their technological infrastructures and facilities in order to support mobile learning (Hashim et al., 2018). In a study of Spanish colleges and universities, Domingo and Gargante (2016) have found that the design aspects of the apps play a key role in determining the success of e-learning. Technical challenges associated with poor internet connectivity and low internet speed have been cited as some of the major hindrances to the use of smartphone apps in education (Park, 2011; Boruff and Storie, 2014; Khaddage et al., 2015; Sabah, 2016). Therefore, it is important to ensure that higher education institutions have good network connectivity with high internet speed so that

learners are able to use their mobile devices in downloading materials needed for learning activities. Moreover, designers of smartphone devices should enhance the design features in order to ensure that the devices are optimized for learning.

The pedagogy behind mobile learning is also an important determinant of the success of mobile learning. In one UK study, Jalil et al. (2015) examined the pedagogical requirements for mobile learning such as learning activities, communication, and collaboration. For mobile learning to be successful, Seifert (2015) recommends that the learning pedagogy must change from the traditional pedagogy to innovative pedagogy where education shifts from teaching to knowledge building. The innovative pedagogy also involves the shift of the focus from the teachers to the learners. Within the technological environment, educators must adapt their teaching methods to the changed learning environment where IT activities are integrated in the learning process. Krotov (2015) has made several recommendations on how higher education institutions may develop pedagogically sound mobile learning programs that promote learning quality. First, mobile learning should be integrated with other educational approaches such as electronic learning. Since mobile learning may not be appropriate in all learning situations, it is necessary to involve other learning technologies so as to capture the learning needs of all students. Second, Krotov (2015) recommends that mobile learning content should be short and simple in order to facilitate overcoming of technical limitations of mobile devices such as small screen size. Moreover, mobile learning should be formalized in learning institutions so that learners view it as a normal educational process rather than a form of entertainment.

The nature of university management has also been shown to be a major determinant of the success of mobile learning. Higher-level management, deans, heads of departments, and IT system administrators are the major decision makers with respect to technology adoption in universities (Alrasheedi, Capretz and Raza, 2015). The university management determines the quality of mobile learning by making decisions on the security, privacy, and upgrading of IT systems. According to Alrasheedi et al. (2015), the commitment of university management, university organizational culture, organizational structure, change management, conflict management, and organizational learning have a strong influence on the success of mobile learning in universities. In their study, Alrasheedi et al. (2015) have

found strong evidence that the commitment of university management to mobile learning as well as the university's change management and learning practices are important success factors for m-learning.

The success of mobile learning is influenced by presence and strength of the m-learning policy and strategy. One of the key lessons from literature is that the implementation of mobile learning should be guided by policy within educational institutions. According Asiimwe et al. (2017), most universities have no policies guiding or regulating the use of mobile devices in learning. In such universities, mobile learning is a voluntary practice and instructors have no obligation to use it in their teaching practices. Investigations by Tondeur et al. (2008) have established that most learning institutions have no electronic learning policies and even when they are present, they are rarely utilized. Tondeur et al. (2008) further note that the development and utilization of ICT policies strengthen the capacity for use of electronic learning. Policies of ICT training and support have been shown to have a significant impact on the use of technology in the classroom. Such policies provide guidelines for enforcing and regulating electronic learning practices such as social media use, internet use, and mobile learning. Therefore, it is necessary to develop and ensure the enforcement of policies relating to electronic learning and ICT use in general in higher education institution. Lack of institutional policies relating to the use of mobile learning has often been cited as one of the major challenges relating to the effective utilization of mobile learning in institutions of higher education (Alhajri, 2016). Therefore, it is important that higher education institutions develop and enforce policies on mobile learning. Well-structured policies should stipulate the good practices of mobile phone use in the academic settings and the penalties for violation of the policies.

3.14 Conclusion

One of the major outcomes of globalization and development has been the ability of countries to share knowledge and technology. In the education sector, technology has become a major trend in shaping the learning process. Developments in computer technology and information communication have led to blending of technology with education in what is broadly referred to as electronic learning (e-learning). Mobile learning is a form of e-learning that involves the use of a mobile device such as a smartphone in the learning process.

One of the important aspects of the smartphone is that it allows users to download software apps that have multiple functionalities. Existing literature on mobile learning and smartphone apps show that learners benefit greatly from these technologies. The benefits of smartphone apps include enhancing the convenience of the learning process, enhancing the interaction between learners and instructors, and improving academic performance of students. However, several obstacles have been noted that prevent successful apps of e-learning including technical challenges, lack of skills, social issues, and lack of managerial support. Therefore, the key to success in mobile learning is to ensure that technical challenges such as poor internet connectivity are removed in addition to ensuring that mobile learning are pedagogically aligned with the students learning needs. It is also important to ensure that top university management offers support to mobile learning in their institutions.

Chapter 4 Research Design and Methodology

4.1 Introduction

This chapter provides a detailed account of the research methodology selected in conducting the research study as well as the justification for the use of various research methods. According to Creswell and Clark (2011), the choice of the research methods in a study is guided by the nature of the research problem being investigated. The nature of the research problem in this study called for the adoption of a mixed methods exploratory research methodology. The study adopted a mixed methods research design where both qualitative and quantitative research methods were used in examining the realities of smartphone usage in a higher education institution in Saudi Arabia. The qualitative research segment of the study involved a case study of the Saudi Electronic University and interviews with faculty members in order to determine their perception of the usage of smartphones among university students. On the other hand, quantitative research part of this study involved the use of self-administered questionnaires in a survey that sought to determine how university students use smartphone apps in learning and the potential challenges they face. This chapter details the specific research procedures used to collect survey data and interview data and the subsequent analysis adopted for making sense of the raw data. The chapter concludes with a discussion of the considerations for reliability, validity, and ethical issues of the research.

4.2 Research paradigms

The present study adopted a mixed methods research approach in exploring the realities of smartphone apps use among Saudi university students. One of the major issues in mixed methods research is the problem of establishing a suitable research paradigm to frame the approach. A research paradigm refers to the way of summarizing the researcher's beliefs about the efforts of knowledge creation (Morgan, 2007). It is the system of beliefs and practices that influences how a researcher conducts research and the methods adopted in conducting research (Shannon-Baker, 2016). Kivunja and Kuyini (2017) have identified three paradigm choices that may be applied in research namely the positivist, interpretivist, and the pragmatic paradigm. The positivist paradigm is grounded on the scientific

method of investigation. The positivist paradigm is based on the belief that legitimate knowledge is only obtained through observation, experimentation, and reason. This approach is used to interpret measurable entities or facts. Research in the positivist paradigm involves the process of hypotheses formulation, testing of hypothesis, and deriving of conclusions. The positivist paradigm is generally based on the belief that knowledge is objective and that research findings can be generalized to other contexts. In the present study, the most appropriate source of evidence to answer the research questions was the perceptions and accounts of experiences of participants. Therefore, a qualitative approach was required as part of the research methodology.

The interpretivist or constructivist paradigm is based on the idea that knowledge may be subjective and socially construed. In this paradigm, the objective is to understand and interpret the subject's meanings within his or her context. Under the interpretivist paradigm, research is conducted first and the interpretations used to formulate theory rather than the development of hypotheses prior to conducting research. The interpretivist paradigm is consistent with the grounded theory due to its theory building approaches that are based on collection of information from prior research and literature. The interpretivist paradigm does not seek the generalization of results to other contexts. Interviews and other qualitative research methods are the common methods of gathering data in the interpretivist paradigm (Kivunja and Kuyini, 2017). In the present study, the utilization of smartphone apps among students and the attitudes of students towards the use of these apps in learning was explored. A quantitative approach involving the collection and statistical analysis of survey data was considered most approach for investigating these phenomena. The survey data had the features of a positivist paradigm including prior setting of hypotheses, use of a large sample size, and generalizability of findings.

The pragmatic paradigm is based on the idea that truth cannot be accessed through a single paradigm orientation. Instead, the pragmatic paradigm proposes that researchers embrace different paradigms that are most appropriate to their research problems (Hall, 2012). The pragmatic approach proposes that the researcher selects the paradigms that are practical to the phenomenon at hand. As discussed in Section 1.7, the pragmatic approach is the suitable paradigm for mixed methods research because it allows the utilization of multiple sources of

data based on the unique needs of a researcher (Kivunja and Kuyini, 2017). According to the pragmatic paradigm, researchers embrace what works as the best in answering research questions in a study rather than reliance on the rigid categorization of knowledge forms (Antwi and Hamza, 2015).

In the present study, a pragmatic paradigm was adopted to guide the research process as it was judged to best address the research questions (See also Section 1.7). The researcher accepted both qualitative and quantitative forms of data as legitimate sources of truth. The study of the perceptions of faculty members on the use of smartphone apps in education was considered best investigated through qualitative methodology involving interviews with a selected faculty members. On the other hand, the patterns of,and behaviours associated with the usage of smartphone apps, including the challenges faced by students would be best investigated through a quantitative approach. Therefore, the pragmatic paradigm provided the researcher with the flexibility to admit both qualitative and quantitative data and evidence to address the research objectives.

4.3 Research Design

A research design refers to the overall plan or blueprint of investigating a research problem. The research design explains the general approach of achieving the research objectives in a study. The present study adopted a case study design that falls within the descriptive research design. A case study of the Saudi Electronic University was conducted to explore the realities of e-learning and smartphone apps usage among university students.

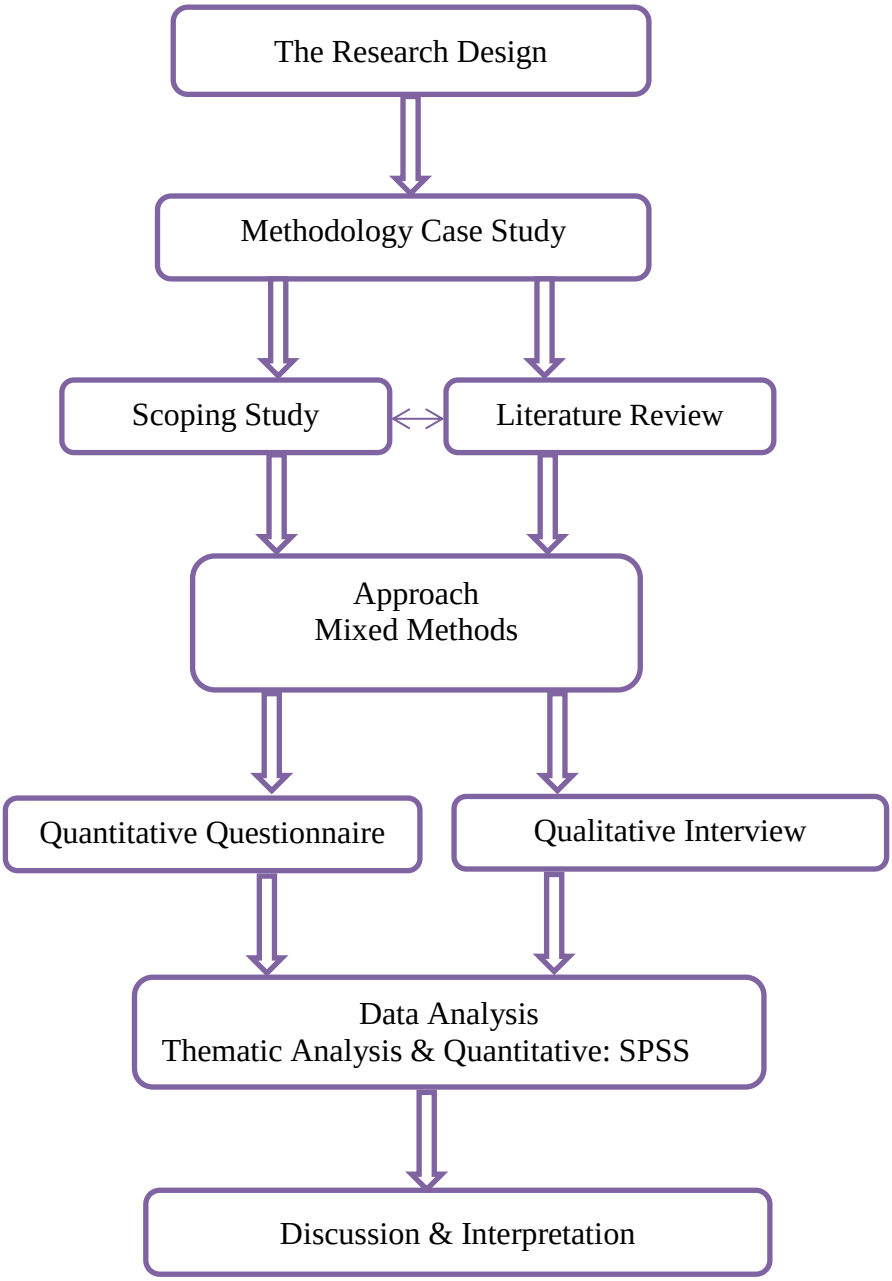

Figure 4:1 The framework of the research design

The overall research design in the present study was a case study of the Saudi Electronic University. A scoping study was conducted to delineate the major concepts and themes associated with the research subject. The scoping study was supplemented with a literature review, which helped to reinforce the identification of major themes and concepts. The main study assumed a mixed methods approach in examining the realities of smartphone usage at the Saudi Electronic University. A quantitative questionnaire was used in a survey of a large sample of Saudi students while a qualitative interview was conducted with faculty members to obtain an in-depth understanding of their perceptions of the usage of smartphone apps.

Most research studies conform to either of three major research designs: descriptive, exploratory, and explanatory (experimental and quasi-experimental designs). This classification is based on the goal of the research. In descriptive research designs, the goal of the study is describe the characteristics of a phenomenon or population of interest. Such studies focus on "what" questions of the research subject rather than the "how" or "why" questions. Descriptive research designs aim at describing the phenomena accurately through methods such as surveys or narrative descriptions. Descriptive research may also be used to classify or explain the relationships between variables (Harrison et al., 2017).

The exploratory research refers to the studies whose focus is on making preliminary investigations into phenomena that are relatively unknown. Exploratory research designs adopt an open, flexible, and inductive approach to research. Such studies are geared towards the discovery of new insights into a phenomenon under investigation. Exploratory research designs are suitable for investigating broad problems that have not been investigated before. These studies usually do not seek to test hypothesis but are instead aimed at gathering new insights and clarifying concepts in a certain research subject.

Finally, research designs may adopt the explanatory approach where the focus is on establishing the cause and effect relationships between variables. Explanatory research studies often involve experimental or non-experimental methods of testing the relationship between variables. In experimental research designs, research subjects are randomly assigned to treatment groups in addition to having a control group for measurement comparison. Quasi-experimental designs have random assignment of research subjects to treatment but have no control group for comparison (Harrison et al., 2017).

The present study adopted a non-experimental research design as no scientific experiments were conducted. The study could be considered to be descriptive in nature since it was focused on determining the characteristics of the student population with respect to their use of smartphone apps following a case study of the Saudi Electronic University. A survey was conducted to obtain the characteristics of the population by asking the respondents to give an overview of their smartphone apps usage behaviors. Descriptive statistics were used in describing the sample characteristics in terms of gender, age, and type of

smartphone used. Moreover, frequencies of smartphone usage behaviors were also analyzed using descriptive statistics. In addition to the surveys, narrative interviews were conducted where the participants who comprised of faculty members gave descriptions of their opinions on the usage of smartphone apps in learning. The interviews were used to corroborate the descriptive evidence collected from the survey of students' opinions.

4.4 Research Methodology

A research methodology refers to the strategy of enquiry adopted in a research study. The research method encompasses the research design and data collection methods within a study (Myers, 2013). Research methodologies are generally categorized into qualitative research methods, quantitative research methods, and mixed methods research (Creswell and Creswell, 2017). Quantitative research methods originate from natural sciences where the objective of research is the studying of natural phenomena. On the other hand, qualitative research methods developed from the social sciences to facilitate the study of social and cultural phenomena that may not be investigated using quantitative research methods. The suitability of each of these methodologies in a research study is influenced by the nature, purpose, and context of the research study. Qualitative research methods facilitate an understanding of the social and cultural contexts within which people live. Therefore, the complexities and dynamics of social phenomena can be explored and presented through qualitative research. Qualitative research methods accept that there are multiple enquiry strategies, knowledge forms, and data collection and analysis methods (Creswell, 2003). Data collected through qualitative methods include texts, public documents, written opinions, observations, interviews, and researcher's impressions. On the other hand, quantitative methods involve the collection of hard facts that mainly comprise of numerical data. The major distinction between quantitative and qualitative research methodologies lies in the approaches used in data collection, analysis, and presentation of results. In quantitative research methods, data collected in research processes is in numerical or statistical form. On the other hand, qualitative research methods focus on collection of data that is in form of descriptive narratives such as texts or words. Therefore, the aim of qualitative research methods is to enable the researcher make sense of a phenomenon or research subject as well as interpret the meanings associated with such

phenomena. Quantitative research methods often include surveys, questionnaires, and experiments. In contrast, qualitative research methods are predominantly case studies, interviews, and phenomenological studies. They may also take the form of literature analysis and ethnographies.

Research methodology may also take the format of mixed methods research. The mixed methods approach aims at taking advantages of both qualitative and quantitative research methods by combining the two in a single research project. The present study employed a mixed methods to examine the realities of smartphone usage in education where multiple research methodologies were employed. The quantitative component of the study involved the use of a survey in which university students filled a self-administered questionnaire seeking to determine their usage of smartphone apps. The survey generated quantitative data that was subjected to statistical analysis with the help of the SPSS package. On the other hand, the study involved qualitative research component that involved the conduct of interviews with faculty members and a case study of the Saudi Electronic University. The two research methods helped to generate rich data that gave insights into the perceptions of faculty members on students' usage of smartphone apps for educational purposes. The research methodology adopted in this study was guided by the considerations of the suitability and appropriateness of each research method in answering the research questions.

4.5 Case Study: The University

The Saudi Electronic University (SEU) is one of the leading distance education institutions in the Middle East. The institution’s history traces back to October 2011 when the then Saudi King Abdullah Bin Abdullah issued an order for the establishment of the university as a government distance educational institution. The institution’s establishment was supported by the collaboration that it enjoyed with various international universities such as the University of Phoenix and Franklin University (Aljaber, 2018). At the time, the SEU was the only institution in Saudi Arabia and the Arab world to offer specialized distance education. The establishment of the Saudi Electronic University was motivated by the success of e-learning demonstrated in other Saudi universities. The goal of establishing the Saudi Electronic University was to ensure that education became flexible particularly for students who faced limitations due to their jobs or locations and

who had a desire to further their education. The design of e-learning at the SEU was mainly influenced by the systems in American and European universities (Aljaber, 2018).

Today, the SEU offers specialized distance education programs in both undergraduate and graduate levels with a focus on life-long learning. The learning process at the SEU allows the instructors and students to collaborate in the design and of the curriculums and schedules. The university is guided by its four goals namely, representing Saudi Arabia in the international universities arena, offering flexible education for supporting self-learning skills and offering knowledge, use of technologies of e-learning to offer education and facilitate transfer of knowledge, and supporting lifelong distance education and e-learning in Saudi Arabia (SEU, 2018).

The primary learning strategy adopted at the Saudi Electronic University is that of blended learning. Blended learning involves the combination of face-to-face classroom learning with electronic learning. Electronic learning at the Saudi Electronic University adopts the synchronous learning model. In this model, students and their instructors are able to collaborate synchronous through virtual educational environments such as virtual classrooms and video conferencing. The virtual classroom system at the institution adopts the Moodle or Blackboard platforms that aid in the delivery of lectures over the internet. The e-learning system at SEU allows students to login into the system where attendance and participation in course activities are monitored. Students are allowed to record lectures for further reference with the help of Echo360 and Tigrity video recording platforms. Owing to the complexity of the e-learning software and systems, the SEU provides instructors with tools and materials that allow them to publish content without having to learn the program itself (Aljaber, 2018).

The SEU currently has four colleges. These include the College of Health Sciences, College of Computing and informatics, and the College of Administrative and Financial Sciences. Recently, the institution established the College of Science and Theoretical Studies (SEU, 2018). These colleges are further organized into 15 departments. Saudi Electronic University has ten campuses located in Jeddahel, Dammam, Taif, Tabuk, Alqassim, Abha, Aljouf, Almadinah, Alahsa, and Jazan. Classes in these physical campuses are typically structured in a format of one

weekly face-to-face class every week for undergraduate students and one class every three weeks for postgraduate students. The students are involved in scheduling the physical classes as well as the virtual classes that are attended through the internet.

One of the innovative features of the e-learning system at the Saudi Electronic University is that it has a test design that integrates a question bank system. The test design facilitates instructors in formulation of tests while the question bank allows the accumulation of test questions. This allows students to have easy access to revision materials. In addition, the SEU has an elaborate system for e-learning that employs a variety of learning methods. These include e-libraries, interactive whiteboards, and video conferencing. The SEU's e-library allows students to access books and other reading materials from diverse sources. Overall, the SEU has been a successful model of e-learning in the Arab world (Aljaber, 2018).

4.6 Scoping Study

A scoping study was conducted for the present research. In this research, the scoping study was used to identify and explore the key issues and major concepts associated with the project's research questions . It gathered preliminary data on the research questions and summarized and synthesized this with the existing research in smartphone apps usage in education.

Scoping studies generally follow a six-step process as described by Daudt, van Mossel, and Scott (2013). The first step is the definition of broad research questions. The second step is the identification of relevant studies within the contexts of the research question. The third step involves the selection of studies with most relevance to the research question following an established inclusion/exclusion criteria as well as the researcher's familiarity with literature. This is followed by the process of charting of data, which involves sorting information based on key topics or themes. The fifth step involves the collating and reporting the results of the review in a descriptive manner. A final step of consultation may be conducted where other stakeholders review and validate the findings (Daudt et al., 2013).

In the current research, the the scoping study involved an analysis of findings of the scoping study to better understand the main themes identified by the respondents. This was followed by an extensive review of literature to obtain support for these themes. The findings were then collated and summarized. The process led to identification of major themes including university apps, usage practices among students and staff, students' usage of mobile learning, general experiences of smartphone apps usage, successes of mobile learning, use of smartphone apps, and challenges in smartphone usage.

The scoping study helped to link the themes from the scoping study with those from literature. A scoping study is an important step in research because it gives an overview of a broad topic by summarizing the specific aspects of the topic. This helps to map out what is generally known about the key concepts about an area of study. The findings of a scoping study are useful in contributing to further investigations about a research topic. In most cases, the end product of a scoping study is a narrative of the key concepts found in literature or expert opinions (Peterson et al., 2017). Scoping studies are also conducted with a view of summarizing the research findings within a specific research area. Moreover, scoping studies can help researchers in identifying the gaps existing in literature (Daudt et al., 2013).

In this study, the primary reason for conducting the scoping study was to understand the topical issues in the use of the smartphone apps in the e-learning environment at the SEU. The scoping study was useful in understanding the issues, topics, and themes that would be examined in the survey and interviews in the main study.

In the present study, the scoping study involved interviewing sample of respondents. The major themes from the answers obtained from these interviews were compared with the findings from literature. The findings of the scoping study, then, guided subsequent data analysis and themes identification in the main study.

4.7 Scoping Study Methodology

The present study included a scoping study methodology to collect preliminary information on the major concepts from literature review and a scoping study. The methodology used followed that stipulated by Arksey & O'Malley (2005) with some modification. A scoping study involving an interview procedure was conducted with a small sample of students and faculty members to obtain their opinions on smartphone apps usage in education. Four students, two faculty members, and two deans were interviewed during the scoping study..

In addition to the interviews in the scoping study, an extensive search of the literature was conducted to obtain support for the themes identified in the scoping study as well as enable the identification of other themes. The literature review involved the identification of relevant studies through searches on electronic databases. The most relevant studies were subsequently identified based on the findings of the scoping study and assessment of relevance to the pre-identified research concepts. Finally, the information was charted, collated and summarized in the form of narratives that support the key themes from literature. The major themes identified in the scoping study included the university apps usage practices among students and staff, students' usage of mobile learning, general experiences of smartphone apps usage, successes of mobile learning, use of smartphone apps, and challenges in smartphone usage.

4.8 Procedures involved in Gathering Data and Data Analysis

The scoping study involved the use of interviews to obtain information about the SEU and use of smartphone apps. Interviews were conducted with 2 deans, 2 faculty members, and 4 students. Informed consent letters were sent to the 8 interviewees asking them to participate in the scoping study. The participants were given details of the research project as well as the aim of the scoping study. During the interviews, the respondents were asked to describe their opinions and experiences of the use of smartphone apps at the SEU. Each interview lasted for a period of between 30 minutes and 45 minutes. The data collected from the interviews was subjected to thematic content analysis where major themes were identified and described. The scoping study also involved an analysis of secondary

literature in order to obtain support for the main themes from the interviews. An analysis of evidence from literature helped to supplement the findings of the scoping study. The themes that emerged from the scoping study and literature analysis were described and used to guide the conduct of the main study.

4.9 Summary of Scoping Study Findings

The scoping study and literature review resulted in the identification of seven major themes. First, the scoping study revealed that the university apps contributed significantly to the adoption of mobile learning. The university's system is optimized to facilitate both face-to-face learning and online classes. It was also revealed that the SEU has adopts the Blackboard e-learning platform that functions of mobile devices thus promoting flexibility in learning. SEU e-learning platform affords high degree of flexibility with users being able to access the system at their convenient locations. This observation is consistent with the findings from literature such as those of the study by Melhuish and Fallon (2010), which demonstrated that the smartphone interface design enhances usability among young users. Another theme that emerged from the scoping study was that of blended learning. It emerged that mobile learning takes place inside and outside the classroom through blended learning. At the SEU, 30% of learning activities are through face-to-face interactions while the rest of the learning activities (70%) take place through online classes. The university offers its students the capability to use the e-learning system in communicating with faculty members and accessing lessons at any location of their convenience. The e-learning platform at the SEU has an interactive environment that facilitates efficient collaboration among students as well as communication with faculty members. Smartphone devices are allowed in face-to-face and virtual classes at the SEU. In consistent with the findings from the case study, the use of mobile devices in supporting learning activities is supported in literature (Alebaikan and Troudi, 2010).

Another important theme that emerged from the scoping study was that of the general experiences of the users. While some staff members have knowledge and experience in mobile learning, others particularly the elderly ones are not conversant with smartphone devices. This suggests a need for training of staff members on mobile learning. Research by Cochrane and Roger (2010) confirms

this theme by suggesting that most students have access to cell phones compared to a few who own laptops and PDAs. The scoping study further identified the theme of success. It emerged that the university had achieved some successes in mobile learning. The major success was the wide usage of smart devices such as Blackboard by students and staff in accessing the university systems. Other successes achieved by the SEU include greater communication and collaboration among students and faculty members on smart devices, collaboration with international universities, and greater focus in students' needs. This is consistent with the findings of Almahfud (2014) who observed that e-learning shifts the focus to the students rather than the teacher.

The scoping study findings further reveal that smartphone apps were widely used the learning process. The apps enable students to log in the system where they could view lesson materials as well as communicate with staff members. Smartphones were reported to be used in conducting research, doing assignments, and submitting assignments. Another theme identified in the scoping study was that of problems and difficulties identified with the use of mobile learning. These included lack of staff incompetence, technical challenges associated with the system such as disconnection with the virtual classes, and challenges in accessing the system.

Finally, the scoping study revealed that mobile learning apps are helpful in enabling students to access information on the educational platform. Students are able to conduct research online and access materials from the Saudi Digital Library as well as the digital repositories of international universities. This is consistent with the findings of Chung et al. (2015) who have reported the beneficial use of mobile learning in facilitating research.

4.10 The Main Study

The current study was guided by five major research questions namely:

- In the research context, what are faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?

- In the research context, what are faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purposes within the Blackboard educational environment?

- In the research context, what are students' attitudes toward the use of smartphone apps for educational purposes within the Blackboard educational environment?

- In the research context, what is the nature of the use of smartphone apps on the learning process and collegiate working within the case study University?

- In the research context, what are the main challenges that confront the students and faculty members in using smartphone apps for educational purposes, within the Blackboard educational environment?

The main study involved a case study of the Saudi Electronic University. According to Dasgupta (2015), a case study involves an empirical investigation of a specific phenomenon within the real life context while employing multiple sources of evidence. Case studies are conducted through intensive, detailed investigation of a single case or related cases. A detailed examination of the Saudi Electronic University was conducted to determine the realities of use of smartphone apps in higher education. The case study approach was considered beneficial in the current study as it allowed an in-depth examination of the topics of interest in real-life contexts.

The main study adopted a mixed methods approach for collecting questionnaire and interview data. Qualitative data was obtained through interviews conducted with faculty members at the Saudi Electronic University. Prior to conducting the interviews, approval by the Institutional Review Board (IRB) of the researcher's university was obtained. The permission of the administration of Saudi Electronic University was also sought prior to any research procedure. The consent of the faculty members who were interviewed in the study was obtained prior to the research process. This involved asking the faculty members to sign an informed consent form. The informed consent form explained the purpose of the study to the interviewees as well as their guarantee to privacy and confidentiality. The

interviews were conducted at the Saudi Electronic University where staff members were invited to participate in the research process following their consent to participation. Faculty members were asked open-ended questions on their perceptions of smartphone usage among students and staff members. The data collection procedure involved arranging for interviews with faculty members who were requested to participate in the interview procedures. Each interview lasted an average of 50 minutes to 60 minutes. During the interviews, the faculty members of the SEU were asked to explain their opinions regarding the use of smartphone apps in learning. The interviews were conducted using an interview guide, which contained a list of open-ended questions that were directed to the interviewees. Each interview was tape-recorded and later transcribed into text ready for data analysis. The data collected from interview data was analyzed following a thematic analysis procedure. Thematic analysis was employed in identifying the repetitive themes and ideas from the interview transcripts.

In the quantitative research, a survey was conducted with a sample of Saudi students. Questionnaires were used to collect the views of the students from the SEU on the use of smartphone apps in learning. The questionnaire was used to collect the demographic data of the students including their age, gender, and class standing as well as the smartphone brand and mobile operator. The questionnaire also recorded the smartphone usage behaviors as well as the potential challenges that students face in the use of smartphone apps. In total, 324 students participated in the survey. The questionnaire data was subjected to statistical analysis in order to determine the patterns of smartphone apps usage in the case study university. The quantitative data collected in the present study included the results of questionnaires sent to students. A sample of 324 SEU students was obtained and the participants asked to fill in a questionnaire that sought to determine the usage of smartphone apps among the students. The respondents were also required to fill in a consent form, which also provided details on the nature of the research project. After filling the questionnaires, the students returned them to the researcher for statistical analysis.

Data analysis for interview data collected from interviewing SEU faculty members involved the use of a thematic analysis approach. The procedure for analysis of the data involved reading the interview transcripts multiple times. This was done while making reference to the findings of the scoping study and subsequently

identifying the recurring themes. The recurring themes were described using evidence from the interview transcripts. On the other hand, the analysis of survey data involved the use of statistical methods. The survey responses were coded and subsequently exported to Statistical Package for Social Sciences (SPSS) software. Descriptive statistics were computed to describe the characteristics of the respondents and summarized in forms of frequencies, percentages, and graphs. Where appropriate, inferential statistical analysis was conducted in order to determine the statistical differences between the participants' smartphone usage behaviors in terms of age, gender, and class characterization. Non-parametric tests involving chi-square tests were conducted to determine the significance of statistical difference between sample and population variances.

4.11 Research Populations and Sampling

Creswell (2013) defines a population as a group of individuals who share similar identifiable characteristics that a researcher can study. The present study examined the population of students and faculty members at the Saudi Electronic University. For the quantitative survey, the population comprised of the entire student population at the university. The university has a total student population of 12,793 students. In 2017, the university enrolled a total 13,793 students with 93% of them being undergraduate students and the rest pursuing graduate studies. The students study in four colleges and include both undergraduate and graduate students. The student population is predominantly male with 64% of those enrolled in 2017 being male while 36% were female. On the other hand, the population of faculty members comprises of all staff members involved in academic work at the SEU.

From the target population, an appropriate sample was selected, which was used to collect data that was used in answering the research questions. For the student population a sample of 324 students was collected and survey questionnaires administered to the respondents. The sample was considered large enough to allow the generalizability of the findings. According to Creswell (2012), a sample comprise of a subset of the target population whose findings are generalizable to the entire target population. In quantitative research studies, sampling should allow the generalizability of the results. A large sample size helps to minimize sampling error, which is the difference between the estimates from a sample and

those of the true population (Creswell, 2012). Based on the review of previous sampling sizes of similar research studies, the researcher determined that a sample of 324 students was large enough to facilitate the generalization of the findings. However, a smaller sample size was employed for the qualitative research component. In qualitative research studies, there is no requirement for generalizability of the results. Instead, the aim is to enable the researcher to derive an in-depth understanding of the phenomenon under investigation. In the present study, 13 participants were recruited and in-depth interviews conducted with them. The sample size of 13 was considered large enough to allow diversity of opinions to emerge from the interviews. In qualitative interviews, there is a tendency to reach information saturation with increase in the number of participants and this may be avoided by ensuring that sample sizes are not too big.

The sample of students studied in the quantitative survey was obtained through random sampling. Choosing a random sample ensured that the final sample was not only representative but also with minimal standard error. In the present study, students were randomly selected using the simple random sampling method and recruited into the study. The random sampling procedure was facilitated by the university administration. The final sample contained students who varied in terms of gender, age, level of study, and field of study.

Sampling for participants in the qualitative interview was done through purposive sampling. In qualitative studies, a sample does not need to be obtained through random sampling since there is no requirement for generalization of results. Instead, the sample is most desirable if it facilitates the generation of rich data. In the present study, the 13 participants who participated in interviews were selected purposively by examining their position, experience, and knowledge. Purposive sampling is a form of non-probabilistic sampling where a researcher selects participants to a study according to the desired characteristics possessed by the participants (Creswell, 2012). In the present study, maximum variation was achieved by ensuring that the participants had diverse characteristics including ages, specializations, and gender. Respondents were selected based on their appropriateness in providing rich information on e-learning and mobile learning at the SEU. The participants included deans and faculty members of various colleges at the SEU.

4.12 Mixed Methods

In this study, a mixed methods approach was adopted to investigate the usage of smartphone apps among students of the Saudi Electronic University. Mixed methods research refers to a type of research where a researcher combines the elements of both qualitative and quantitative research approaches by employing the viewpoints, data collection, and data analysis techniques of both approaches with a view of expanding the breadth, corroboration, and depth of understanding (Johnson et al., 2007). Researchers employ mixed methods research for several reasons. One of the major reasons for adoption of mixed methods is to achieve triangulation, where different methods are employed to study the same phenomenon with a view of achieving corroboration and convergence. Mixed methods are also employed to achieve complementarity, where the findings of one method are enhanced or clarified from the results of another method (McKim, 2017). Mixed methods may also be used with a view of facilitating the researcher to identify contradictions and paradoxes existing within a research subject (Johnson et al., 2007). In the present study, mixed methods research was employed with the goal of achieving complementarity and corroboration. The researcher sought to obtain data from interviews with faculty members to enhance the understanding of usage of smartphone apps as obtained from a survey of students.

The quantitative research aspect of the present study involved a survey of 324 SEU students who were asked to fill in a questionnaire. The data collected from the questionnaire comprised of quantitative data that was subjected to statistical analysis. The large sample size ensured that the findings could be generalized to the Saudi Electronic University. Students were asked to give their opinions on the use of smartphone apps in learning. The survey responses were coded and entered into the SPSS program for subsequent data analysis. The quantitative research component helped to determine the extent of smartphone apps usage among the students at the SEU as well as the challenges facing them in mobile learning.

The qualitative aspect of the research involved an interview of 13 participants who included deans and faculty members of the Saudi Electronic University. The interviews were conducted using open questions that sought to determine the opinions of the participants on the usage of smartphone apps at the SEU. The in-

depth interviews were useful in developing an understanding of smartphone usage and challenges of smartphone learning from the perspective of faculty members. The interview data was coded and analyzed using a thematic analysis approach. The information obtained from the interviews helped to complement and corroborate the survey findings.

4.13 Data Collection Instruments

Data collected in this study comprised of survey data and interview data and therefore two different data collection instruments were employed. A questionnaire instrument was employed in collecting survey data from a sample of 324 SEU students. The questionnaire instrument contained closed-ended questions that followed a Likert-scale measurement format as well as open-ended questions that sought to determine the respondents' opinions on the challenges of smartphone usage. The interview was conducted with the help of an interview guide instrument. The interview guide contained several pre-set open-ended questions that were directed to the participants during the interviews. The questionnaire and interview guide are further discussed in details in the following sections.

4.14 The Questionnaire

Quantitative data collected from the survey of Saudi students involved the use of self-administered questionnaire. Johnson and Christensen (2014) define a questionnaire as a self-report data collection instrument in which participants fill out during a research process. In a questionnaire, respondents select answers to questions set out by the researcher. Most frequently, respondents are also asked to provide certain demographic information prior to returning of the questionnaires (Creswell, 2012). Questionnaires are powerful data collection instruments that may be used to obtain information about individuals' feelings, beliefs, attitudes, values, opinions, and perspectives (Johnson and Christensen, 2014). Creswell (2012) recommends that a questionnaire should have a cover letter, which provides participants with background information about the study, the research objectives, and a guarantee of privacy and confidentiality. In addition, the questionnaire should have both close-ended and open-ended questions. Closed-ended questions seek to obtain information using a checklist or

agreement scale while open-ended questions ask respondents to give their opinions on certain issues. A questionnaire should also have some closing remarks where participants are thanked for participating in the survey (Creswell, 2012).

In the present study, quantitative data was collected through a questionnaire. The questionnaire was developed through a synthesis of findings of the literature review and the scoping study. The questionnaire was designed to answer the following two research questions:

- In the research context, what are students' attitudes toward the use of smartphone apps for educational purposes?

- In the research context, what are the main challenges that confront the students and faculty members in use of smartphone apps for educational purposes?

The questionnaire used in this study contained three broad segments. The first segment focused on collecting the participants' demographic information. The respondents were asked to indicate their ages, gender, class standing, mobile operator, and brand of smartphone they used. However, personal information regarding the names and addresses of the respondents was collected in line with the ethical principles of confidentiality and privacy. The second segment of the questionnaire focused on collecting information of the attitudes of the students toward the use of smartphone apps for educational purposes. The participants were provided with statements that sought to measure their attitudes of smartphone usage and asked to indicate their level of agreement with these statements using a Likert scale measurement. The segment measured whether students used smartphones to check their emails, browse the internet for information, communicate with classmates and instructors, access class lectures, pursue learning outside the classroom, participate in students' group discussions, and access course materials. Other questions sought to determine whether smartphone apps enhanced flexibility, created a better learning environment, enabled access learning management system, and facilitated the use of smartphone apps in submitting assignments. Other issues examined in the second segment of the questionnaire included the usage of smartphone apps for scientific purposes and information sharing as well as whether the university provided

formal training on how to use smartphone apps. The final segment of the questionnaire contained two open-ended questions, which sought to give the students an opportunity to identify any challenges that they faced while using smartphone apps for educational purposes. The section also gave the students an opportunity to identify any benefits they derived from the use of smartphone apps for education purposes.

4.15 The Interview

The present study involved the collection of qualitative data through interviews with 13 faculty members and deans from Saudi Electronic University. The interview procedure involves the posing of purposeful, open-ended questions to a participant or group of participants within a particular context for purposes of obtaining the feelings, experiences, and opinions of the respondents in order to enhance the understanding of a topic under study (Glesne, 2011). Interviews are useful because they provide data that may be difficult to collect using other research methods. In the present study, interviews were conducted with the aim of collecting data that would be used to answer the following three research questions:

- In the research context, what are the faculty members' perceptions of using smartphone apps for educational purposes?

- In the research context, to what extent are students using smartphone apps for educational purpose from the faculty members' perceptions?

- In the research context, what are the main challenges that confront the students and faculty members in use of smartphone apps for educational purposes?

The following table (4.1) shows briefly how the interview questions linked to the research questions.

Table 4:1 Linkage between research questions and the interview questions

Operational Research Questions	Interviews Questions

1. In the case study context, what are the faculty members' perceptions toward using smartphone apps for educational purposes?	1. Do your Smartphone apps help you to access the learning management system in your university? Please give examples? 2. Do you use your Smartphone to read your university news, communication with colleagues, administration and etc.? Please give examples? 3. Does your Smartphone help you improve your professional skills in teaching, communication with students and work activities? Please give examples? 4. Do you use your Smartphone apps for collaboration with students in and out of the class, and for receiving assignments? Please give examples? 5. How do you develop your own professional skills through the use of smartphones? Please give examples? 6. What do you think about your university's responsibilities regarding the integration of smartphone apps? Do you suggest any incentives? Can you explain them? 7. De you think should be the university must provide smartphones to faculty members' and students? Please give examples?
2. In the case study context, to what extent students are using smartphone apps for educational purpose from the faculty members' perceptions?	8. Do you have any concerns about using smartphones in your courses? In regard to the knowledge delivery to your students in your classroom? Please give examples? 9. Do you think the Students using smartphone apps learn promotes learning for finding sufficient academic or research information? Please give examples for particular apps? 10. Can you talk about the role of smartphones on learning and pedagogy, if any? Please give examples? 11. Do you think that smartphone apps can be major learning tool in education? Please give examples?
3. In the research context, what are the main challenges that confront the students and faculty members in use of app for educational purposes	12. Are there any challenges that you confront using Smartphone apps for education purposes? Please give examples? 13. Could you highlight any advantages of using Smartphone apps for education purposes? Please give examples?

The present study involved conducting semi-structured interviews with faculty members of the Saudi Electronic University. Semi-structured interviews involve the use of open-ended questions that are already prepared in advance while at the same time allowing the researcher to ask follow-up questions in order to gain clarification and details when needed (Savin-Baden and Major, 2012). Therefore, semi-structured interviews combine the features of flexibility with control. In the

present study, the researcher chose semi-structured interviewing with purposive sampling because it offered an opportunity to expand the depth of information obtained in the study. The interview was guided by pre-set questions contained in an interview guide. However, the researcher was flexible enough to allow the exploration of emerging issues in the interview. Each of the 13 interviews lasted for a period of between 50 minutes and 60 minutes. The researcher conducted one-on-one interviews with the participants whose demographic characteristics differed in terms of gender, ages, and areas of specialization. The interview protocol consisted of a cover letter explaining the nature and purpose of the study as well as a series of questions that sought to determine the usage of smartphone apps for educational purposes. The participants were also asked to give their opinions on their perceived challenges of using smartphone apps for educational purposes. All interviews were conducted within the precincts of the Saudi Electronic University. The interview procedure involved first making some welcome comments in which the researcher thanked the participants for their participation in the study. After making the appreciation remarks, the researcher highlighted the objectives and significance of the research and the ethical considerations including their right to withdrawal from the research process. The next phase involved conducting the interviews, which were tape-recorded and stored safely by the researcher.

4.16 Qualitative Data Analysis

The aim of data analysis is to organize data into a manageable form in order to facilitate ease of understanding, interpreting, and discovering relationships, patterns, and themes present in the data (Savin-Baden & Major, 2012). In the present study, the thematic analysis approach was used to analyze interview data. Thematic analysis is a systematic procedure for identifying, reviewing, and naming themes from textual data. This technique focuses on searching through interview data in order to identify patterns and themes. In the current study, the researcher read the coded interview data with the aim of exploring and identifying the themes and relationships between them. Subsequently, the identified themes were reviewed and described.

The thematic analysis procedure adopted in the present study followed that stipulated by Braun and Clarke (2006). The first procedure involved the researcher

familiarization and organization of the data. In this stage, the researcher read the interview transcripts while searching for patterns and meanings. Since the interviews were conducted in Arabic, they were first translated into English prior to familiarization. The second step involved generation of initial codes where the researcher generated an initial list of ideas that emerged from the familiarization process and assigning each idea a code. The third step involved searching for themes. In this phase of the data analysis process, the researcher used the coded data to identify possible themes, which were defined as patterns or similarities among codes. The fourth step involved the process of reviewing the themes where the researcher refined the themes while eliminating irrelevant and redundant ones. The fifth step involved defining and naming the themes. At this phase, the themes were adequately described based on evidence from interview data. The final stage is the writing of the report where all the themes are summarized.

The following table (4.2) shows briefly example of how did the coding system for the thematic analysis framework.

Table 4:2 Example of coding process

Question	Response	Codes
What are the faculty members' perceptions of using smartphone apps for educational purposes?	''The University provides an application [Blackboard] through which all faculty members and students can log in to use it for educational purposes. apps in smartphones tremendously assist us in accessing the University system. " (Interview; Respondent: F4; Male). ''The University provides the Blackboard app and it has become the communicating tool between staff members and students in the University. Staff members can deliver virtual classes, send off tasks and homework, and respond to students' questions through this application''. (Interview; Respondent: M1; Male).	Chance Necessity
What are the main challenges that confront the students and faculty members in use of smartphone apps for educational purposes?	''There are problems with communication and weak network, and technical problems in the website. Staff and students also face problems in communicating with the application, especially in the search process''. (Interview; Respondent: M3; Male). ''Some staff members lack knowledge in using smartphone applications. Some faculty members have no desire to communicate with students through these apps''. (Interview; Respondent: M3; Female).	Slow Knowledge

4.17 Quantitative Data Analysis

The analysis of quantitative data focused on the use of statistical methods to organize data for better understanding and interpretation. The Statistical Package for Social Sciences (SPSS) was utilized in conducting an analysis of the survey data. Descriptive statistics such as means, frequencies, and standard deviations were calculated and used to indicate how the students responded to the 15 statements that measured their perceptions of smartphone apps usage. Descriptive statistics were also used to show the demographic features of the respondents. According to Johnson and Christensen (2014), descriptive statistics are useful in helping to summarize the features of a sample as well as describing and explaining the outcomes of a research study.

In addition to descriptive statistics, inferential statistics were calculated to test for significant differences between the survey responses and the demographic characteristics of the respondents. The present study adopted a non-parametric

test approach in estimating the statistical difference between the survey responses. Non-parametric tests do not make any assumptions about the distributions of the data to be tested. A single sample chi-square test was used to test whether the statements had any statistically significant difference with one another. In addition, Mean Rank was employed in describing the direction of the difference between statistics. The findings of the inferential statistics helped to determine whether a statistical difference existed in the usage of smartphone apps among students of different ages, gender, users of different smartphone brands, and users of different mobile operator services. Moreover, the statistical tests helped to determine whether significant differences existed between the responses to different statements.

4.18 Validity and Reliability

The quality of a research project is influenced by the measures of validity and reliability. Validity assesses whether the research instruments measure what they are supposed to measure. In the present study, validity was achieved by ensuring that the questions in the questionnaire were derived from literature and therefore previously validated. The development of the survey instrument and interview protocol was done with guidance from the findings of a comprehensive literature review. This helped to identify the suitable methods of investigating the research problem as well as the appropriate questionnaire items and interview questions. In addition, this study involved a scoping survey in which a group of four students, two deans, and two faculty members were interviewed. The scoping study helped to determine whether any flaws existed in the data collection instruments.

Reliability is concerned with ensuring that the research process and procedures have consistency such that repeated measurements produce similar results. Measuring instruments are considered reliable if they give stable and consistent results (Creswell, 2012). In order to test the reliability of the questionnaire, Cronbach's alpha was determined. The instrument was shown to have a high internal consistency score of above 0.70.

4.19 Research Ethics

The present study involved the active participation of human subjects and therefore several considerations were made for ethical issues. According to Creswell (2012), researchers have a duty to ensure that all ethical issues are addressed in order to provide a guarantee that data collection procedures will not cause harm to the participants. Consequently, the researcher in the current study followed the general ethical principles of conducting research. First, the researcher obtained the ethical approval to conduct the research from the parent university where the researcher was registered as a student. Approval was also sought from the management of the case study institution, the Saudi Electronic University. Furthermore, all the respondents were asked to assign informed consent forms. The forms provided details of the research project, the objectives and research questions, research procedures, and the responsibilities and rights of the participants. This ensured that participants to the study were fully informed prior to agreeing to participate in the study.

Another ethical consideration made in the present study focused on the privacy and confidentiality of the respondents. The researcher made several efforts aimed at ensuring that the participants' privacy and confidentiality were protected. These efforts included observing anonymity during the data collection process, safe storage of raw data, and a commitment to destroy raw data upon completion of the study. The anonymity of the respondents was achieved by using pseudonyms and numbers to refer to the participants in the study reports as well as ensuring that personal information of the respondents was mot collected. Raw data containing the study questionnaires and tape-recorded interviews were stored in a safe location under lock.

Finally, the researcher observed ethical practices of good academic authorship and conduct. This was achieved by ensuring that written content in published reports was plagiarism-free to the extent known by the researcher. External sources of materials and references were adequately cited. The researcher also ensured that personal opinions and attitudes did not influence the outcomes and interpretations of the findings.

4.20 Conclusion

The aim of this study was to explore the realities of smartphone apps usage for educational purposes among Saudi students. The study also explored the perceptions of faculty members on the usage of smartphone apps as well as the challenges faced by students in the use of smartphones in learning. A mixed methods approach was suitable in exploring this problem because it allowed the collection of quantitative data through a survey of Saudi students as well as the use of interviews to gain an in-depth understanding of the topic through interviews with faculty members. The main study was preceded by a scoping study, which involved a scoping study and a review of literature in order to delineate the major concepts and themes. The main study involved a survey of 324 students drawn from the case study university (the Saudi Electronic University) as well as interviews with 13 faculty members. Mixing the two research approaches helped to achieve triangulation as well as enhancing the depth of understanding of the key issues and concepts. The adopted methodology had high validity and reliability and therefore generated credible research findings.

Chapter 5 Qualitative Data Analysis

5.1 Introduction

The aim of this chapter is to present the analysis of the qualitative data, gathered during the fieldwork portion of the study and the multiple qualitative methods used to conduct the data collection (interviews and open-ended questions). Throughout, an allocated identity title for every respondent (Interview; Respondent: M2; F9; Male; etc.) was maintained, in order to map out the spread of responses and accurately represent of the views of different participants. In this manner, the case study attempted to answer the following questions:

1. In the research context, what are the faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?

2. In the research context, what are faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purposes within the Blackboard educational environment?

3. In the research context, what are the main challenges that confront the students and faculty members in the use of smartphone apps for educational purposes, within the Blackboard educational environment?

5.2 Stages of Analysis

The analysis of the qualitative data was undertaken using 'thematic analysis', a type of qualitative analysis used to categorise participants' comments using a mix of a prior and in vivo codes to identify key themes pertinent to the research questions. As an iterative process, it also allows salient themes to emerge that might have been unanticipated by the original research questions. This form of analysis illustrates the data in great detail and deals with diverse subjects via interpretations. Also, thematic analysis is an appropriate approach for any study using interpretations of respondents' responses. It provides a systematic approach to data analysis, allowing the researcher to associate an analysis of the frequency and relationship of one theme with the whole content of qualitative material

(Marks and Yardley 2004). Namey *et al.* (2008) described thematic analysis as moving beyond counting explicit words or phrases and focusing instead on identifying and describing both implicit and explicit ideas. Codes developed to represent specific ideas or themes are then applied or linked to raw data as summary markers for later analysis, which may include comparing the relative frequencies or emphases of themes or topics within a data set, identifying code co-occurrence, or graphically displaying code relationships. Braun and Clarke (2006) explained that "a theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set," (p. 82). The main phases in the analysis of qualitative data in this case are as follows:

Figure 5:1 Phases of qualitative data analysis

These stages can be described as follows (Braun and Clarke, 2006):

1- Familiarising and organisation: The researcher listened to phonetic data and read the data in an active way – searching for meanings, patterns in the audio and written data to immerse themselves in the data to the extent that they are familiar with the depth and breadth of the content. All verbal and written data collected was in Arabic, transcribed in Arabic and then translated into English by the researcher. During this phase, the researcher started taking notes and marking down ideas for coding to be applied in subsequent phases. The raw data was divided into responses to questions for each data collection method. Tables were

used to organise the answers to each question based on type of participant group, which allowed for later data comparison.

2- Generating initial codes: Phase 2 began when the researcher had familiarised themselves with the data, and generated an initial list of ideas about what the data contains and how these characteristics relate to the research questions. Each characteristic was assigned a code and relevant, illustrative quotes were extracted from the data.

3- Searching for themes: This phase emphasises themes, rather than codes; it marks the end of the division of the various codes into possible themes (Braun and Clarke, 2006). In this stage, the researcher developed the list of categories that emerged from the coded data and started to search for themes.

4- Reviewing themes: Candidate themes were developed in phase 4, and refined to generate a 'thematic map' of the analysis.

5- Defining and naming themes: At this point, analysis to refine the specifics of each theme was ongoing, along with the overall story the theme. Clear definitions and names for each theme were generated.

6- Producing the report: Phase 6 involved the final analysis and write-up of the report through setting out a summary of all the issues related to each theme, including data extracts.

5.3 Interview Analysis

This section presents the analysis of data gathered through semi-structured interviews conducted with (13) participants. The focus of the interviews was an exploration into faculty members' and deans' perceptions, beliefs and experiences relating to the research questions set out in Section 5.1.

It was hoped that the participants, in this case faculty members, would provide their perspectives regarding the reality of using smartphone apps in the learning environment. To explore these views and experiences, six a priori themes reflecting aspects of the research questions were identified, providing an initial

framework for further analysis. Sub-themes identified during the literature review and set out in the interview framework were then explored within this context (see appendix 2.A, B).

Table 5:1 Major themes and Subthemes for data analysis

Major themes	Sub-themes
1. Integration of smartphone apps in education	1.1 Smartphone apps provide opportunities to learn more effectively 1.2 Using smartphone apps is necessary to get the most from learning 1.3 Special University centred app is / should be provided
2. Improving professional skills of faculty members through smartphone apps	2.1 Smartphone apps assist in improving professional skills through access to professional learning opportunities and training 2.2 Smartphone apps assist improving professional skills online 2.3 Smartphone apps assist improving professional skills through specialised groups
3. Communication through smartphone apps	3.1 Smartphone apps facilitated communication between faculty members 3.2 Communication between faculty members and students 3.2.1 Smartphone apps help expedite communication with students 3.2.2 Use of smartphone apps promotes access to knowledge inside classrooms 3.2.3 Use of smartphone apps promotes access to knowledge outside classrooms

Major themes	Sub-themes
4. Smartphone apps can encourage exploration and research in the education process	4.1 Smartphone apps facilitates research by improving searching techniques and information retrieval, via apps 4.2 Smartphone apps are important support tools for spontaneous learning and vital knowledge updates 4.2.1 Smartphone apps can be vital tools for generating new knowledge and emerging research developments 4.2.2 Smartphone apps are a secondary tool in learning
5. Challenges facing the use of smartphone apps in learning	Slow internet connection 5.2 Lack of knowledge regarding using smartphone apps 5.3 Incompatibility of information and educational technology systems with students' devices 5.4 Lack of some faculty member interest in appearing in virtual class 5.5 Mistimed communication 5.6 Absence of incentives to use technology 5.7 Smartphone apps distract students in the classroom
6. Advantages	6.1 Easy to use smartphone apps 6.1.1 Easy to access information 6.1.2 Easy to go back to materials 6.2 Smartphone apps are very quick 6.2.1 Very quick for getting information 6.2.2 Very quick for communicating 6.3 Widening the range of knowledge 6.4 The existence of virtual classrooms 6.5 Time management 6.6 Smartphone apps provide specialised educational groups

5.3.1 Integration of smartphones apps in education

Incorporating smartphone applications in learning can provide the opportunity for faculty members and students to develop and innovate in education. Although the

use of smartphone applications in education is a relatively new field of academic study, the technology is everywhere and constantly evolving. The current generation of students in the developed and most developing countries are surrounded by technological tools, such as computers, personal digital assistants (PDAs), handheld mobiles, smartphones and wireless networks (Purcell, 2012).

According to El-Hussein and Cronje (2010), “The advent of the technology has created new signs, new ways of writing and receiving information” (p. 15). What is more, Hoppe (2001) points out that technology yields innovative conditions for learning and can also introduce new ways of learning.

5.3.1.1 Smartphone apps provide opportunities to learn more effectively

The majority of faculty members said the University provides applications and works towards introducing smart apps in all areas. The university uses the Blackboard application as its primary e-learning system, through which all staff members and students communicate, submit assignments, access resources and course information etc. The university system can be accessed to understand relevant issues and to communicate with colleagues. Also, they can access the university system through other smart apps or any other social media, for example, WhatsApp or Twitter. . Informing applications ("social informing" or "visit applications") are applications and stages that empower texting. Numerous such applications have formed into wide stages, including empowering announcements, chat box and learning. They are typically brought together systems run by the servers of the stage's administrators, not normal for distributed conventions like XMPP.

A few instances of well-known informing applications incorporate WhatsApp, Facebook Messenger, China's WeChat and QQ Messenger, Telegram, Viber, Line, and Snapchat. Certain applications have accentuation on specific uses —, for instance, Skype centres around video calls, Slack spotlights on informing and record sharing for workgroups, and Snapchat centres around picture messages. Some long-range informal communication

administrations offer informing administrations as a segment of their general stage, for example, Facebook Messenger, while others have an immediate informing capacity as an extra assistant segment of their interpersonal interaction stages, like Instagram, Reddit, Tumblr and Twitter, either straightforwardly or through visit rooms. The most regularly utilized cell phone applications incorporate WhatsApp, Twitter, and Facebook (ChatApps,2020).

For instance, one respondent stated, “The university provides an application {Blackboard} through which all staff members and students can log in and use for educational purposes. Applications in smartphones tremendously assist us in accessing the university system. Undoubtedly, the use of smart apps is much better than the use of computers because we can communicate quickly with colleagues and students by emails. Also, we have private educational groups used by the department staff and educational groups between faculty members and students. We can reply to enquiries by using the same app.” (Interview; Respondent: F4; Male).

However, there those who had a different view: “This application {Blackboard} is not compatible with all programmes. Therefore, we have to resort to computers to use those programmes. There is no application that belongs to university.” (Interview; Respondent: F7; Female). Moreover, one respondent commented on these applications thus: “In fact, neither achieve the university’s vision nor meet its needs. The university works on having its own applications built under the supervision of the Administrative Unit, which takes into account the suitability of the needs of the faculty, students and administrative staff by following technological developments. This will allow the university to meet educational goals through the use of the most up-to-date educational applications.” (Interview; Respondent: F8; Male).

On the other hand, one respondent stated: “The university is solely responsible for the provision of these applications such as Blackboard as it depends a lot on modern technologies in education. It has to provide all educational applications to students and facilitate all means of communications between the university and students. There are some points where discussions are still ongoing with the

university's administration in order for it to provide other opportunities and services. It has become part of our daily job at the university and we depend heavily on these applications in our administrative and educational work." (Interview; Respondent: M3; Male).

5.3.1.2 Using smartphone apps is necessary to get the most from learning

The majority of faculty members said that it is necessary to use smartphone apps in their university work as they can be effective in getting accurate results when integrated with the university systems and they offer great support to educational interaction with students. They suggest that the use of smart applications provide useful services to education.

The main reason for using smartphone apps within the university is attributed to the university's unique system, which distinguishes it from other universities. The system is designed to accommodate distinct phases of learning: attending face-to-face and online classes. Students can also follow lectures from anywhere as the University offers appropriate devices for this and all the University systems support mobile smart devices. This was confirmed by one respondent: "It is a necessity to use smart devices in work as they can be effective in getting accurate results when integrated with the University systems and they offer huge support to the educational process and these applications became helpful to reach an effective education system in the University. In my opinion and experience, this can be 100% true!" (Interview; Respondent: F1; Male).

The University uses the e-learning platform Blackboard, which functions on mobile devices, to achieve flexibility and most importantly to achieve education targets wherever a student or faculty member is, whether they are at home, at work, in the office, or on campus, attending lectures, taking part in activities, or finishing assignments and this application is specifically designed for learning.

One respondent commented "The university works on supporting smart apps and smart devices in general. All staff members and students use smart apps via smart devices. The university provides the Blackboard application and it has become the key [e-learning and] communication tool between staff members and students in the university. Staff members can deliver virtual classes, send off tasks and

homework, and respond to students' questions through this application. The university has imposed a system for staff members to respond to students' questions within 48 hours and in case of urgent questions, they get answers within 24 hours. We have a special application used by deans, undersecretaries, and advisers so that they can communicate effectively to complete procedures and make decisions." (Interview; Respondent: M1; Male).

5.3.1.3 Special University centred application is / should be provided

The majority of faculty members suggest that the university should provide a special bespoke application to support the educational process, ideally fully operated by the university and its systems, covering all educational needs. In addition, they think the university should provide smartphones to faculty members and students, technical and maintenance support to these smart devices and coordinate with companies to offer the best of each to its staff and students. This will, they believe, enhance the educational process and will increase productivity and efficacy.

The faculty members use commercial applications such as WhatsApp, Twitter etc. One respondent believed that these commercial applications don't achieve the university's vision. *"These applications, in fact, neither achieve the university's vision nor meet its needs. The university works on having its own applications built under the supervision of the Administrative Unit, which takes into account the suitability of technology to address the needs of the university by following technological developments. This will allow the university to meet the educational goals through the use of the most up-to-date educational applications."* (Interview; Respondent: F8; Male).

5.3.2 Improving professional skills of faculty members through smartphone apps

The majority of faculty members see smartphone apps as having the potential to improve and develop their professional skills, as well as developing other skills related to teaching through engagement with virtual classrooms, online research and educational groups. They consider the majority of smartphone apps to work quickly and have easy-to-use formats.

5.3.2.1 Smartphone apps assist in improving professional skills through access to professional learning opportunities and training

The use of Blackboard, provided by the university, was reported to enhance and improve the professional skills of the faculty members, as well as engagement with other applications on smartphones, such as Twitter, WhatsApp, etc., and using smart devices that offer easy access to specialised websites. For example, they have access to the Saudi Digital Library and they can attend online training courses using these applications. In addition, they can participate in department discussions and chats with colleagues through groups using smart devices such as WhatsApp, etc. This, as shown in section **5.3.2.2**, helps staff members to improve their communication skills. Faculty members can join specialised groups to find and discuss information with their peers through these applications, which can be accessed through smart devices.

For instance, one respondent stated that: "The smartphone apps contributes to developing our skills through attending training workshops that the university organises each term, or attending some of these courses on the internet, as well as participating in some online conferences." (Interview; Respondent: F9; Female).

This sentiment was confirmed by another respondent, who said: "There are many applications and programmes that help faculty members to develop their professional skills. These applications and electronic websites can be very useful and one can make the most of them to increase their professional skills. I have been to Japan and noticed that they rely on these smart devices more than on computers in scientific research." (Interview; Respondent: F5; Female). In addition, one of faculty members confirmed: These applications greatly assist us in our job, through use of search engines and other applications which enable staff members to easily find information, as well as reading and researching in specialised journals to keep up-to-date in their field." (Interview; Respondent: F4; Male).

5.3.2.2 Smartphone apps assist improving professional skills online

The majority of faculty members said smartphone applications help them to improve professional skills through online training courses on finding information

and comprehending and acquiring many skills, such as promoting professional skills on how to manage virtual classes, participate in online conferences, and so on.

This was confirmed by one respondent: “The smartphone apps {Blackboard} facilitate communication between both faculty members and students. The faculty members also get training on how to manage virtual classes, and attending and participating in online conferences.” (Interview; Respondent: M3; Male). In addition, a number of respondents believe that “We have access to the Saudi Digital Library and we can attend online training courses using these applications. In addition, we can participate in departmental discussions and chats with colleagues through using smart devices such as WhatsApp, etc. This, of course, makes faculty members improve their communication skills.” (Interview; Respondent: F3; Female).

Another added that: “Faculty members can develop their professional skills using the training packages that the university provides on its website. Faculty members can virtually attend these training sessions, which include communications skills, delivery and presentation skills, test construction skills, etc. The university also provides an Arabic language programme to those who are not Arabic native.” (Interview; Respondent: M2; Male).

Furthermore, another respondent said: “The smartphone apps greatly support the improvement and development of professional skills among faculty members. Smartphone applications greatly support the professional skills of faculty members through electronic links the university provides on its website. For example, the university has a link to the Saudi Digital Library, which provides many online skill-improving programmes and training sessions. So, many staff members can attend these by using smart devices.” (Interview; Respondent: M1; Male).

5.3.2.3 Smartphone apps assist improving professional skills through specialised groups

Smartphone apps are reported to help faculty members to improve and develop their professional skills through facilitating the joining of specialised groups and using the applications to search for particular information. One respondent stated that: *“The smartphone apps help faculty members to improve and develop their professional skills. For instance, searching for particular information is very easy*

through the use of these smart devices – a staff member can easily reach a piece of information he/she seeks. Besides this, staff members can join specialised groups to find and discuss information with their peers through these applications, which can be accessed through smart devices." (Interview; Respondent: F8; Male).

However, some don't believe that smartphone apps help improve the professional skills of faculty members. "I don't think that smartphone devices help improve the professional skills of faculty members. However, they can help the staff attend and participate in online conferences and seminars." (Interview; Respondent: F7; Female).

5.3.3 Communication through smartphone apps

Smartphone app usage within educational settings is increasing around the world and across different levels of education (Clayton and Murphy, 2016). Technological integration varies from the simple use of email communications between students and faculty members to providing full courses in an online environment, utilizing various forms of applications.

Moreover, internationally, communication between faculty members and students has been moving towards the digital realm for the past decade (Bouhnik and Deshen, 2014), and with this increase of digital communication came an increase in research studies that investigate the possible benefits of utilizing digital communication channels, with different characteristics, between faculty members and students in educational settings (Calvo, Arbiol and Iglesias, 2014). Smith and Caruso (2010) discussed data that reveals how college students use social media both formally and informally to support their academic experiences.

The majority of faculty members said smartphone apps offer continuous communication between faculty members with other colleagues and students, though formal communication in the university is done through emails. Hence, smart apps can support this formal process. Smart apps are also used to communicate between faculty members with other colleagues and students, such as the formal application Blackboard, or informal applications such as WhatsApp, Twitter, etc. Also, some of the respondents confirm that using smartphone

applications improve educational processes through enabling the search for information and communication between faculty members and students, etc. As shown in section 5.3.4, this indicates that smartphone apps help to improve learning.

5.3.3.1 Smartphones apps facilitated communication between faculty members

The majority of faculty members and deans said smartphone apps offer continuous communication between faculty members with other colleagues through private groups, confirming that smartphone apps contribute greatly to communication and cooperation between faculty members. They also report that contacting staff members has become a smooth and fast process with the creation of special groups in these applications. This can be achieved through Blackboard or using other applications on smart devices, such as WhatsApp and Twitter, or using emails. Also, they can be used to organise the department's meetings and these applications facilitate communication between faculty members to discuss things or answer questions, at any time.

One faculty member reported: "Smart apps tremendously helped in providing a means of communication between staff members. We also communicate through social media programmes such as Twitter and WhatsApp. It helped communication between colleagues and between staff. The university provides the Blackboard application and it has become the communicating tool between staff members in the university. We have a special application used by deans, undersecretaries, and advisers so that they can communicate effectively to complete procedures and make decisions." (Interview; Respondent: M1; Male).

While another interviewee said, "The smart app has become the main means to communicate with other colleagues, whether in the same department on across the university. Many meetings are managed through smart apps. It also hugely contributed in expediting the process to communication with colleagues. Many faculty members are now members of groups in smart apps such as WhatsApp or Twitter." (Interview; Respondent: M3; Male).

5.3.3.2 Communication between faculty members and students

The majority of faculty members said smartphone apps greatly helped in providing means of communication between faculty members and students, allowing them to communicate with students promptly by using the Blackboard application or through social media programmes, such as Twitter or WhatsApp. Furthermore, all students' tasks and homework are submitted through Blackboard. The smart apps have become communication facilitators between faculty members and students. They are time-savers, as students can use smartphone apps to ask questions and chat with staff members and their peers, wherever they are, by creating work groups for these purposes. They can raise thematic questions and get instructors' feedback. Smartphone apps also made it easy for students to attend virtual classes from anywhere.

One of the respondents stated: "They are helpful in organising meetings with students or the department. For example, once we had a meeting with 400 students through the application. We have more than 12 tools to communicate with students at the university." (Interview; Respondent: M2; Male).

Some faculty members said smartphone applications created educational spaces among students through the use of app-based private educational groups, which improved the relationship between students and faculty members. One respondent commented: *"The smartphone apps increased communication between faculty members and students. They also changed the traditional roles of faculty members, who can now be reached at different times by smartphone apps."* (Interview; Respondent: M4; Female).

On the other hand, there are some who see informal apps like Twitter shifting traditional relationship boundaries between staff and students and can impair students' study skills. One respondent stated, *"I personally don't use them as they abolish the borders between staff members and students and open the doors for students to unofficially communicate with their instructors. This breaks the boundaries for dealing with the staff and indicates that students are not serious in their queries. I personally had an experience with the students in this regard on Twitter. I noticed students were not serious in their questions – they repeat them, they don't consult their previous notes where the question they asked had*

already been responded to. I cancelled this means of communication with students through public applications. I only communicate with them through the university's application or email." (Interview; Respondent: F7; Female).

5.3.3.2.1 Smartphone apps help expedite communication with students

The majority of faculty members see the smartphone application as having greatly contributed in expediting the process of communication with students. Not only this, communication between staff and students is now always through these applications and usually takes places between 8:00 a.m. and 10:00 p.m., extending possible hours of contact. Many students are now members of groups in smart applications such as WhatsApp or Twitter, and the like. They communicate in regard to course materials and many questions relating to the subject matter they are studying are raised in these groups.

One respondent commented: "The smartphone apps greatly contribute to communication and cooperation between staff and students. For example, contacting faculty members has become smoother and faster by creating special groups in these applications. We can do this through the university application {Blackboard} or other applications using smart devices, such as WhatsApp. They also facilitate cooperation and communication between staff members and students, and between students themselves. The university application is an example of this in that students can get quick replies to their enquiries. It is also useful for uploading assignments and giving instructions about them. Private groups have been created in some applications to facilitate communication between staff and students, so that they benefit from discussions and get quick replies to their questions. It is a place for exchanging expertise. The smart devices give the opportunity to students to contact their instructor at any time, from anywhere. These smart applications make it possible to deliver additional virtual lectures, when needed, for all students. For example, we have some virtual classes that all agreed to attend, and we did one at 11:00 p.m." (Interview; Respondent: F3; Female).

5.3.3.2.2 Use of smartphone apps promotes access to knowledge in inside classrooms

The majority of faculty members see using smartphone apps in the classroom as advantageous and beneficial to students. For example, using smartphone applications in classrooms, students can take good notes during the lesson using the smart device to make the academic side of much easier for learning, and they won't need paper notes for this; all notes are on the device. They can also use smart devices to find information related to the topic at hand during class.

One respondent stated, "Using smartphone apps inside the classrooms can be advantageous and beneficial to students, who can take notes during the lesson using the smartphone apps, and they won't need paper notes – all notes are on the device. I sometimes ask students to use smartphone apps to find a piece of information inside the classroom, then we initiate a dialogue about it. This is done when the class is delivered face-to-face. I organise chat sessions and have discussion activities inside the classroom using smartphone apps." (Interview; Respondent: F1; Male).

Another added, "I allow students to use smart devices in class to make use of modern technology in education. Students can read and follow the course materials from the application. They can also take notes using their smart device. I sometimes give students the chance to find information online using the devices so that we initiate a discussion." (Interview; Respondent: M3; Male). Also, one respondent stated: "Give students a chance to find answers using the smartphone apps and then initiate a discussion about it." (Interview; Respondent: F4; Male).

However, one respondent believed that using smartphone apps in the classrooms allows students to become distracted, but they can use Blackboard app outside of class for revising lecture material. *"I think there is no need for students to use smart devices in the classroom as they distract students and make them lose focus during the lecture. I personally don't allow students to use smart devices while lecturing inside classroom."* (Interview; Respondent: F8; Male).

5.3.3.2.3 Use of smartphone apps promotes access to knowledge outside classrooms

Some faculty members see using smartphone apps outside the classroom as advantageous and beneficial to students. One respondent stated: *"They offer a chance for students to view the lecture before the lecture. It is very quick in answering students' questions. All students attend the virtual classes through this application and I can see whether the student is attending the virtual class from a computer or smart device. These devices can be very quick for finding information. This, of course, aids students a lot in cooperating with each other and working together to find a piece of information."* (Interview; Respondent: M3; Male).

However, some faculty members said the use of some computer programmes are easier than using smartphone applications, that giving assignments to students is better done with computers and that computers are more secure. According to one respondent: *"Smart apps are helpful tools, but we cannot give up on computers when marking and giving assignments. I think the some computer programmes are easier to use and giving assignments to students is better done with computers. Computers offer programmes that smart devices don't offer. For example, we cannot give out the examination through a smart device. We still need more secure smart devices."* (Interview; Respondent: F2; Female).

5.3.4 Smartphone apps can encourage exploration and research in the education process

The majority of respondents see smartphone apps as noticeably enhancing the educational process, for example, when searching for a particular piece of information on the university website, the Saudi Digital Library, or other external applications, as well as following classes, easily and quickly communicating with staff and students and as a means to allow staff members to control them and use them to best serve the educational process.

Furthermore, smartphone apps such as Blackboard are reported as enhancing the educational process. For instance, students can log in to virtual classes and recorded classes, as well as discussing issues with faculty members. They can also enhance the search process within scientific papers, educational websites and

other materials, as they can be very quick to sort and reach information and facilitate the search process. They also offer many sources for the students to find the information they seek and allow them to follow all the classes at anytime, anywhere, as well as listening to the lectures more than once. It has noticeably widened the knowledge of the students, especially in finding information, to the point they can constructively criticise the course material.

5.3.4.1 Smartphones facilitate research by improving searching methods and information retrieval, via apps

Some of the respondents reported that smartphone apps enhance their learning, for instance, by providing effective search tools. Smartphone apps for education may come in various forms including commercial applications that have educational supports, content or value aspects or actual learning applications such as WhatsApp, Twitter, and Facebook. Apps linking to scholarly libraries support students in searching for a particular piece of information on the university's website, for example, in the Saudi Digital Library or other external catalogues.

In another open-ended response the interviewee stated, "The smartphone appls hugely support education by enabling students to find information easily. Schools and faculties depend largely on the availability of information to guide study activities. While computers were instrumental in enabling communications, smartphones are proving to be more agile and convenient. By creating online platforms and learning groups on social media, learners today find their smartphones to be important keyways to information pools and discussions and consultation. Apart from the social platforms, students can now access the applications formerly only available on computers such as internet search tools and access to online libraries through their smartphone app versions.

For instance, students can attend classes without carrying books or pens. They can attend by following the faculty member through viewing the course material using smart device, then taking notes electronically. Students can attend the virtual classes using smart devices. Education through smartphone apps is now an international trend." (Interview; Respondent: M1; Male).

Another respondent added, "From my long experience in the academic arena and in communicating with students, the footprint of the smart app is clear in moving

the education forward and smartphone apps enhance the educational process. Students have become cleverer in their approach to things they want to have knowledge on and can get any piece of information very quickly. The search function in smart apps, educational websites and digital libraries has made it extremely easy to get information. This has clearly enhanced the educational process. It has noticeably widened the knowledge of the students, especially in finding information, to the point they can constructively criticise the course material." (Interview; Respondent: F3; Female).

A further respondent commented, "Smartphone apps have greatly enhanced education. They made it possible for students to access the internet and search for the information they need. Students can also log in into the Saudi Digital Library and search different sources. Student can review course materials available on the university's website. Smartphone apps have become a necessity in the education process. For instance, at the university we partially depend on educational applications. We use them for communication between faculty members and students. We have online classes (virtual classes). We give assignments and term papers through these applications." (Interview; Respondent: M2; Male).

5.3.4.2 Smartphone apps are important support tools for spontaneous learning and vital knowledge updates

A number of respondents described smartphone apps such as Blackboard as important support tools in education, and discussed the significant role they play in facilitating and monitoring the educational process. There are those who see smartphone apps becoming the main tool in the teaching process. On the other hand, some respondents did not think that smartphone apps would be appropriate as the main tool in the education process for several reasons, but have a place as a useful secondary tool. This is indicated in sections and 5.3.4.2.2. One respondent commented: *"Smartphone apps make many things achievable, like saving and storing data, books and research, making them easy to access at any time. They are useful supporting tools to education and make it very easy to access information."* (Interview; Respondent: F7; Female). Nonetheless, smartphones still function as proxies for providing immediate resource for learning content and activities.

5.3.4.3 Smartphone apps can be vital tools for generating new knowledge and emerging research developments

One response said: “Smartphone apps such as Blackboard, WhatsApp and Twitter have become one of the main influential tools in education. The roles of faculty members have changed to support and facilitate communication with students and share reliable and beneficial materials with them. The expanding use of smartphones in school faculties suggest that the university moves from electronic education to smart education. It is time for smart education. We can learn from Hamdan Bin Mohammed Smart University’s experience.” (Interview; Respondent: M3; Male).

Another respondent also made it clear that: “Smartphone apps can be the main tool in the education process. The university has begun to depend on many apps in its education process. In fact, nowadays, there are universities which completely depend on virtual classes that utilise these smartphone apps.” (Interview; Respondent: F8; Male).

One informant added more detail, discussing the limitations to current applications such as Blackboard regarding their use across all subjects and suggesting that there needs to be a closer connection between apps and the course or subject material: *“Smartphone apps can be a significant tool in education, but this depends on the content of the subjects uploaded in the application. There is no suitable application at this time to be used as course materials. We need to develop applications that meet the educational needs of our students.”* (Interview; Respondent: F6; Female).

Faculty members can adjust many applications such as Snapchat to suit their purposes, such as those applications targeted towards the use of images, animation, etc. All these can be useful teaching tools, alongside other research applications. A majority of respondents reported using smartphones for a variety of activities all of which were vital to enhancing their learning skills and offered an immediate learning opportunity. The prevailing idea was that smartphones worked as an easy access, one-stop facility for retrieving important tools that supports learning.

In fact, apps such as WhatsApp, Twitter, Instagram and Facebook have a diverse set of functions including facilitating the education process as well as providing opportunities for monitoring and assessment. They can contribute to planning and efficient execution of teaching, providing feedback and dealing with submissions. Students and professors are able to gain an instant follow up of the programme plans and cues to the course objectives and emerging tasks. Such specialized applications such as Blackboard are playing an excellent role in the education process, especially by opening a door to expertise from other universities. The probable reason why educators and students are finding smartphones to be increasingly reliable has to do with their capacities as information devices. With several activities that engage the mind, smartphones act as platforms for spontaneous learning. Consistent communications with students and data and information pools in smartphone applications make them significant tools in learning.

5.3.4.3.1 Smartphone apps are a secondary tool in learning

Conversely, some respondents did not think that Smartphone apps can be the main tool in the education process for several reasons: they need continuous updates and still need development to reach a comparable level of usability and security to computers. However, these respondents acknowledged that some apps such as Blackboard are helpful to the education process if used effectively. They may become the main tools in education if widely developed to serve the faculty member's needs and to better facilitate university faculty members' curricula.

One respondent commented: "Nowadays, they are significant in education as they support education greatly, whether in communication between staff and students or in private groups in handing related issues. These also support the education process through providing the ability to search for information quickly, both on websites and in special applications. They can become the main tools in education if they are widely developed to serve the teachers' needs and to better facilitate university instructors' ability to handle their curricula." (Interview; Respondent: M4; Female).

According to another of the respondents: "Smartphone apps have become important supporting tools in the education process. For instance, students can

attend classes without carrying books or pens. They can attend by following the staff member through viewing the course material using a smart device, then taking notes electronically. Students can attend the virtual classes using smart devices. Education through smart devices is now a new international trend." (Interview; Respondent: M1; Male).

The advantage of smartphone technology is that it facilitates internet learning, e-learning and distance learning to potentially supports and enhances the learning process. Essentially, the software technology makes it possible for educators to reach out to their classes remotely through emails and applications such as dropbox. As such, besides not requiring any books and pens, students are also able to access information from the various internet stores and storage apps that facilitate access to vital learning content. Students no longer have to deal with the inconveniences of working with crowded libraries or faculty officials in accessing their coursework. Ideally, through the use of appropriate smartphone applications, the students can have access to learning content updates and support information from online search tools and external libraries and catalogues. However, such an ideal situation can face challenges in reality and some interviewees remain to be convinced about whether smartphones and apps can be the primary learning vehicle.

One respondent stated "I do not think smartphones apps can be the main tool in the education process. They are helpful tools that can be used to develop, enhance and support education as they facilitate reaching information, digital libraries, and scientific websites, and they offer more information to students than the traditional methods of teaching can. Students can save and go back to information whenever needed. But students are more active in face-to-face lectures than in virtual lectures." (Interview; Respondent: F5; Female).

Another respondent commented: "Smartphone apps enhance the educational process by providing the beneficial information search tool. They cannot become the main tool in the education process, but they are indeed assisting and helpful for the educational process." (Interview; Respondent: F9; Female).

5.3.5 Challenges facing the use of smartphone applications in learning

As with any new technology, smartphone apps have some limitations which create challenges in the learning environment. For example, screen sizes can be too small, especially for reading pages of text; the size of the phone's memory determines how many applications can be stored; battery life can limit how much work can be done remotely and some students remark that some apps drains the phone's power quickly. Other factors noted as being challenging were the time it takes to load applications and internet connection speeds. The cost of running smartphones and buying apps is of course an important factor (Woodcock, Middleton and Nortcliffe, 2012).

5.3.5.1 Slow internet connection

The majority of faculty members and deans said the biggest challenge facing the widespread use of smartphone apps in education is related to slow internet speeds on campus, home or remote networks, which can increase loading times, make uploading or downloading content unreliable and occasionally lead to a complete communication blackout. This can seriously hinder the flow of delivering lectures, particularly virtually.

One of them said: "There are problems with communication, weak network connectivity, and technical problems on websites. Staff and students also face problems in communicating with the application, especially when using search." (Interview; Respondent: M3; Male). Another respondent made it clear that: "The challenge of internet disconnection can lead to a complete lack of communication between devices, which hinders the flow of delivering lectures." (Interview; Respondent: F2; Female).

Some faculty members indicated that the main challenge they face when using smartphone apps is that not all students are able to purchase smartphones of sufficiently high specifications to meets the quality needed for the delivery of virtual lectures, or that are sufficiently secure. Further, some faculty members see informal smartphone apps like Twitter, WhatsApp, etc., as not very secure for protecting data and. They also considered the storage capacity or memory of the majority of smartphones to be insufficient for their purposes. The need for

continuous maintenance or updates was also indicated as a potential recurring challenge.

One said: “Students are not always able to purchase smart devices of high enough specifications, some informal smartphone apps are still not very secure in protecting data, don’t meet the quality needed and need continuous maintenance.” (Interview; Respondent: F2; Female).

5.3.5.2 Lack of knowledge regarding using smartphone apps

A number of respondents see some faculty members as lacking knowledge about using smartphone apps and, despite this, these staff members don’t attend training workshops that would enable them to follow technological updates. According to one respondent, *“Some staff members lack knowledge in using smartphone apps. Some faculty members have no desire to communicate with students through these applications.”* (Interview; Respondent: F3; Female). Another respondent added more detail: *“Some faculty members have no desire to follow technological updates; they don’t come to training workshops, which are intended to develop their skills.”* (Interview; Respondent: M3; Male).

Some faculty members and deans said the most pressing technical problem lies in the university website itself. For example, it is slow, sometimes it stops responding, crashes or logs out unexpectedly, among other issues. When asked, one of them said, *“There are problems with communication and weak network connectivity, and technical problems in the website. Faculty members and students also face problems in communicating with the application, especially in the search process.”* (Interview; Respondent: M3; Male).

5.3.5.3 Incompatibility of information and educational technology systems with students’ devices

The majority of the interviewees said that staff and students also face problems in communicating with the university application, and that some applications don’t work with some devices and the search function. *“Challenges include some applications not working with some devices,”* one respondent said. (Interview; respondent: F7; Female). A different participant added: *“There are technical*

problems with the website and we also face problems in communicating with the application, especially in the search process." (Interview; respondent: M3; Male).

Some of the respondents identified other challenges, such as several smartphone apps don't work with particular brands of device and are incompatible with PDF files. Also, some devices do not support file storage and or downloading some programmes that faculty members need in teaching; these smartphone apps also lack a data transfer option and a mechanism of directly displaying slides using a projector.

One respondent stated, "We need development in smart apps and devices. For example, some devices do not support file storage and downloading some programmes that we need in teaching. These smart devices also lack the data transfer option and a mechanism for directly displaying slides using a projector from the device inside the classroom." (Interview; Respondent: M1; Male).

Moreover, there were those who said the university does not provide specialised applications that meet the education needs of each subject. *"There is no provision of specialised applications for each subject that can fulfil the objectives of the subject,"* said one respondent. (Interview; respondent: F6; Female).

5.3.5.4 Lack of some faculty member interest in appearing in virtual class

One of the female respondents pointed out that some of the female faculty members did not want to appear on camera during the virtual class. Also, some faculty members had observed students occasionally being disengaged during virtual classes.

One female faculty member said: "Female faculty members don't want to appear physically during the virtual class. For social reasons, as well as the reluctance of some female faculty members to be videoed, classes can be limited to audio content and the students are usually more inactive during this kind of virtual class than in face-to-face lectures. This may be due to the fact that they don't see the faculty member." (Interview; Respondent: F5; Female).

5.3.5.5 Mistimed communication

With regard to communicating with students by smartphone apps, some negative and unanticipated consequences of the introduction of new technology were noted by respondents, specifically that technology use in this case significantly increases students' access to lecturers and can increase staff workload when they are expected to respond to enquiries at any time, along with the lack of clarity of response time and time dedicated to communicating with students. There are also a lack of operational manuals to explain the mechanisms contact hours for students outside the normal working day. They said working hours became longer as they spent more time communicating with students. One respondents elaborated: *"There are problems in that working hours are now longer as we spend time communicating with students. Also the greater workload when communicating with students through the applications is not considered the same as work done in office hours."* (Interview; respondent: M4; Female).

5.3.5.6 Absence of incentives to use technology

Several respondents pointed out the importance of providing incentives for faculty members and students to use modern devices, which contributes to developing the ability of faculty members and students to use modern technology, especially new education apps and the university app. Also, the incentives help to reduce the burden of working hours which become longer when communicating with students through the applications. One of the interviewees stated: *"Some faculty members have no desire to follow technological updates; they don't come to training workshops, which develop the ability of faculty members to use modern technology. There are no incentives for faculty members and students to use modern devices."* (Interview; respondent: M3; Male).

Furthermore, another respondent commented: "it became greater workload when communicating with students through the smartphone apps outside work time." (Interview; respondent: M4; Female).

5.3.5.7 Smartphone apps distract students in the classroom

A few of the interviewees believed students are sometimes distracted when using smart devices in the classroom or when they go online, perhaps because some students use their smartphones for personal things during the lecture.

One faculty member suggested that there needs to be a controlled application or device preventing students from leaving the educational sphere the faculty member intends them to use during the lecture, both in the classroom or during virtual classes. *"The challenge is when using smartphone apps in the classroom or during virtual classes, students are sometimes distracted when using smart devices. Perhaps there needs to be a controlled application or device to prevent students from leaving the intended educational sphere used by the faculty members," said one interviewee.* (Interview; Respondent: F9; Female).

5.3.6 Advantages

There are numerous advantages to the use of smartphone apps for educational purposes. Accessing information very quickly, anywhere and at any time, for example. Smartphone apps are generally easy to use, provide many different learning styles and can be used at any time (Alkhalaf, 2015). In addition, they can be used to upload the teaching material, determine discussions via groups and receive students' assignment electronically. They improves various types of learning, enables a swift and thorough search for information, encourages reflection, and supports decision-making. The learners become better at planning since they are engaged with a more student-centric type of learning than in traditional teaching methods. They can also improve learners' confidence and direct interaction between the students. The use of smartphone apps has positive effects on the conversation skills and academic achievements of students (Elfeky and Thouqan, 2016).

5.3.6.1 Easy to use smartphone apps

The majority of interviewees believed it is easy to use smartphone apps in education and that they help control the education process, enhancing it and simplifying information, allowing the students to get the information they need very quickly. They are accessible at any time, anywhere. Also, there are those

who see smartphone apps as offering more information to students than traditional methods and that students tend to participate in virtual classes more effectively than in the classroom.

5.3.6.1.1 Easy to access information

The majority of interviewees admitted that smartphone apps are easy to use and improve access to information through scientific applications, educational sites, websites and digital libraries, increasing students' and colleagues' participation, enabling the uploading of homework and allowing easy access to emails.

One respondent commented that: "Smartphone apps make getting information very easy, simplifying information, making knowledge accessible, allowing students to access researchers, papers and share research easily." (Interview; Respondent: F1; Male). Another said: "Smartphone apps are widening the range of knowledge available to students as they can now find information easily, any time and anywhere. They allow students to communicate with the rest of the world about their subject at any time. We can all participate in and attend scientific conferences in any place." (Interview; respondent: M1; Male).

Another respondent added more detail: "Smartphone applications have made it easier to reach learners and to deliver class content to them. They create educational spaces among students through private educational groups, improve the relationships between students and increase communication between staff and students. They also change the traditional roles of staff members, who can now be reached at different times. They create easier and quicker ways of finding the information students seek." (Interview; respondent: M4; Female).

5.3.6.1.2 Easy to go back to materials

A number of those interviewed reported that smartphone apps help students to go back to educational materials very easily, allowing them to save and go back to information whenever needed and at any time. One of them said: *"Smartphone apps offer access to more information using very easy methods. Students can save and go back to information and materials whenever needed. It has hugely*

contributed to the development of education." (Interview; respondent: F5; Female).

Further to this, some of them said that all the materials are available on the blackboard application also students can view them electronically any time before the class. One respondent commented: *"The course materials are available on the application and students can view them electronically before the class. Students can also listen to the recorded classes and watch them before class. This can help them prepare themselves, better understand the topic and participate more readily during the class. We can communicative effectively with students. I suggest special devices for education should be developed, making it possible to deal with all programmes and applications, with high specifications to facilitate the teaching process for staff and to make it easy for students to deal with them."* (Interview; respondent: M3; Male).

5.3.6.2 Smartphone apps are very quick

Today, smartphone apps are excellent educational tools. There are many apps that help faculty members and students. Smartphone apps can help stakeholders to achieve better performance in organizing, managing and monitoring classroom activities, along with making use of the possibilities of enhanced learning.

Smartphone apps help students to quickly get information, access scientific applications, educational sites and access digital libraries. They are a quick means of allowing staff to respond to student queries at any time, anywhere.

5.3.6.2.1 Very quick for getting information

The majority of respondents among the faculty members and deans said that smartphone apps help students to get information quickly by making knowledge accessible, allowing students to access scientific applications, educational sites, researchers or papers, digital libraries and to share research. They are very quick at responding to student queries at anytime, anywhere.

One interviewee stated: "The smartphone can be used to very quickly find information, is very effective in communicating with students, allows prompt replies to students' questions at anytime, anywhere, and is handy for uploading

and receiving assignments. I noticed that students participate in virtual classes more effectively than in classroom classes." (Interview; respondent: F4; Male).

Another respondent added that: "Smartphone apps have made it quicker to reach learners and to deliver classes to them. They have created educational spaces among students through private educational groups, improved the relationships between students and increased communication between staff and students. They have also changed the traditional roles of staff members, who can now be reached at different times. They have created easier and quicker ways to find the information students seek." (Interview; respondent: M4; Female).

5.3.6.2.2 Very quick for communicating

Some respondents said that smartphone apps allow quick communication between faculty members and between faculty members and students. They can be very quick in responding to student queries at anytime, anywhere. The apps are also handy for uploading and receiving assignments and allow easy access to emails or the university app.

According to one respondent: "Smartphone apps increase the efficiency and effectiveness of communication between faculty members and students and allow staff to respond very quickly to students. They make it possible to go back to a piece of information if needed." (Interview; respondent: F7; Female). Another respondent added: "Smartphone apps are very quick and very effective for communicating with students and faculty members, allow prompt replies to students' questions and are handy for uploading and receiving assignments." (Interview; respondent: F4; Male).

5.3.6.3 Widening students' range of knowledge

There are those among the sample population who see smartphone apps as helping to broaden the range of information available to students and enhancing communication with others in relation to knowledge at any time, in any place. Smartphone apps help support the teaching process and – if used effectively – can be better than traditional teaching methods and offer excellent presentation

methods for learning. Some of them said the benefits of smartphone apps included attending conferences online at any time.

One of them commented: “Smartphone apps contribute to widening the range of knowledge available to students as they can now find information easily, anytime and anywhere. They also enable students to communicate with the world in relation to their subject at any time. We can all now participate and attend scientific conferences in any place.” (Interview; respondent: M1; Male). Meanwhile, another interviewee commented that “Smartphone apps offer more information to students than traditional teaching methods. Students can save and go back to information whenever needed. It hugely contributes to the development of education.” (Interview; respondent: F5; Female).

5.3.6.4 The existence of virtual classrooms

A virtual classroom is typically an online learning system where both the learners and teachers communicate with each other just like in the real classroom but from different geographical locations. The system comprises all the basic tools required to effectively run a classroom. Communication among participants can be achieved in various ways, such as text chat, live video, live audio, etc. Many applications that support this kind of learning are currently used in the case study university, but the focus is on using the university-led Blackboard application.

Some of the respondents said virtual classrooms contributed to learning and removed the limitations of time and location, allowing students the freedom to study and finish the coursework anytime, anywhere. Learners also have the opportunity to engage with others on classroom topics, do their assignments and absorb class content. According to one respondent: *“I noticed that students participate in virtual classes more effectively than classroom classes.”* (Interview; respondent: F4; Male). While another believed: *“We need creative methods to motivate student participation during virtual classes.”* (Interview; respondent: F7; Female).

5.3.6.5 Time management

Learning through smartphone apps provides time and anywhere. Attending virtual classes remotely saves otherwise useless commuting time. One respondent stated:

"We use smartphone apps at anytime, anywhere. They are very useful for accessing emails or apps and this saves us time and effort." (Interview; respondent: F2; Female).

Another respondent commented: "Smartphone apps contribute to students' time management as they can now find information easily anytime, anywhere. They enable communication with the world in relation to knowledge at any time." (Interview; respondent: M1; Male).

5.3.6.6 Smartphone apps provide specialised educational groups

The majority of interviewees believed one of the advantages of smartphone apps for educational purposes is the creation of and ready access to educational groups, promoting easy ways to share information with groups of peers within their field, allowing faculty members and students to engage in discussions using applications like Blackboard (as favoured in the case study university) or social media applications like Twitter and WhatsApp.

One respondent commented: "Smartphone apps save time and effort when communicating with colleagues or students. They hugely contribute towards solving problems for both staff members and students by allowing them to present their issue in a special group where everyone can share their opinion to solve it." (Interview; respondent: M2; Female).

Another respondent elaborated: "Smartphone apps have made it easier to reach learners and to deliver classes to them. They create educational spaces among students through private educational groups, improved the relationships between students and increased communication between staff and students. They have also changed the traditional roles of staff members, who can now be reached at different times. They have created easier and quicker ways to find the information students seek." (Interview; respondent: M4; Female). Another interviewee commented: "We can communicate effectively with students. We organise our department meetings through them, using private groups." (Interview; respondent: M3; Female).

5.3.7 Summary

The qualitative data analysed in this chapter were collected from university managers, faculty members and students, using two methods: semi-structured interviews for the University staff and open-ended questions as part of a survey addressed to a large number of students in the case study university as part of the questionnaire used in this study. Using the thematic coding approach detailed in Chapter 3, data analysis of the semi-structured interviews highlighted several main themes and associated sub-themes: the use of and integration of smartphones apps in the education process, improving the professional skills of faculty members, professional communication through smartphone applications, contribution of smartphone applications to enhancing learning systems and processes, and the challenges and advantages of using smartphone apps in an educational context.

The data analysis of the open-ended questions from the student questionnaire was presented under two main themes, focusing initially on the challenges that students confront using smartphone apps for education purposes; this theme included eight sub-themes. The second theme comprised of reported advantages of using smartphone apps for education purposes; this theme included five sub-themes. The analysis highlighted that the qualitative data gathered from University staff and students demonstrated similarities regarding a number of themes related to the research questions, though there were differences in some other respects.

The analysis revealed that, overall, facility members held largely positive views regarding the utility of smartphone apps such as WhatsApp, Twitter, Facebook and Instagram etc, which were seen as contributing to the learning processes and systems in their University. The mobile applications were seen as supplementing and enhancing face-to-face teaching approaches. In particular, students were reported to be using smartphone apps to remotely access learning materials and content, contribute to learning discussions and to facilitate student learning networks. Smartphone applications were seen to promote learning by enhancing communication between lecturers and students as well as interactions between faculty members themselves.

Faculty members also saw smartphone apps as articulating with the Blackboard e-learning environment, but there were some technical challenges, and these were particularly highlighted by students. The study findings reveal that the Blackboard application adopted by the University, provided a framework to support mobile learning and allowed faculties to provide resources for students to access online. The Blackboard environment also articulated with other software resources such as PowerPoint and audio/ visual media sources, but students reported that there were compatibility issues when accessing Blackboard using smartphone applications.

Faculty members believed that smartphone apps were useful tools in enhancing the learning process by allowing learners to access educational materials remotely and conveniently as well as promoting the conduct of research by students. Staff reported that the use of smartphone apps also facilitated interaction and collaboration among students through participation in discussion forums and other group activities.

The findings demonstrate that the range of smartphone apps also provided opportunities for collaborative learning activities, professional learning, training, and facilitating specialised groups. Faculty members reported that they found mobile applications helpful in their work and for their professional development. From staff members' perspective, smartphone apps promoted the efficiency of teaching in the virtual classrooms and made it easier for students to conduct assignments and submit them to the instructors. The mobile applications, particularly WhatsApp and Blackboard apps, were also reported to enhance communication between staff and there was evidence that this helped facilitate online group interaction and networking, which supported specialist groups and communities of practice. This app-supported communication was also seen as helping to share professional advice and knowledge and facilitate colleagues' access professional development and conference opportunities.

Not all faculty members were positive about the benefits of mobile apps and e-learning. A minority of those interviewed were concerned that use of smartphones in the classroom and learning environment could be a distraction to learning. However, where faculty members did highlight issues and challenges, these largely concerned technical limitations and ICT infrastructure in the wider University ICT

environment, such as broadband connection and internet speeds rather than the nature of the apps themselves.

The majority of the students surveyed in this study used smartphone apps to access emails, browse the internet for information, communicate with classmates and instructors, and engage in other learning activities. The smartphone apps enabled students to share their learning experiences and knowledge in a collaborative environment.

Most of the students surveyed had a good understanding of how smartphone apps could support their learning. They were particularly positive about how smartphone apps statements helped reduce reliance on desktop computers and facilitated submission of assignments. The smartphone apps were widely used, with most students reporting using them to access research literature and resources. Students using smartphone apps were generally able to access academic information via the University's educational platforms within the Blackboard e-learning system. For instance, the University runs the Saudi Digital Library through collaboration with international universities which facilitates online research among students. However, students believed that the University did not provide adequate formal training on how to get the most from smartphone applications.

Despite the benefits and opportunities offered by the smartphone technology in education, the students and faculty members still faced challenges and limitations in using smartphones and apps in the e-learning environment. Rather than being problems with the various smartphone apps, these challenges were mainly associated with technical issues such as slow internet connection and aspects of the university's Blackboard system, such as problems in opening files, difficulties in loading files, and incompatibility with some smart devices. In some cases, these challenges were compounded by 'human factors' such as some faculty staff members' lack of knowledge about using smartphone apps for education, or a lack of interest among some faculty members in appearing on virtual classes.

This study did not directly focus on the impact of the use of smartphones on students' academic achievement and learning, but rather explored whether and how smartphone apps contributed to and enhanced the learning process and

systems in a university. Other studies such as Norries et al. (2011) have established that students' academic achievement improves significantly following the adoption of smartphones due to the increase in learning time and greater time-on-task completion during class activities. The findings of research in this thesis align with those of Norries in that faculty members and students reported that the smartphone apps enhanced access to learning materials, content and resources. Also, a common theme in Faculty members accounts was that smartphone applications fostered collaborative and interactive approaches to learning, and this was seen as contributing to the improvement of learning outcomes for the students. In the absence of direct measures of attainment, these insights suggest that the use of smartphones has potentially contributed to students' academic performance.

It is perhaps not surprising that the majority of faculty members who were interviewed possessed a positive outlook on the role of e-learning technology and the use of smartphone apps within this model of learning. The Saudi Electronic University, almost by definition has been established by the Government to adopt e-learning technology and blended learning to help the Country address the challenges presented by changing social and economic realities. The University cites UNESCO to highlight the importance of blended learning in higher education to help promote learning outcomes needed to meet the needs of the Country shaped by globalization and technology (https://www.seu.edu.sa/en/blending-learn/). From a policy position, therefore, E-learning is seen as having an important role in the reform of the Country's educational systems in order to better promote students' knowledge and skills required in the age of knowledge economy. The findings also highlight that, despite the e-learning developments, progress and aspirations of the University, there is still work to be done to fully integrate mobile applications with the University's e-learning environment.

The Technology Adoption Model (TAM) theory is helpful in understanding the uptake and use of smartphone apps in the case study university's e-learning environment. According to TAM, the perceived ease of use and usefulness has a strong impact on technology acceptance (Davis 1989) and this theme runs through the accounts from university staff and students. The usefulness of the various smartphone apps, whether in improving effectiveness of assessment processes, accessing materials, or enhancing communication across the student and staff

communities, appears to be a strong diver in the use of the apps within the e-learning environment. The qualitative data gathered in this study strongly suggests that the smartphone apps have played a role in the social and community aspects of learning. According to the Situative theory, learning takes place as a social participation process characterized by collaborative and active learning (Clough and Ferguson 2010). Students at the case study university, did collaborate with other students and faculty members to build online communities that they reported had helped enhanced their learning.

The TAM conceptual framework also has potential to be used analytically to help understand the National policy drivers underpinning the promotion of e-learning. The policy context discussed in Section 2.6 suggests that the Saudi Government's sees e-learning technologies in higher education as being useful, and indeed crucial, to address social and economic challenges and change. Further research could explore the interplay between the perceptions of educational technology amongst the academic community in the University and National educational policy. In particular, to what extent are the positive perceptions of faculty staff influenced by strategic direction and to what extent is a result of their professional experience?

On reflection, the methods used for this study have provided appropriate data and information to answer the research questions. However, as in most research studies, findings emerged that could have been explored further if time allowed and suggest areas for further research. For example, it is interesting that most the smartphone apps used by staff and students in the education process are general social media and communication apps that were not specifically developed with an education purpose in mind. This suggests that the staff and students in the university have already engaged with these apps and used them to share information and communicate. However, the adaptability of these apps indicates that staff and students have found that they articulate with their university systems and processes and, therefore, have applied them to support their work and learning.

Another area that could be explored further is that this research did not collect evidence from the faculty members and managers that the university to explore whether they saw the potential of these apps when developing its e-learning

systems and implementing the Blackboard system. However, this potential seems to be organically influencing the use of smartphone apps rather than in some systematic way. The findings indicate the presence of a culture within the student and staff communities in the university that reflects the official University's stance on e-learning and blended learning as integral to the higher education learning process. This has most likely helped to drive the uptake and use of smartphones into the learning systems. These are topics that could be further explored.

The next section will present the analysis of the qualitative data collected by the open-ended questions on the questionnaires.

5.4 Open-ended Question Analysis

The third part of the questionnaire consisted of two open-ended questions regarding the challenges that students confront while using smartphone apps for educational purposes, along with any advantages. Participants were invited to add any comments about the study (see Appendix 5.A). Those questions were answered by most of the 324 participants. They represented students from various levels of study and both genders. The responses analysed and then grouped in the following themes (see Table 5.2).

Table 5:2 Themes for challenges and advantages of using smartphone apps in an educational context

Major themes	Sub-themes
Advantages of using smartphone apps in education	1. Easy to use smartphone apps 2. Easy to find information 3. Quick access to information 4. Quick for communication 5. Facilitates educational groups 6. Access to self-learning platforms 7. Using smart phone at any time, in any place 8. Saving time
Challenges to using smartphone apps in education	1. University app challenges (Blackboard) 1.1. Problems opening files 1.2. Blackboard app incompatible with smart devices 2. Smartphone device challenges 2.1. Problems on-screen 2.2. Problems in data storage capacity 3. Internet connection challenges 4. Virtual lecture challenges 5. Student distraction

5.4.1 Smartphones advantages

Nearly all participants have a smartphone and the vast majority of these are smartphones that allow users to connect to the internet and run apps as well as sending texts and making phone calls. The majority of students think that the smart device applications are advantageous because they are easy to use and smart devices are easy to carry at all times and wherever they go.

5.4.1.1 Easy to use smartphone apps

The findings highlighted the ease of using smartphone apps in education. Respondents emphasised that smart device applications "Are advantageous because they are easy to use, to carry at all times and in any place. They are also easy to deal with, whether the using Blackboard or other student-targeted

applications. Students also believe that smart device applications have greatly facilitated the attendance of virtual lectures, follow up emails and university news. They allow students to find their grades and facilitate communication with faculty members using Blackboard or the other applications, such as WhatsApp or Twitter, etc."

5.4.1.2 Easy to find information

Smartphone apps have played a major role in facilitating the search for information, keeping up-to-date with new developments in the field and listening to or watching lectures. It is much more convenient to check email and social media using smartphone apps. The majority of respondents believed that *"Smartphone apps have a major role in facilitating the search for information, access to electronic sites or other educational applications, as well as access to the digital library through the other available applications."*

5.4.1.3 Quick access to information

Smartphone apps are playing an increasingly important role in college students' academic lives. Devices such as smartphones connect users to the world instantly, increase speed of access to information and enable users to interact with each other.

The majority of respondents considered that, "The advantages of smartphone applications are quick access to lecture files, quick access to any information in search engines and access to various educational sources at any time and from any place. They allow students to store files and return to them at any other time in the future. They also facilitate accessibility to educational materials on the internet."

5.4.1.4 Quick for communication

Smartphones apps are seen as an instrument for communication in academic life. They help keep people in contact with faculty members, colleagues and students, and other stakeholders in the learning environment. In addition, smartphone apps enable quick communication in different ways for learning.

Some participants also agree that, “Smart devices are advantageous in terms of communication between faculty members, whether through the university application or any other applications. For example, the use of e-mail has facilitated communication with staff members and allowed easy access to assignments. It has also made it easier for students to communicate with their colleagues, allowing them to exchange information and establish effective links, discuss assignments and lessons, learn about the schedule, attend lectures, and read lesson slides and notes.”

5.4.1.5 Educational groups

Smartphone apps contribute to creating an educational environment by allowing students to form groups in order to distribute and share their knowledge with ease. Most respondents described the advantages of smartphone apps as including, *“Creating educational groups, for example on WhatsApp or Twitter, so that students can join and talk about classes and other relevant issues. This has facilitated communication and participation in the learning process and has introduced some educational discussions that contribute to enhancing students' learning in general.”*

5.4.1.6 Access to self-learning platforms

Smartphone apps provide access to self-learning platforms and help students to access university learning platforms and other self-learning platforms, both formal and informal. Some respondents said that: *“Smartphone applications help students browse lectures on YouTube and other websites. They assist students' discussions through the creation of groups such as those on WhatsApp and Twitter, which are helpful platforms for answering students' inquiries and discussing class-related topics. They can save a great amount of time when seeking information, handing in assignments at any time and are very fast ways to connect with instructors. They allow students to access virtual lectures at any time and from any place, as well as to read recent announcements and follow up on assignments.”*

In addition, the respondents confirmed that, “Smartphone apps are very helpful when searching for annotated video and audio lessons, or print lessons on

YouTube, for example, or on other teaching sites, which contributes to the understanding of the lessons."

Moreover, some respondents believe that, "Smartphone apps are contributing to saving time and reducing costs. For example, one does not need to purchase printed materials when they are available electronically. Applications can make it easy to access some learning platforms such as Blackboard and other self-learning platforms, such as Coursera and EDX."

5.4.1.7 Using smartphone apps at any time and any place

Recent advances in smartphone app technology have enabled them to carry out a wide range of tasks when on the go, access a wide range of information and files, no matter where you are and they access important information anywhere and at any time.

The majority of respondents believe that the use of smartphone apps, "Has contributed significantly to supporting the learning process. This is due to the fact that they are available at any time and in any place." Some respondents confirmed that, "They provide an easy way to get a lot of information and locate references. For example, Dropbox is important for saving files, which can be retrieved from anywhere and can be easily shared on the internet at any time. Smart devices also make it easy to access Blackboard from any place. One can listen to virtual lectures through the Blackboard application. The search for information has become easier and faster, which supports the learning process by enabling access to all the new sources in one's field. One can also look up all university updates, without using a computer."

On the other hand, some respondents also believe that "Access to lectures and resources on the move is a great advantage for them. This means that learning is happening in different circumstances and students can follow along whether through follow-up lectures or through virtual or registered lectures. They can also participate with colleagues and instructors through the groups on the devices."

A number of respondents described the presence of smartphone apps and the availability of internet connection at all times as, "A useful feature for students

to read the subjects through their smart device and return to the material at any time. In addition, there are alerts from Blackboard of any updates of PDF files or announcements from the university website, as well as announcements about assignments or marks."

5.4.1.8 Saving time

Smartphone apps are excellent tools for helping to save time. Smartphone apps perform a wide array of functions which save time. Whatever format a resource is in, smartphones allow accessing to any of the educational content at any time and can easily be used to improve knowledge and skills, allowing the student to learn and improve.

The majority of respondents showed great faith in the smartphone apps' ability to save them time: "The applications are easy to use and one can read or watch videos at any time. It is helpful for students as they are a means of giving educational updates from time to time, which will allow students to maintain familiarity with the information and understand it more in relation to the materials, especially when the information is presented in a short and attractive way. If there is audio material for a particular lecture, the smartphone is the best way to listen to this audio material as, for instance, it can be used even when driving."

5.4.2 Challenges of using smartphone apps in an educational context

While students generally reported that smartphone apps were beneficial to their learning, the majority of students also reported that they sometimes faced difficulties and problems when using them in an educational context. The most prominent problems are embodied in the university app (Blackboard), smartphone device challenges, internet connectivity challenges, virtual lecture challenges and problems arising from the ability of smartphone apps to distract students during lectures. These issues are discussed in the following sub-themes.

5.4.2.1 University app challenges (Blackboard)

Some students say that they face problems when using the Blackboard smartphone app, particularly when loading or opening files.

5.4.2.1.1 Problems opening files

Nearly all respondents in the case study referred to Blackboard as an obstacle to learning. Some students said that this is because there are often problems in opening files. One participant stated: *"There are problems when opening some files on the phone, which requires applications available on computers such as Word and PowerPoint. The university, for example, only recognizes and supports computer subscriptions, but not smart phones. In addition, not all the copying features are available on the smartphone, whereas they are available on computer. This constitutes an obstacle in using smart device applications."*

Another participant added: "There are also problems with audio volume as it is sometimes very low and not clear, which prevents students from following the classes properly. There is sometimes a delay in the volume of the virtual lectures, which affects students' comprehension as well as interaction with the instructor. Moreover, students sometimes face login difficulties when attempting to join virtual lectures. It is difficult for us to interact with the content of given materials via a smartphone. For instance, the features intended for taking notes and copying and pasting are not practical compared to computers."

5.4.2.1.2 Blackboard is incompatible with smart devices

A number of respondents raised the issue of the Blackboard app's incompatibility with smart devices. One of the participants stated: *"The Blackboard learning tools are sometimes incompatible with smart devices, such as the page size, which usually does not display the whole page. One of the challenges is that Blackboard has not been updated with the latest version of the Apple system, which leads to problems in using the application, which is not fully compatible with smartphones. For example, students cannot log in to the recorded and virtual lectures on the university's Blackboard application. In this case, students resort to using computers."*

Another participant indicated that, “Among the problems that students face in using smart apps is the suspension of the university application during lectures, which sometimes prevents them from following the lectures. This results in students being unable to send assignments and tasks through the smartphone, especially Word files, and the incompatibility of devices in displaying the content to be used in the classes.”

5.4.2.2 Smartphone device challenges

The students had different opinions about the challenges of using smartphone devices, but all agree that while smartphones have a lot to offer, the screen size is a problem. In addition, some participants believed that there are challenges in data storage capacity.

5.4.2.2.1 Screen size and battery life problems

Interviewees frequently referred to the limited size of the screen, the lack of comfort in looking at it and the battery charging as serious challenges to using smartphones in an educational context. Respondents also emphasised that, *“One of the challenges that students face in using smart devices is the small size of the screen and the lack of comfort in looking at it, as well as limits of battery life, which usually dies quickly when using resource-heavy applications and watching lectures. Writing on a smartphone keyboard is difficult.”*

5.4.2.2.2 Data storage capacity problems

Another challenge emphasised by respondents is the lack of data storage capacity and the difficulty of downloading files. One participant stated, *“The difficulty of downloading the recorded lecture files on smart devices can be a problem for various reasons, such as the incompatibility of Blackboard with smart devices, along with storage capacity problems in smart devices, which usually have not enough space.”*

5.4.2.3 Internet connection challenges

Internet connectivity was frequently cited as an issue when using smartphone apps in an educational context. Students heavily depend on continuous connection with

the internet during their studies, whether in attending virtual lectures or in accessing the university site or applications, including Blackboard. One participant stated, *"The challenges that students face most often are the slow internet and weak connectivity."*

Some participants believe that the problem is with the operating company; others think that the problem originates with the university servers. Another challenge emphasised by respondents as one of the most prominent virtual problems is weak connectivity, both inside and outside the university.

Another participant expressed his displeasure because of the lack of internet access outside the university, reporting that, "They cannot attend virtual lectures and that will result in absence from the classes. They also cannot contact their instructors or fellow students, follow the lessons or download their homework."

Another challenge emphasised by respondents is unsympathetic lecturers who register students absent from the class when the internet suddenly disconnects during virtual lectures without considering the reasons that the internet has disconnected.

5.4.2.4 Virtual lecture challenges

The virtual lecture it is a system dedicated to holding lectures online and allows the students to meet directly through the internet to view the content of the course in various formats and have their questions answered. The system uses the virtual classroom tools and applications that enable the teacher and students to communicate together.

Some respondents referred to the challenges for virtual lecture as, "A difficulty in moving between the icons. For example, I cannot listen to the lecture while browsing books. In addition, it is cannot be used as an assistant during the virtual lecture, especially in taking notes, and in translating words. There is a lack of educational applications and there is insufficient support by the educational authorities in the university." Another participant indicated that, "The problem lies in educational applications used with smartphones as they are cannot be easily accessed and usually have technical problems."

5.4.2.5 Smartphone apps are a distraction

Some respondents believe that the use of smart devices distract or preoccupy them with things that are unrelated to their education in the classroom and virtual lectures. One interviewee pointed out that, *"Students will waste their time, especially when they get notifications from other programs on the device, such as messages, social media and game applications."*

5.4.3 Summary

The analysis of the qualitative data collected through the open-ended questions on the student questionnaire in this study was presented in this section. The two themes generated focused on the challenges that students confront when using smartphone apps for educational purposes; this theme included eight sub-themes. The second theme dealt with the advantages of using smartphone apps for education purposes; this theme included five sub-themes and gave participants the opportunity to add any comments about the study.

A table was used to summarise the challenges and advantages of using smartphone apps for educational purposes. A detailed analysis of each theme was presented, with illustrative extracts from participants' responses.

5.5 Conclusion

The qualitative data analysed in this chapter were collected from managers, faculty members and students, using two methods: semi-structured interviews and open-ended questions addressed to a large number of students in the case study university as part of the questionnaire used in this study. Thematic analysis was used to analyse the qualitative data collected by these methods. The analysis followed six main phases: (1) familiarisation and organisation; (2) generating initial codes; (3) searching for themes; (4) reviewing themes; (5) defining and naming themes and (6) producing the report. The data in these two sections were presented as part of a more detailed discussion, supported by illustrative tables for comparisons, along with extracts of the participants' responses.

The data analysis of the semi-structured interviews was displayed in six main themes and each theme included several sub-themes: the integration of smartphones apps in education, improving the professional skills of faculty members, communication through smartphone applications, enhancing learning, and the challenges and advantages of using smartphone apps in an educational context.

The data analysis of the open-ended questions from the questionnaire was displayed in two main themes, focusing initially on the challenges that students confront using smartphone apps for education purposes; this theme included eight sub-themes. The second theme comprised any advantages of using smartphone apps for education purposes; this theme included five sub-themes.

In conclusion, it was noted that qualitative data from two sources agreed on a number of aspects related to the research issues, though there were differences in some other aspects. In order to develop a using smartphone app in education, it is essential that the researcher takes into consideration the issues arising from all types of data, whether qualitative or quantitative. The discussion chapter, Chapter Seven, will consider all types of data and put forward a summary of the results in order to provide adequate answers to the research questions.

The next chapter (Chapter Six) will present an analysis of the quantitative data collected by the questionnaire.

Chapter 6 Quantitative Data Analysis

6.1 Introduction

Building from the methodology discussed in Chapter Four, this chapter presents and discusses the process of analysing questionnaire data. First, the design and use of questionnaires in this study is considered, along with the sample (Saudi University students), and the process of data analysis itself. Finally, the triangulation of data and findings are presented and discussed.

6.2 The Questionnaire

As discussed in Chapter Four, the questionnaires were constructed based a review of the relevant literature and the findings from the scoping study presented in Chapter Three (see Appendix 5.A). These questionnaires were designed to explore the Saudi university students' attitudes about using smartphone applications for educational purposes and to provide answers to the following research questions:

In the research context, what are students' attitudes toward the use of smartphone Apps for educational purposes within the Blackboard educational environment?

In the research context, what are the main challenges that confront the students and faculty members in use of smartphone apps for educational purposes, within the Blackboard educational environment?

In addition, the questionnaires developed for this study consisted of three main sections. Section one focuses on the participants' personal information, including their gender, age, class standing, smartphone brand and mobile operator. Section Two explores the Saudi university students' attitudes towards the use of smartphone apps for educational purposes (15 Statements). The third section, two open-ended questions (see Chapter Three) provides the opportunity for participants to identify any advantages or challenges in using smartphone apps for educational purposes.

The data obtained from the questionnaire was analysed thematically using the Statistical Package for Social Sciences (SPSS) software (Pallant, 2010; Brace et al.,

2012). First, descriptive statistics were employed to describe the participants and to categorise and summarise the data. This was achieved by thorough consideration of frequencies and percentages and the production of graphs indicating the participants' gender, age, class standing, smartphone brand and mobile operator. In addition, the percentage for each statement was determined, and a rank order was assigned to each statement according to its agreement values. This procedure was also applied to section two. Furthermore, a 5-point Likert scale was used to measure the participants' attitudes towards particular statements. The Likert scale is described as an ordinal scale of measurement, used to order categories (McCrum-Gardner, 2008; Cohen et al., 2007). The participants showed their attitudes by choosing one of the following five categories: 1 meaning Never (N); 2 meaning Rarely (R); 3 meaning Sometimes (S); 4 meaning Often (O) and 5 meaning Always (A). The higher the category chosen, the greater the strength of agreement.

Furthermore, inferential statistical procedures were utilised in order to identify any statistical differences between the participants in terms of using smartphone apps in learning based on their gender, age, class level, brand of smartphone and mobile operator. According to Sheskin (2007), inferential statistical procedures have been categorized as being:

> parametric versus nonparametric tests and some sources distinguish between parametric and nonparametric tests on the basis that parametric tests make specific assumptions with regard to one or more of the population parameters that characterize the underlying distribution(s) with which the test is employed whereas nonparametric tests (also referred to in some sources as distribution-free assumption-free tests) make no such assumptions about the population parameters (p. 213).

Pallant (2010) suggests that "non-parametric techniques are ideal for use when you have data that are measured on nominal (categorical) and ordinal (ranked) scales," (p. 213). This study applied non-parametric tests because they do not make assumptions about the underlying population characteristics and distribution (Pallant, 2010; Allen and Seaman, 2007; Cohen et al., 2007). Finally, a single-sample chi-square test was applied to the data to determine variances among single populations in a hypothesis testing situation (Sheskin, 2007). The single-sample chi-square test was employed in order to identify which of the

participants' statements were statistically significantly different from one another.

6.3 Demographic Information

This section presents personal information about the participants based on their gender, age, class level, brand of smartphone and mobile operator. As described in Chapter Three, the total number of questionnaire respondents was three hundred and twenty-four, amongst which one hundred and eighty participants (56%) were male and a hundred and forty-four (44%) female, as shown in Figure 6.1, below. The figure shows that the numbers of participants in the gender categories are convergent, indicating that both gender groups were given equal opportunities to participate in this study.

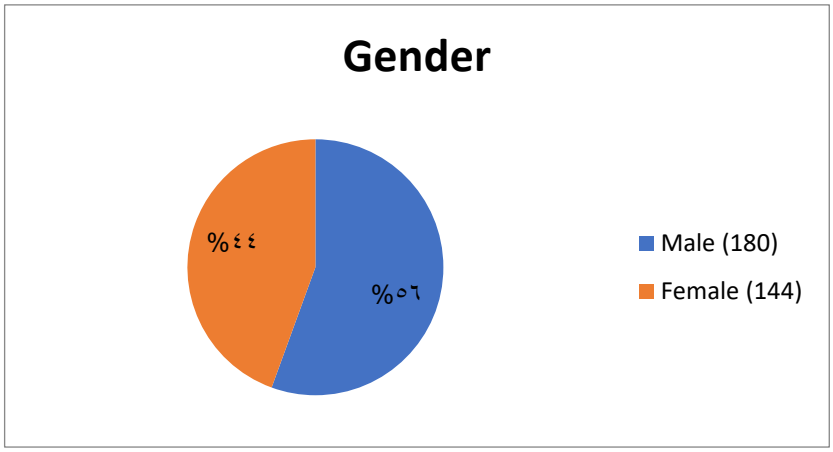

Figure 6:1 Demographic Distributions of Participants Based on Gender

The data shows that the average age of participant is between twenty-two and thirty-one. Of a total number of participants of three hundred and twenty-four, one hundred participants (31%) were aged between eighteen and twenty-six years old, and two hundred and twenty-four participants (69%) were aged between twenty-seven and thirty years old, as illustrated in Figure Two below. Further, in terms of class level, one hundred and seventy-nine participants (55%) were first and second year students, while one hundred and forty-five participants (45%) were third and fourth year students, as shown in Figure 6.2 below.

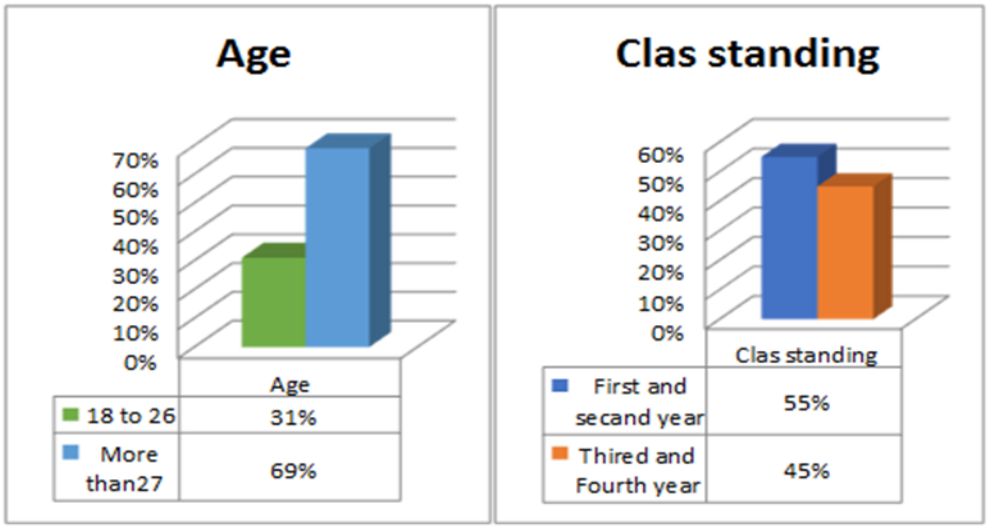

Figure 6:2 Demographic Distributions of the Full Sample, Based on Age and Class Level

Finally, the data indicated that the participants have various mobile brands and use different mobile operators. For example, the data revealed that two hundred and twenty-seven participants (70%) have iPhones, whereas ninety-seven participants (30%) have other mobile brands, such as Samsung and Blackberry. Moreover, the data showed that one hundred and ninety-six participants (52%) are registered with STC, while one hundred and fifty-five participants (48%) are registered with other operators, including Mobile and Zain companies as shown in Figure 6.3 below.

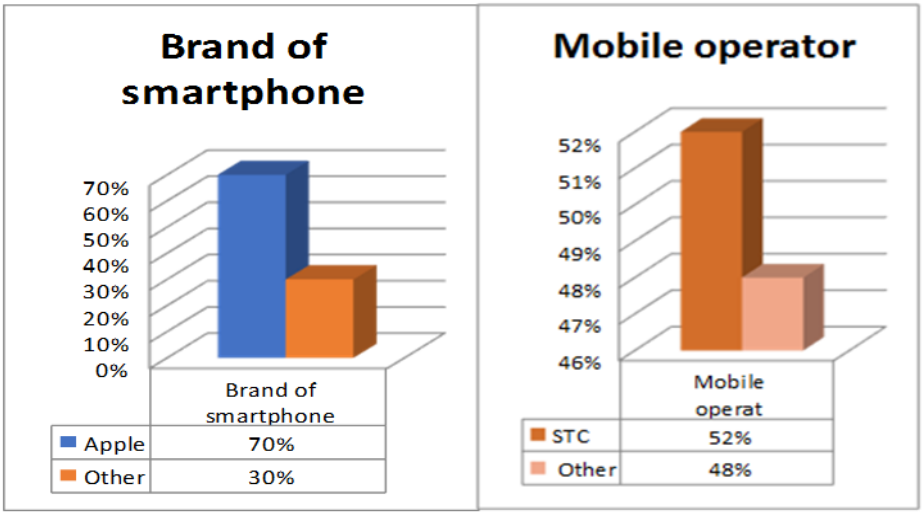

Figure 6:3 Demographic Distributions of the Full Sample Based on Brand of the Smartphone and Mobile Operator

Along with the diagrams above, the participant data indicates that the research sample covers students of different ages and levels of study, with diverse educational backgrounds and needs. In addition, the above data suggests that

most Saudi students seem to have and use mobile phones, regardless of the mobile brand or operator used. This suggests that Saudi students may have positive atittudes towards using smart apps for educational purposes; these positive attitudes may have the potential to motivate Saudi students to adopt new ways of learning. Next, participants' attitudes towards using smart apps for educatioanl purposes based on their gender, age, class level, and mobile brands and operators must be evaluated.

6.4 Students' attitudes toward the use of smartphone apps for educational purposes

This section reports the results of the second section of the questionnaire, which explored the Saudi students' attitudes towards using smartphone applications for learning by having them respond to fifteen statements, generated following the results of a literature review and scoping studies. These fifteen statements indicate positive engagement attitudes and practices of stakeholders in using smartphone applications for learning. In Table (6.1) below, distributive statistics of the participants' responses are presented, including percentages and frequencies, and their ranking based on frequency of agreement (always, often, sometimes, rarely and never). Like the previous section, a five-point Likert Scale was used to measure the participants' attitudes towards particular statements. The participants marked their agreement with five categories: 1 = Never (N); 2 = Rarely (R); 3 = Sometimes (S), 4 = Often (O) and 5 = Always (A). The level of importance was suggested by the Likert Scale, which states that the higher the category chosen, the greater the strength of agreement. Thus, 1 indicates that something is not important (N); 2 indicates that it is of little importance (R); 3 indicates that it is moderately important (S); 4 indicates that it is very important (O); and 5 indicates that it is extremely important (A), as shown in Table One, below.

Table 6:1 Descriptive statistics of the full sample perceptions and attitudes toward the use of smartphone apps for educational purposes

Rank	Statements	Percentages				
		A	O	S	R	N
1	I use my smartphone to check my email	73.5	13.6	11.7	0	1.2
2	I use my smartphone to browse the internet for information	59.3	28.1	10.2	1.5	0.9
3	Using the smartphone can improve communication with instructors and classmates	53.1	28.4	13.9	2.8	1.9
4	I use my smartphone to access / listen to class lectures	37.3	33.0	17.9	7.7	4.0
5	I use smartphone outside of class to pursue learning	35.5	30.2	24.7	7.1	2.5
6	I use smartphone for discussions through educational students' groups	35.5	30.2	19.1	9.6	5.6
7	I use my smartphone to access lecture notes or other course materials	32.4	33.0	21.3	8.0	5.2
8	The use of smartphones can increase flexibility of access to resources	30.2	30.6	30.2	6.5	2.5
9	Using smartphones helps with scientific research	29.9	32.7	30.9	4.9	1.5
10	I use my smartphone to access the learning management system in my university	27.5	34.0	24.7	8.0	5.9
11	Smartphones create a better environment for learning	27.2	36.1	28.1	6.2	2.5
12	Using a smartphone in class helps share more resources	26.5	28.4	32.4	9.0	3.7
13	I use my smartphone app to submit assignments	15.4	25.3	25.2	15.1	9.0
14	With a smartphone I do not need to depend on desktop computers	9.0	18.8	36.1	15.1	21.0
15	My university provides formal training on how to use smartphone apps	8.6	9.9	21.0	21.0	39.5

Table (6.1) above, indicates that there is wide positive agreement among Saudi students about engagement with using smartphone apps for learning in higher education. These interesting responses reveal that stakeholders are aware of the importance of using smartphone apps for learning in education through using smartphone apps to check out email, browse the internet for information, communicate with instructors and classmates, access and listen to lectures and surf the internet outside of class to pursue learning. However, the data also suggests that some respondents seem uncertain about using smartphone applications for learning. For example, some participants agreed more strongly with the following statements:

> "The university provides formal training on how to use smartphone apps."

"With smartphone apps we do not need to depend on desktop computers."
"I use smartphone apps to submit assignments."
"Using smartphones in the classroom helps share more resources."
"Smartphones create a better environment for learning."

From the rank column, the statements showing least agreement by the participants were in R14: "With smartphone apps I do not need to depend on desktop computers" and R13: "I use my smartphone application to submit assignments", with 9% and 15.4%, respectively On the other hand, the participants' lowest percentage agreement was with R15: "My university provides formal training on how to use smartphone apps", with 8.6%. The presence of these items among the lower rankings of the participants' agreement list may shed light on the level of participation of students. It also raises a question about the extent to which Saudi universities offer opportunities to their students to engage with and use smartphone apps in learning. In turn, the participants' highest statements were in R1: "I use my smartphone to check my email"; R2: "I use my smartphone to browse the internet for information"; and R3: "Using the smartphone can improve communication with instructors and classmates"; R4: "I use my smartphone to access / listen to class lectures", with the following percentages, 73.5%, 59.3%, 53.1% and 37.3% respectively.

The high agreement shown to the above statements suggest that most of the Saudi students have positive attitudes toward and readiness to use smartphone applications for educational purposes. Having said this, it would be extremely important to explore the participants' attitudes towards using smartphone apps in learning based on their gender, age, brand of smartphone and mobile operator, which is addressed in the following sections.

6.4.1 Students' attitudes toward the use of smartphone apps for educational purpose based on gender

The Chi-squared test results indicate that there was a statistically significant difference between the stakeholders' engagement in the use of smartphone apps for educational purposes based on their gender, as shown in Table (6.2) below. The data revealed that male stakeholders showed more engagement with smartphone apps to submit assignments than female participants.

Table 6:2 Significant Chi-square test results for division of statements by gender

N	Statements	Gender	N	Percentage					Chi-square	Significance
				A	O	S	R	N		
1	I use my smartphone apps to submit assignments	Male	180	34	52	57	28	9	13.724	0.008
		Female	144	16	30	57	21	20		
2	Smartphones create a better environment for learning	Male	180	59	65	37	13	6	14.831	.005
		Female	144	29	52	54	7	2		

As shown in the table above, 34% of male participants selected Always, compared to 16% of female participants, suggesting that there is a large gap between the use of smartphone apps by male and female participants for educational purposes. In addition, the male participants believe that smartphone Apps provide better environments for learning than traditional learning tools such as books and pencils to a greater extent than the female participants. This is reflected in the data, where 59% of male participants selected Always for that statement, compared to 29% of female participants.

These results suggest obvious gaps between the male and female participants in terms of their attitudes towards and use of smartphone apps. In the next section, data based on the participant age will be explored.

6.4.2 Students' attitudes toward the use of smartphone apps for educational purposes, based on age

The Chi-squared test results indicate a statistically significant difference between participants aged between eighteen and twenty-seven in terms of their engagement with the use of smartphone apps for educational purposes, as shown in Table (6.3) below. For the statement: "I use smartphone apps to submit assignments", there was a significant difference in favour of participants aged twenty-seven years old or more. This suggests large differences between participants' attitudes and use of smartphone apps based on their age. For example, 38% of participants aged twenty-seven and above selected Always in relation to the above statement, whereas only 16% of participants aged between eighteen and twenty-six in the Chi-squared test. Moreover, further results show a

statistically significant difference between participants aged eighteen and twenty-six years and those older than twenty-seven years old in the statement: "I use a smartphone to check my email". 71% of participants aged twenty-seven or more selected Always for this statement, compared to 79% of eighteen to twenty-six-year-old participants, as show in Table (6.3) below.

Table 6:3 Significant Chi-squared test results for statements, by age

N	Statements	Age	N	Percentage					Chi-square	Significance
				A	O	S	R	N		
1	I use my smartphone apps to submit assignments	18-26	100	12	17	37	23	11	11.797	.019
		27 and More	224	38	65	77	26	18		
2	I use my smartphone to check my email	(18-26)	100	79	6	15	0	0	9.831	.020
		27 and More	224	159	38	23	0	4		
3	Using a smartphone in the classroom helps in sharing more resources	(18-26)	100	29	38	25	7	1	10.947	.027
		27 and More	224	57	54	80	22	11		

The data highlights large gaps between the eighteen- and twenty-six-year-old participants and those who are twenty-seven and older in their attitudes toward and use of smartphone apps for educational purposes. As shown in Table Three (above), there is a significant difference between the responses of students aged eighteen to twenty-six and those aged twenty-seven and over regarding the statement "Using smartphone apps in classroom helps in sharing more resources". For this statement, 57% of participants who were twenty-seven or older recorded Always, while 29% of participants aged eighteen to twenty-six.

So far, analysis of the data indicates a significant difference between smartphone app use between students of different ages and genders. In the next sections, participants' attitudes are assessed in the context of their level of study, mobile brand and operator.

6.4.3 Students' attitudes toward the use of smartphone apps for educational purposes, based on class standing

As in the previous two sections, the participants' class level appears to have significant impacts on the Saudi students' attitudes and use of smartphone apps. This impact was evident in the Chi-squared test results, which indicated a statistically significant difference in the engagement of first, second, third- and fourth-year participants' with smartphone apps for educational purposes, as shown in Table (6.4) below.

Table 6:4 Significant Chi-squared test results for statements, based on class standing

N	Statements	Class Standing	N	Percentage					Chi-square	Significance
				A	O	S	R	N		
1	I use my smartphone apps to submit assignments	First and second year	179	32	56	55	23	13	12.095	.017
		Third and fourth year	145	18	26	59	26	16		
2	I use my smartphone to access / listen to lectures	First and second year	179	53	63	49	10	4	12.786	.012
		Third and fourth year	145	35	54	42	10	4		
3	My university provides formal training on how to use smartphone apps	First and second year	179	16	19	49	36	59	12.518	.014
		Third and fourth year	145	12	13	19	32	69		

The data suggests that a higher percentage of participants in their first and second years agreed more strongly with the statement: "I use smartphone apps to submit assignments" than participants in their third and fourth year of study. For example, 32% of first- and second-year participants selected Always for this statement, compared to 18% of third and fourth years. In addition, in response to the statement: "I use a smartphone to access / listen to lectures", the first- and second-year participants who selected Always for this statement made up 53% of the population, which was greater than third- and fourth-year participants, of

which there were 35%. Finally, in the statement: “the university provides formal training on how to use smartphone apps”, 16% of first- and second-year students who responded selected Always in relation to this statement, whereas only 12% of third and fourth years selected Always for this statement.

In summary, the data presented in Table Four above indicates significant differences between the Saudi students’ attitudes and use of smartphone apps based on their level of study, which was reflected in their responses to the Chi-squared test. Having said this, the participants’ attitudes and use of smartphone apps might also be influenced by their mobile brands and operators, which is explored in the following section.

6.4.4 Students’ attitudes toward the use of smartphone apps for educational purposes, based on brand of smartphone

Table (6.5) below, presents the results of the Chi-squared test applied to the respondents’ attitudes toward and engagement with the use of smartphone apps for educational purposes, which revealed a statistically significant difference between those participants using different brands of smartphone, especially Apple and Samsung, Blackberry, or other brands.

Table 6:5 Significant Chi-squared test results for statements, organised by brand of smartphone

N	Statements	Brand of Smartphone	N	Percentage					Chi-square	Significance
				A	O	S	R	N		
1	I use my smartphone to check my email	Apple	227	176	33	16	0	2	17.153	.001
		Other	97	62	11	22	0	2		
2	Using a smartphone in class helps in sharing more resources	Apple	227	66	65	75	18	3	14.440	.006
		Other	97	20	27	30	11	9		
3	Using a smartphone can improve communication with instructors and classmates	Apple	227	132	65	28	0	2	29.916	.000
		Other	97	40	27	17	9	4		
4	I use my smartphone to browse the internet for information	Apple	227	145	54	23	4	1	9.882	.042
		Other	97	47	37	10	1	2		
5	I use my smartphone outside of class to pursue learning	Apple	227	89	64	60	12	2	16.185	.003
		Other	97	26	34	20	11	6		

Based on the participants' responses to the statement: "I use smartphone apps to check my email", the data suggests that Apple smartphone users are most likely to use an app to check education related emails, with 77% selecting Always for this statement. Respondents who owned other brands of smartphone selected Always for this statement less frequently (64%). Moreover, the participants' responses to the statement: "using smartphones in class helps in sharing more resources", suggests that Apple appears to the type of device most used for this purpose, with 60% of Apple users selecting Always for this statement, compared to the other mobile brands, such as Samsung and Blackberry, which made up 20% of responses. This difference between Apple and the other major brands was also evident in relation to other statements, including: "using the smartphone apps

can improve communication with instructors and classmates", where 59% of Apple users from the sample population selected Always for this statement, compared to 41% of respondents using other brands of smartphone. In addition, the participants' responses to the statement: "I use a smartphone to browse the internet for information" showed a similar distribution; 64% of those students using Apple products responded to this statement with Always, in contrast to 48% of students using other brands of smartphone. Finally, in relation to the statement: "I use my smartphone outside of class to pursue learning," respondents with Apple smartphones again largely opted for Always (89%), while those 29% of those using other brands, such as Samsung or Blackberry, selected Always.

The above data suggests significant differences between the attitudes toward and engagement with the use of apps in an education context based on what brand of phone each respondent used. Another influence on attitude and engagement in this context is mobile operators, which is analysed in the next section.

6.4.5 Students' attitudes toward the use of smartphone apps for educational purposes, based on mobile operator

The data presented in this section is the final part of the Chi-squared test analysis applied to the quantitative data collected over the course of this study, which explores the participants' attitudes and engagement in the use of smartphone apps based on their mobile operator. As presented in Table (6.6) below, the data indicates a statistically significant difference between Saudi students' engagement with the use of smartphone apps for educational purposes based on their mobile operators, particularly between participants whose mobile operator was STC and those who had other operators, in the context of their responses to the statement: "I use smartphone apps to access lecture notes or other course materials". 55% of participants using STC agreed strongly with this statement, compared to 50% of those using other operators.

Table 6:6 Significant Chi-squared test results for agreement with statements divide by mobile operator

N	Statements	Mobile operator	N	Percentage					Chi-square	Significance
				A	O	S	R	N		
1	I use my smartphone to access lecture notes or other course materials	STC	169	55	53	46	9	6	11.262	.024
		Other	155	50	54	23	17	11		

The Chi-squared test indicates minor differences between attitudes toward and engagement with using smartphone apps for educational purposes based on Saudi students' mobile operators. However, the impact of the students' mobile operator on their engagement and use of smartphone apps should be carefully considered and related to the other factors assessed in this study (gender, age, class standing) in order to provide or suggest alternative approaches to learning, including more widespread use of smartphone apps.

6.5 Triangulation of quantitative and qualitative data analysis

This part presents a triangulation of the quantitative and qualitative data collected over the course of this study, key themes drawn from the collected data using qualitative instruments (Chapter five: interview, open-ended question), where data were analysed according to the thematic analysis and quantitative instrument (Chapter five: questionnaire), and where data were analysed descriptively based on (SPSS) software, with consideration to participants' characteristics. In this chapter, these findings are addressed and synthesised, with a view to linking quantitative and qualitative data analysis.

Triangulation allows a comparison of the perceptions of the stakeholders and the determination of aspects of consistency or inconsistency within the data. In fact, triangulation ultimately fortifies and enriches a study's conclusions (Hesse-Biber, 2010: 3-4).

Qualitative and quantitative methods are derived from two schools of inquiry. Qualitative research tends to be inductive, whereas quantitative methods tend to be deductive. However, triangulation provides a means by which the benefits of

quantitative design can be integrated into qualitative research (Myers, 2016). Triangulation entails the use of more than one method in a study to validate the results (Wijnhoven and Brinkhuis, 2015). Overall, the levels of confidence in a result are higher if at least two methods converge to establish the same conclusion. Thus, triangulation is a powerful research technique that supports validation via the cross verification of the results from more than one source (Renz et al., 2018). The use of multiple theories, observers, and methods aids researchers in avoiding the follies of single method, theory, and observer designs (Paltridge and Phakiti, 2015). When employed in qualitative studies, triangulation primarily improves the validity and credibility of the findings.

From a philosophical perspective, qualitative research is grounded on post-positivist epistemologies. The commonality between these philosophies is the rejection of universal truth (Vănescu and Filimon, 2017). Thus, qualitative research is based on the notion that the truth can only be approached and that there are different dimensions to phenomena. This epistemological framework forms the basis of triangulation. Triangulation allows for the integration of data from different aspects of a research problem. Convergence of the data from the various sources is a sign that the truth has been approached (Ryan, 2015). The subjective nature of qualitative data also necessitates the use of triangulation.

Triangulation in qualitative research can take on different forms. The first type, data triangulation, involves varying the time, persons, and space in a study. The second form of triangulation entails using multiple investigators or researchers. When using subjective measures to evaluate a phenomenon, the use of various assessors can reduce the effects of individual biases on the overall result. The third form of triangulation entails theory triangulation, where more than one conceptual framework is employed in the interpretation of a phenomenon (Ellis, 2016). In the fourth and most common form, methodological triangulation, researchers use at least two methods or designs to investigate an event or problem (Greyson, 2018). From this perspective, some types of mixed method designs involve the use of triangulation. However, if a mixed method study uses qualitative and quantitative methods to investigate separate phenomena, then it does not use triangulation.

Triangulating qualitative and quantitative data enhances the strengths of either method while reducing their weaknesses (Kheir et al., 2017). For instance, generalization is often problematic when utilizing qualitative data. However, sampling science is extensively employed in quantitative studies to ensure generalization of the findings. Triangulating findings from a quantitative study in qualitative research ensures that the results are generalizable. On the other hand, quantitative studies often lack detail whereas qualitative data tends to be detailed. Triangulating the two sources of data ensures that the "objective facts" are captured from the quantitative data, while making sure that the findings are as detailed as possible.

In summary, triangulation is grounded in post-positivist epistemologies. Triangulation takes different forms, the most common being the amalgamation of qualitative and quantitative designs. Triangulation is a form of validation that improves the credibility of data and ensures that the findings benefit from the strengths of the different methods used while reducing their corresponding weaknesses.

6.5.1 Using smartphone apps for educational purposes

The first operational question of this study explores the extent of stakeholders' use of smartphone apps for educational purposes. In order to achieve a valid answer to the question, the following issues must be given consideration:

- Integration of smartphones Apps in education
- Improving the professional skills of faculty members
- Communication through smartphone applications
- Enhancing learning

Analysis of the qualitative data revealed that stakeholders from all levels agreed that incorporation of smartphone apps in learning can provide a chance for faculty members and students to develop and innovate in education, the use of smartphone apps is a relatively new field of academic study. Stakeholders confirmed that the university at which the study was undertaken provides and

develops smart apps in all departments and that the Blackboard application is used frequently, through which all staff members and students communicate. They use it in all their work. In accordance with this, the quantitative data also showed that there is wide positive agreement about engagement with smartphone apps for learning in higher education, ranging from n=115 (35.5%) to n=238 (73.5%) of the people surveyed. Participants showed high willingness to achieve the use of smartphone apps for learning between students and faculty. However, approximately a quarter of respondents' indicated they were uncertain about or have no clear understanding of using smartphone apps for learning, and they may not know the requirements of use smartphone apps for learning.

The faculty members indicated belief that it is necessary to use smart devices in work as they can be effective in getting accurate results when integrated with the University systems and offer great support to educational interaction with student. Applications can also provide useful services to education, since well-developed smart apps are much better than more traditional educational computer software in some contexts.

The results indicate that the use of the Blackboard application, provided by the University, enhances and improves the professional skills of the faculty members and students, as do the use of other applications on smartphones, such as Twitter, WhatsApp, etc. Smartphone apps offer easy access to specialised websites, allow attendance of online courses and help faculty members to improve and develop their professional skills through joining specialised groups or searching for particular information. In addition, this study revealed that the smartphone apps greatly helped in providing a reliable means of communication between faculty members and students, either through Blackboard applications or social media programmes, such as Twitter or WhatsApp. Also, the quantitative statements indicate a positive agreement about the smartphone’s ability to enhance and improve the professional skills of the faculty members and students through listening to lectures, using smartphones to pursue learning and improving communication with both instructors and classmates. However, this study discovered some critical issues in using smartphone apps. The participants' perspectives indicate that the university not be provides formal training, on how to use smartphone apps.

6.5.2 The main challenges confronting students and faculty members in the use of smartphone apps for educational purposes

Faculty members	Students
The biggest challenge for smartphone apps is related to connectivity problems, slow internet speeds and the occasional instance of signal drop, which hinders the lectures' virtual classes.	The most prominent problems in the university app (Blackboard), is with loading and opening files.
The university application is not compatible with all devices, or with .pdf files. Also, they lack a data transfer option and a mechanism to directly display slides using a projector.	The Blackboard app is incompatible with smartphones, particularly the page size, which usually does not display the whole page. Students cannot log into recorded lectures and listen to virtual lectures recorded by the Blackboard application, and students are sometimes unable to send assignments and tasks through the smartphone.
Faculty members lack the knowledge to use smartphone applications.	The students believe the screen size is a problem for smartphones, making it uncomfortable to look at. There is also an issue with battery drain.
Some faculty members do not want to appear physically during the virtual class, limiting these to audio lectures.	Another challenge is the lack of data storage capacity and the difficulty of downloading the files. This is exacerbated by the incompatibility of Blackboard with smart devices and storage capacity problems in smart devices.
The respondents stressed the lack of clarity of time for communicating with students and lack of operational manuals to explain the mechanisms for communication outside working hours.	Challenges and problems that students face are slow internet and weak signal both inside and outside the university.
There are no incentives for staff and students to use modern devices, which may attract them to attend training workshops and develop their skills.	A challenge for virtual lectures is the difficulty in moving between the icons when listening to the lecture. For example, students cannot listen to the lecture while browsing electronic books, taking notes, and or translating words, which would assist learning during the lecture.

Lack of interaction during the virtual classes; one faculty member believed that students are usually inactive during the virtual classes.	Some respondents believe that the use of smart devices distract them in the classroom and virtual lecture.
A few of the interviewees believed students are sometimes distracted when using smart devices inside the classroom or when they go online. Perhaps the reason for this is the students using smartphones for personal things during the lecture.	

6.6 Conclusion

The data analysed in this chapter was gathered by questionnaire, which was given to a sample of 324 Saudi Electronic University students. The first section of the questionnaire asked the research population to provide personal information in relation to their gender, age, level of study, brand of smartphone and mobile operator, in order to properly understand the characteristics of the research population, and to assess whether there is a statistically significant difference between students' perceptions of using smartphone apps in learning. The second section of the questionnaire asked all participants to agree or disagree (on a 1-5 Likert scale) with 15 closed statements related to the use of smartphone apps for educational purposes. The data were analysed using both descriptive statistics and parametric tests, and the results presented in graphs and tables.

Overall, the results indicated that there is high positive agreement toward engagement in using smartphone apps in learning. Participants agreed least with items which described practices that may need support from the university management. The results of the variance tests revealed that there are statistically significant differences between the responses of participants' with difference smartphone brands. The mean acceptance of students' attitudes toward the use of smartphone apps for educational purposes on brand of smartphone is significantly different and that the significant different of brand of smartphones is Apple; however, at the same time, a proportion of them use another brand of smartphone. In addition, the results indicated that despite the fact that the policies and decisions in the university support the development and use of smartphone apps, opportunities for training are limited.

The next chapter discusses the results from the qualitative and quantitative datasets. This will address the research questions from different angles to explore the reality of using smartphone apps for learning in the case study context – higher education in Saudi Arabia.

Chapter 7 Discussion and Findings

7.1 Introduction

This study sought to investigate the realities of smartphone apps usage in higher education using a case study of a Saudi university. The study adopted mixed methods research model where qualitative data was obtained from interviews with faculty members and case study of the Saudi Electronic University. In contrast quantitative data was obtained from a survey of a large sample of Saudi university students. A thematic analysis of interview data from the faculty members and a quantitative analysis of survey data collected from the students helped to develop a deeper understanding of the extent and nature of smartphone usage for educational purposes in Saudi Arabia. This chapter aims to provide a presentation of the discussion of the findings of the study. The data analysis results for each of the five research questions explored in the study are presented in this chapter.

7.2 Part 1: The reality of using smartphone apps for educational purposes in the case study university

7.2.1 Understanding of using smartphone apps in the learning process

An analysis of the usage of smartphone Apps at the Saudi Electronic University reflects a wide usage of smartphones for learning purposes. A majority of the students surveyed in this study use smartphone apps to access emails, browse the internet for information, communicate with classmates and instructors, and engage in other learning activities. Most of the respondents surveyed in the study have a good understanding of how smartphone apps can be used in the learning process. However, there is a significant number of students who differ. The findings show that only 9% and 15% of the participating students agreed with the statements, “With smartphone apps I do not need to depend on desktop computers” and “I use my smartphone application to submit assignments”. The tow statements were among the least agreed with by the participants. The participants’ lowest percentage agreement was with “My university provides formal training on how to use smartphone apps”, with 8.6%. Some students lacked an understanding of whether the university offers formal training on the use of smartphone apps. Similarly, there is a general lack of understanding on the

usefulness of smartphones and desktop computers and the use of smartphone apps in submission of assignments.

The faculty members believe that smartphone apps are useful tools in enhancing the learning process by enabling learners to access educational materials from their convenient locations and promote research by students. Besides, respondents have a general understanding that smartphone apps help enhance and improve students' professional skills and faculty members. The study findings further reveal that the Blackboard application adopted by the SEU has the adequate functionalities that support mobile learning at the university. The application allows students to use smartphone devices to access learning materials from any location of their convenience, but there are limitations. The majority of students and staff have a good understanding of the usage of the system and other e-learning apps. However, staff members, particularly the elderly ones, have difficulties in using smart devices and mobile learning.

This study's findings reflect the situative and cognitive models of e-learning found in literature. According to the situative theory, learning takes place as a social participation process characterized by collaborative and active learning (Clough and Ferguson, 2010). Learners at the SEU collaborate with other students and faculty members to build online communities that help in enhancing learning activities as commented by one of the respondents:

Contacting faculty members has become smoother and faster by creating special groups in these applications. They also facilitate cooperation and communication between staff members and students, and between students themselves. The students can get quick replies to their inquiries. It is also useful for uploading assignments and giving instructions about them. Private groups have been created in some applications to facilitate communication between staff and students, so that they benefit from discussions and get quick replies to their questions. It is viewed as a place for exchanging expertise. The smart devices give the opportunity to students to contact their instructor at any time, from anywhere. Moreover, the leaners appear to have a high understanding of the usefulness and capabilities of e-learning. This understanding is gained cognitively as well as through situative learning. From a cognitive perspective, the learner’s understanding is transformed over time through efforts such as communication,

problem solving, and use of explanations (Hubackova, 2014). In the present study, mobile learning and mobile apps were seen to play a critical role in supporting learning communities in Saudi Arabia. One of the important roles of mobile learning and mobile apps was the support of communication among faculty members through chat applications. Faculty members interviewed in this study said that they participated in chats through apps such as WhatsApp where they obtained important information on their departments. For instance, SEU faculty members used the Blackboard app to communicate with colleagues while the deans, undersecretaries and advisors used a separate app for communication amongst themselves. In addition to enhancing communication among faculty members mobile apps helped to support learning communities by facilitating the development of professional skills. Faculty members from the Saudi Electronic University established professional chat groups where colleagues offered support to each other. For instance, participants could also obtain information on upcoming conferences from their colleagues. From the students' perspectives, mobile apps enhanced students' interactions by facilitating file sharing and participation in online discussions. In consistent with the findings of Aparicio et al.,2016 mobile learning helped to enhance the development of communities of practice among students and faculty members.

The development of online communities at the Saudi Electronic University fits within the five-stage model of e-learning proposed by Salmon (2003). The model helps to explain the process of building of online communities among students and faculty members in Saudi Arabia. During the first stage of access and motivation, users access the Blackboard app and other mobile apps that support e-learning. During this stage, learners interact with the ICT environment and develop a motivation for e-learning. The e-learning platforms are highly accessible to the students since they can access learning materials from locations of their convenience. The main motivation for the use of the Blackboard app and smartphone apps comes from students' understanding of the benefits of these platforms.

The next phase is online socialization where participants interact with each other, construct their identities, and find peers. At the SEU, faculty members play a critical role in enhancing online socialization through the Blackboard app. Faculty members allow students to participate in discussion groups and discussion threads

online. In the third stage of information exchange, users engage in personalization of the software through efforts such as creation of separate chat groups. In the present study, much of the information exchange was observed to take place between students and faculty members while less information exchange occurred among students themselves. For instance, faculty members shared information with students through the Dropbox app that facilitated exchange of learning materials. The fourth stage of knowledge construction occurs when members engage in collaborative efforts to develop knowledge. This is evident from the professional collaboration between faculty members. At the SEU, faculty members engaged in collaboration with colleagues through chat applications. In the final stage of development, participants seek to obtain more benefits from the system in order to reach their personal objectives. Users of various e-learning systems available at the SEU appear to follow this process of knowledge construction within their online communities.

The process and nature of online socialization and development of students' learning communities at SEU reflects the reality of mobile learning in the digital age. According to Traxler (2016), social networking technologies have converged with learning technologies, thus defining online socialization's new norm. Kukulska-Hulme and Traxler (2019) also note that online communities and social networks are an integral part of mobile learning today. At SEU, online communities play a key role in the learning process, thus demonstrating mobile learning's current reality.

7.2.2 The reality of using smartphone apps

The interviews' findings reveal a general agreement among faculty members on the usefulness of incorporating smartphones in the learning process. The use of mobile learning at the SEU could be attributed to the university's system that is effectively designed to support e- and m-learning activities. The Saudi Electronic University offers a blended learning model that combines online and face-to-face learning. At the SEU, 70% of learning activities take place through various online and virtual platforms while 30% of the learning activities are conducted through face-to-face interactions. It provides an opportunity for students to engage in mobile learning and the use of smartphone devices. The SEU's e-learning platform allows students to perform various functions such as viewing the lessons and

communicating with staff members. The university adopts the Blackboard e-learning platform, which has a good but developing functionality with mobile devices. This enhances flexibility and usefulness of the system to learners. Students are able to access the e-learning platform from their mobile devices without having to visit the campus. These findings are consistent with the Technology Acceptance Model, which postulates that the adoption of a technology is influenced by the system's inherent factors such as perceived usefulness and ease of use. According to Abdullah and Ward (2016), the acceptance of an e-learning platform among students is influenced by the perceived ease of use, perceived usefulness, and interactivity of the technology.

The case study of the Saudi Electronic University reveals that students use smartphone devices to access the Blackboard system where they can watch virtual lectures. At the SEU, computers are used less frequently than smartphone devices. Students and staff members frequently use smartphones in communicating with each other. Through smartphone apps, students are able to access lectures and lessons from remote locations.

The smartphone apps are also widely used in research with most students using them to access scientific research materials. Students using smartphone apps are able to access academic information through various educational platforms. For instance, the SEU runs the Saudi Digital Library through collaboration with international universities. The digital library facilitates online research among the SEU students could have better learning.

From the staff members' perspective, smartphone apps help in delivering classes in the virtual classrooms. The communication benefits obtained from these apps enhance the work of the staff members. The apps also facilitate interaction among students through participation in discussion forums and other group activities. The apps are also used in assisting students to conduct assignments and submit them to the instructors.

Arguably, the constructivist theory can be related to the situative theory. Based on this study, it was identified that constructivism is another model that promotes e-learning, especially using smartphones among high school students. The constructivism model affirms that learning is an active process as learners begin

the journey of acquiring knowledge by attempting to understand events of the real-world environment (Weegar & Pacis, 2012). The advocates of constructivism believe that learning primarily occurs in a situation where there is active processing of information. The activities that happen in the constructivist theory are vital for e-learning as they improve students' capacity to solve complex problems, carry out research, and work within a group. Similarly, the educators performs critical role as an assistant/supporter of the whole learning process. The educator is mandated with motivating students to formulate their own concepts and implications of an issue (Weegar & Pacis, 2012).

The reality of smartphone apps as established in the present study is consistent with previous findings in literature. For instance, Chang (2015) has established that e-learning helps to resolve logistical challenges of access to learning by facilitating the students' access to educational resources from wherever they may be. This is similar to the observation made by participants in this study. Similarly, e-learning has been shown to enhance time management (Solimeno et al., 2008) and be a convenient way for studying (Wuensch et al., 2008). Pande et al. (2016) has also established that convenience is one of the major attractions of e-learning since students can learn at their own pace, time, and location. Furthermore, in consistent with the findings of the present study, the literature on e-learning shows that e-learning promotes interactivity between faculty members and students (Ellis et al., 2009; Kuimova et al., 2016).

The reality of mobile learning at SEU is reflective of the changing paradigm of the role of the educational institution. Today, the findings indicate that the student takes an active role in the learning process by creating and sharing information. Mobile learning is gradually transforming formal educational institutions' traditional role as the only credible academic knowledge source. (Kukulska-Hulme & Traxler, 2019; Traxler, 2018; Traxler, 2016). Besides, at the SEU, students flexibly pursue learning activities, including from their homes, and participate in their overlapping on-line learning communities. It facilitates online socialization, where participants adopt or reflect norms from their virtual community and networks (Mínguez and Suárez Hernán 2009).

7.3 Part 2: Discussion and Main Findings of the Research Questions

Q1 In the research context, what are faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?

The interview data were analysed thematically to identify the interview transcripts' major themes to answer the first research question. Interviews were conducted with 13 faculty members who gave in-depth insights into their own perceptions of the use of smartphone apps in for educational purposes. Three major themes were identified as reflecting the perceptions of faculty members on smartphone apps usage namely: the integration of smartphone apps in education, improving the professional skills of faculty members, and enhancing learning. These themes are discussed in the following sections:

The acceptance of mobile learning in this study could be understood through the application of the technology acceptance model (TAM) theory. The theory postulates that the adoption or acceptance of various technologies including mobile technologies is influenced by the beliefs and attitudes of users towards the technology. Perceived benefits and perceived simplicity of use are particularly important factors that determine the acceptability of mobile learning. In the present study, the perceptions of faculty members towards mobile learning were seen to be influenced by the perceived usefulness of the mobile devices. All the interviewed faculty members observed that they benefitted from the use of mobile learning in multiple ways. The perceived benefits of smartphone apps as perceived by faculty members included providing a chance for learning, improving the professional skills of faculty members, improving collaboration with peers, and enhancing the research process. Overall, the faculty members perceived smartphone apps as a necessity in their professional life. This is consistent with the TAM theory, which postulates that an individual’s continued use of a certain technology is influenced by the belief that the technology enhances their job performance.

The emergence of new e-learning technologies can be seen to have value to academic staff regarding enhancing their work and the current research

demonstrates that smartphone technology was also allowing interaction between the learning environment and processes in the case study university and the wider Internet, to support access to relevant information and to contribute to course content (Masrom, 2007).

7.3.1 Integration of smartphones Apps in education

One of the dominant themes revealed from the interviews was that of integration of smartphone apps in education. The faculty members interviewed in this study agreed that incorporation of smartphone apps in learning had the benefit of giving the faculty members and students an opportunity for development and innovation in education. While the smartphone apps are relatively new in the education field, the faculty members agreed that the technology is widely used and constantly evolving. Today, almost every college student in Saudi Arabia has a smartphone, which presents a good opportunity for harnessing technology for educational use. The faculty members perceived the current generation of students to have access to numerous technological tools including smartphones, computers, personal digital assistants (PDAs) and other mobile devices. Concerning the integration of smartphone apps in education, three sub-themes were identified.

7.3.1.1 Smartphone apps provide opportunities to learn more effectively

One of the key sub-themes that emerged from the interviews was that smartphone apps provided a chance in learning at the university. A majority of the faculty members interviewed in this study were of the opinion that smartphone apps facilitated the learning process. The faculty members said that the SEU had made it possible for the use of smartphone apps for educational purposes through the Blackboard application. The app not only allowed the use of smartphones for educational purposes but also for communication.

The responsibility of ensuring that appropriate systems exist for the use of smartphone apps lies with the university. By providing e-learning systems such as the Blackboard, the SEU encourages learners to use smartphones for learning purposes. Staff members are also able to access the University system and communicate with colleagues through apps such as the social media.

There is wide literature support to the findings of the present study. Several studies show that the use of mobile devices in learning promotes education and learning activities (Ellis et al., 2009; Salter et al., 2014). The findings of this study are also consistent with those of Shaw and Tan (2015), which suggested that the integration of mobile technology in education improved participation in the learning process. Smartphone apps were shown to improve the students' participation and engagement in the learning process. Moravec et al. (2015) have also established that integration of mobile devices in learning helps to improve the overall learning performance of students.

7.3.1.2 Using smartphones apps is necessary to get the most from learning

Another prevalent theme that emerged from the interviews was the necessity to use smartphone apps in education. A majority of the faculty members interviewed in this study were of the opinion that smart devices were necessary for their work. The faculty members perceived the smart device as an indispensable component of their work environments. Those who considered smartphone apps as a necessity believed that the apps effectively get accurate results learning when the University's systems are integrated. The apps also offer support to educational interactions with the students. Due to the smartphone device's essential roles such as they use anywhere and at any time, most faculty members believed that the Smartphone is better than desktop computers when used for educational purposes.

An interview with the faculty members revealed that the adoption of smartphone apps within the University could be attributed to the University's systems' distinctiveness. The SEU has a learning system designed to allow blended learning, where face-to-face and online classes occur. With the system, students can access lectures and learning materials from the University system through smart devices. The Blackboard system adopted by the University has high functionality with mobile devices, which enables students to access learning from their convenient locations.

The findings of the current study are consistent with previous studies in literature that have found mobile applications to be a valuable resource in the learning process. Waters, Kenna, and Bruce (2016), for instance, found that teachers

believed that the use of educational mobile app was a valuable resource for fostering engagement and learning. In the present study, the faculty members perceived smartphone apps as a positive learning resource. Moreover, Kuimova et al. (2016) have established that use of e-learning tools help to improve the convenience of students' access to educational materials as well as improving the overall educational standards.

7.3.1.3 Special University -Centred app should be provided

To enhance the usability and integration of smartphone apps in learning, most faculty members interviewed in this study suggested that the University needed to develop a special application for serving its students and staff members' educational purposes. Such an application would be fully operated by the university to meet the special needs of the university. Moreover, the faculty members felt that it was necessary for the university to offer smartphones to students and faculty members. The respondents further proposed the provision of technical and maintenance support to the students in order to enhance the usefulness of these devices in meeting the staff and students' needs. The proposal will help to increase the productivity of the devices as well as enhance the educational process. The University currently uses commercial applications such as Twitter and WhatsApp, which some respondents believed that they did not serve the University's special needs.

As suggested by the faculty members, having a specially designed application may help to customize the application according to the university's special needs. According to Crosslin et al. (2018), customizable learning management systems help to deliver learning content to the students based on the unique circumstances of an institution and user needs. Previous studies have demonstrated the benefits of special applications in enhancing learning as opposed to commercial applications. For instance, a Spanish university had a specially designed application that was shown to improve learning and class engagement (Muñoz-Organero et al., (2012). In another study, an Italian university was shown to enhance learning, communication, and collaboration on mobile devices through the use of a specially designed learning application (De Lucia et al., 2012). This is actually in line with the constructivist theory which provides an understanding about how humans can build knowledge through e-learning.

7.3.2 Improving professional skills of faculty members through smartphone apps

The findings of the present study revealed that one of the major benefits that faculty members perceived to emanate from smartphone apps was the improvement in the professional skills of the faculty members. A majority of the interviewees believed that smartphone apps had the potential to improve and develop their professional skills. Besides, the interviewees believed that the apps had potential to enhance their teaching abilities through the use of social media and smartphone apps. The respondents were of the general opinion that smartphone apps made their jobs easier. Improvement of the faculty members' professional skills was also seen from the perspective of the enhanced communication and collaboration capability provided by the smartphone apps. The potential for improvement of professional skills among faculty members was perceived to occur through communication with groups facilitated by the apps.

As established in literature, learning through smart devices could enhance the professional skills of faculty members. The university staff interacts with e-learning systems and therefore gains communication and interactivity skills that they would not have gained if they only used face-to-face teaching (Jones et al., 2009). As Jones et al. (2009) establishes, the e-learning platform gives instructors technical knowhow and communication abilities that help to boost their career growth. Faculty members may also gain skills of collaboration due to the encouragement of collaboration in online communities (Aparicio et al., 2016).

7.3.2.1 Smartphone apps assist in improving professional skills through access to professional learning opportunities and training

A majority of the faculty members who participated in interviews conducted in this study were of the opinion that smartphone apps had a positive impact of improving and developing their professional skills including teaching skills. Some of the interviewees cited the Blackboard application offered by the university as well as other smartphone apps such as WhatsApp, Twitter, and Imo as facilitating easy access to specialized websites. Access to these websites helped the faculty members enhance their professional skills through continuous learning. Access to the Saudi Digital Library as well as access to online training courses was also cited as additional benefits of professional development among faculty members.

Others opined that the smartphone apps helped them to participate in departmental discussions and chats with their colleagues through chat groups on WhatsApp. Carrying out departmental discussions and chats on the smartphones helped to improve the staff members' communication skills. Furthermore, specialized groups facilitated by smart devices helped the staff members to obtain professional development through accessing information and discussing professional matters with their peers.

Faculty members respondents indicated that the smartphone apps are not just beneficial to the students but also to the staff members. The faculty members' professional development was passed down to the students in the form of better instruction.

Consistent with these observations, Aparicio et al. (2016) have established that e-learning promotes the establishment of Communities of Practice (CoP) that helps individuals of similar interests on certain subjects to come together and form groups. These professional groups promote the skills development of the members in academia and other aspects of the process. Similarly, Liu et al. (2010) have suggested that online communities play a critical role in the professional development of members.

It was further established that the smartphone apps helped the faculty members to develop and improve their professional skills through online training courses. A majority of the respondents believed that smartphone apps allowed them to go online to access online training course materials. The Saudi Digital Library was specifically cited as a useful platform for online training. Moreover, the smartphone devices enabled the faculty members to engage in departmental discussions and chats with their colleagues thus enhancing their communication skills.

The faculty members felt that the university website offered multiple opportunities for skills development through online training. Others observed that the university website offered access to links that external websites that offer professional skills development.

The findings of this investigation are similar to those of Islim and Cirak (2017) concerning faculty members' perceptions on the use of technology in American higher education. In their study, Islim and Cirak (2017) found that faculty members integrated smart devices in their daily and professional lives. These devices were shown to offer numerous benefits in implementing work-related tasks. The faculty members benefited from the smart devices through enhanced collaboration with colleagues through chat applications, file sharing with students on apps such as Dropbox, and use in preparation of lectures. Besides, faculty members had enhanced communication skills from using of smart devices. Similarly, the present study reveals an improvement in the professional skills of faculty members through the use of smartphone apps.

7.3.2.2 Smartphone apps assist improving professional skills through specialised groups

In addition to improving professional skills through the applications and online courses, the faculty members also perceived the smartphone apps as playing an important role in their professional skills and development through the assistance obtained from groups. The faculty members generally agreed that the smartphone applications allowed them to join and participate in groups and chat forums to obtain help on professional issues. Through interaction with other professionals, the faculty members were able to obtain support that ultimately improved their professional skills. Such perspectives reflect a general agreement among respondents that staff members could benefit from participation in group activities by obtaining relevant information from the groups as well as obtaining help by discussing issues of concern to them.

While a majority of the respondents believed that smartphone apps helped to improve professional skills of faculty members, others were sceptical. However, these respondents still agreed that the apps could facilitate staff members in attending conferences and seminars and therefore ultimately enhance the professional development of the staff members.

The findings of this study reveal a positive benefit of smartphone apps through promotion of group activities. The findings are in line with previous studies that have found a positive relationship between mobile technology and professional

skills development of faculty members. In their study of the use of mobile learning in higher education in the UAE and Oman, Al-Emran, Elsherif, and Shaalan (2016) found that mobile technology had a positive role in faculty members' professional development by facilitating collaboration and communication among the teaching staff. In addition, the study revealed that faculty members benefited from accessing useful resources related to their work online as well as enhancing their teaching skills. In another study, Islim and Cirak (2017) established that faculty members benefited from greater collaboration with colleagues who offered them professional support through chat discussions.

7.3.3 Smartphone apps can encourage exploration and research in the education process

The theme of “exploration and research in the education process” featured prominently in the interview discussions with the SEU faculty members. The majority of the respondents perceived the smartphone apps as playing an important role in enhancing the learning process. The students could better their learning through the enhanced capabilities of accessing information from the university website, the Digital Library, and other external applications. The e-learning platforms also facilitated the communication process between staff members and students and enhanced the overall educational process. Students could log into the virtual classes through smartphone apps and record lectures, as well as discuss concerns with the faculty members. Some of the respondents also believed that the smartphone apps enhanced the research process by facilitating access to scientific articles, educational materials, and other academic materials. This enhanced the quick retrieval of information among the students. In addition, some faculty members believed that the smartphone apps enabled the students to access learning platforms from their convenient locations without having to move to campus. This provided an opportunity for students who are working or those with other commitments that may make it difficult to attend to academic work on a full-time basis. Overall, the faculty members were of the opinion that the smartphone apps enhanced the learning process in several ways.

Extant literature widely supports the assertion that e-learning supports overall learning practices. According to Liu et al. (2010), mobile learning plays a critical role in enhancing overall learning. Similarly, Pande et al. (2016) have established

that e-learning promotes learning by allowing students who would otherwise be limited by time and space to access education. Chang (2015) also suggests that e-learning exposes students to expanded learning opportunities and promotes in-depth learning experiences.

7.3.3.1 Smartphones facilitate research by improving searching methods and information retrieval, via apps

A majority of respondents perceived the beneficial role of the smartphone apps in enhancing the educational process as coming from the ability to enhance the search for information. The faculty members believed that the University website, the Digital Library and other external applications including commercial applications offered a platform for students to access relevant information that was useful to the learning process. The comments from interviewees demonstrated the general perception of faculty members on smartphone apps as useful research tools. Two interviewees specifically made reference to the ability to access educational websites and digital libraries as the useful role of the smartphone applications.

The general perception across faculty members towards the role of smartphone apps was that they helped facilitate research by improving searching methods and information retrieval, via apps. The findings of the present study conform to those of Ansari and Tripathi (2017) who studied the use of mobile apps in education within the Indian context. As found in the present study, Ansari and Tripathi (2017) established that a significant portion of students used mobile apps for research purposes, specifically to access information from the internet. Mobile learning apps were shown to play an essential role in promoting research and overall learning.

7.3.3.2 Smartphone apps are important support tools for spontaneous learning and vital knowledge updates

Most of the faculty members and deans interviewed in this study agreed that smartphone applications had become ubiquitous in education and the main tool in the teaching process. According to the interviewees, smartphones have numerous applications that make them useful to the academic community. Faculty members

cited numerous applications such as word document files in PDF and word, images, and animations that are used daily in the teaching practices.

Some of the faculty members also felt that the smartphone apps played a role in facilitating the planning, execution, and monitoring of the educational process. According to the respondents, staff members and students are able to follow all programme plans and courses through the university application. The applications have also allowed the university's academic community to obtain expertise from other universities. Some of the useful functions facilitated by the applications include storage and saving of books, data, and research output as well as facilitating easy access and retrieval. The general perception across faculty members was that smartphone apps were a useful and essential tool in education and reflected the way higher education was evolving. However, there were some who were more cautious and thought that apps could be a major tool in education, but tneeded more developmeht to better suit the nature of courses and students' educational needs.

Consistent with the findings of this study, Al-Emran et al. (2016) have established that the mobile technology is a major tool for use in educational purposes. Almost every student today uses these apps to conduct various educational and learning activities. Islim and Cirak (2017) have noted the mobile devices have become a ubiquitous part of the daily life that permeates all aspects of human life today. These devices are widely used in the educational system to support various learning purposes. The extent of smartphone apps usage in the education process was particularly high at the Saudi Electronic University due to the university's distinction as an electronic university.

7.3.3.3 Smartphone apps are a secondary tool in learning

While a majority of the respondents viewed smartphone apps as the main tools in the education process, others did not support that view. Several reasons were cited for this observation including the need for continuous development and the need for further development to reach the levels of computer in data handling and security. However, the respondents still believed that the smartphone apps are helpful in the education process if used effectively. Some of the respondents believed that the smartphone apps could become the main tools in education of

developed further to enhance their capacity to meet the needs of faculty members.

A major sub-theme that emerged from the respondents was that the smartphone tools could assist teaching rather than be used as main tools. Indeed, some of the respondents felt that smartphone apps could assist in the education process but could not replace the traditional method of delivery of learning materials. The respondents believed that smartphones have great potential in supporting education through facilitating access to information on digital libraries and scientific websites. However, the respondents did not perceive the smartphone applications as the main tool in the education process.

The findings of this study, which demonstrated the role of smartphone apps as an assisting tool, imply that the traditional methods of learning still play a critical role in the education process. Therefore, learning takes place through blended learning where both online and face-to-face learning takes place concurrently. According to McCarty et al. (2016), learning today takes place within blended learning, where traditional methods are blended with electronic learning. In this learning model, mobile learning acts as a support to the overall learning process. Similarly, Borba et al. (2016) have shown that mobile and electronic learning are supportive of the overall student learning. These studies imply that smartphone apps play the role of assisting in the education process but not the main learning tools.

Q2 In the research context, what are faculty members' perceptions regarding the extent to which students are using smartphone Apps for educational purposes within the Blackboard educational environment?

The second research question sought to determine the extent to which students used smartphone apps for educational purposes from the faculty members' perspectives. This research question was investigated by conducting in-depth interviews with faculty members and deans of the Saudi Electronic University. The faculty members were asked to give their opinions on how they perceived the use smartphone apps among students for educational purposes. The prevalent theme that emerged from these discussions was that students used the smartphone apps for communication.

7.3.4 Communication facilitated by smartphones apps

A prevailing theme that emerged from the discussions with the respondents interviewed in this study was the positive role of smartphone applications by facilitating learning and professional-related communication. With increased usage of smartphones in educational institutions, the way in which staff members and students communicate has changed significantly. Technology has changed communication from the simple email communication to the instant messaging facilitated by modern communication. The faculty members observed that while formal communication within the university was done through emails, the smartphone applications had enhanced continuous communication between faculty members and their colleagues as well as between faculty members and the students. The interviews with faculty members revealed that smartphone apps enhanced communication in several ways: communication between faculty members, communication between faculty members and students, expediting communication with the students, and enhancing smartphone apps usage inside and outside the classroom.

The constructivist theory states that learners develop their own themes by connecting new knowledge to those motifs. In the process, this allows them to experience consistent development of their cognitive abilities and related skills. Behaviourists view knowledge as the self-regulation of the human mind and believe that the brain is the internal representation of the external world. Conversely, constructivists believe that students develop their knowledge and understanding through individual encounters and real-life situations (Koohang, Riley, Smith, & Schreurs, 2009).Therefore, the smartphone apps were seen as having a supportive role to the formal communication channels for the University community.

7.3.4.1 Smartphone apps facilitated communication between faculty members

Faculty members generally thought that smartphone applications offered a platform for continuous communication between faculty members and their colleagues. The professional groups communicated and collaborated using mobile applications such as WhatsApp, Twitter, and emails articulating with the central Blackboard application. The respondents agreed that the smartphone applications

allowed them to create special groups that enabled smooth and fast communication among colleagues. Through these apps, the faculty members could organize departmental meetings as well as discuss matters of importance at any time.

These findings are consistent with previous studies that have shown a positive role of smartphone apps in enhancing communication between staff members in educational settings. For instance, Al-Emran et al. (2016) have reported better communication among faculty members who used mobile apps. In another study, Sheriff (2015) reported enhanced communication among lecturers who used various mobile apps. In particular, the capability for instant messaging gave the faculty members improved abilities to communicate directly with their peers.

7.3.4.2 Communication between faculty members and students

The respondents were of the perception that the smartphone apps enabled the faculty members to communicate with students as well as reply the students' queries promptly on the Blackboard application. Moreover, students could upload their assignments and homework on the application. The respondents generally saw the smartphone apps as an important communication link between students and the faculty members. Moreover, some respondents perceived the smartphone apps as time-savers in the communication between students and staff members by eliminating the need to come to campus to engage on various matters that could be communicated instantly on smartphone apps. In addition, the smartphone apps enable students to access virtual classes from any location of their convenience. Other respondents felt that the applications helped in scheduling meetings with students

Perhaps the major benefit was seen from the ability of smartphone apps to enhance communication between faculty members and their students. According to Islim and Cirak (2017), faculty members perceive engagement with students as one of the most important aspects of mobile technology integration in education. Al-Emran et al. (2016) have also reported enhanced communication between students and faculty members following the adoption of mobile learning and technology.

7.3.4.2.1 Smartphone apps help expedite communication with students

Another theme that emerged from the interviews was that of the role of smartphone apps in expediting communication with students. Most of the faculty members viewed the smartphone apps as contributing to the expediting of communication with students. The faculty members generally agreed that they could now communicate with their students in as late as 10:00 pm, however, this was largely seen as problematic given the potential additional workload involved and intrusion on faculty members' leisure time., Students with access to WhatsApp and Twitter could easily communicate with their instructors on issues regarding the course materials and ask questions on these platforms. The faculty members felt that the smartphone apps made communication with students instant. Some compared the communication process before the adoption of these technologies and today with all respondents agreeing that the communication process had improved. Of particular note was comments that highlighted how the smartphone apps promoted effective communication that helped facilitate shared-interest groups and collaboration.

These findings conform to those of Shim et al. (2011), which suggest that using smart apps such as Twitter, Facebook, Google, and the iPhone/iPad helped expedite the communication process with students. The quickness in gaining communication skills was mainly attributed to the fast and instant nature of information transfer on these communication platforms.

7.3.4.2.2 Use of smartphone apps promotes access to knowledge inside classrooms

The faculty members interviewed in this study also felt that the students used smartphone apps inside the classroom. Majority of the respondents considered the use of smartphone apps inside the classrooms as advantageous to the students. One of these benefits is in making the students' learning process easier particularly in taking notes. Through smart devices, students could also find information that is relevant to the topic of discussion in the classroom.

These findings complement those of previous studies that have found a positive role of smartphone apps when used in the classroom. Advances in technology are

altering the way classroom activities are conducted. According to Stacy and Cain (2015), note taking is one of the major time-consuming classroom activities. However, the smart devices and mobile applications have made it easier for students to take notes during the classroom activities. In a recent study, Wyk and Ryneveld (2018) have demonstrated the positive of mobile devices in supporting note-taking activities. Some of the noted benefits of using smart devices in taking notes include the ability to combine typed notes with handwritten notes and incorporation of media such as pictures and videos. Shim et al. (2011) have also established the positive role of smartphone apps use in enhancing classroom learning activities. Heflin, Shewmaker, and Nguyen (2017) have found that mobile technology improves student engagement and learning by creating a collaborative classroom environment.

7.3.4.3 Use of smartphone apps promotes access to knowledge outside classrooms

Some of the respondents noted that the students predominantly used smartphone apps outside the classroom. It was deemed beneficial to the students as it helped to enhance learning. Outside the classroom, students could access virtual classes and obtain educational materials online through the smartphone apps. This finding is similar to that those of Wyk and Ryneveld (2018) who reported the use of smartphone apps to read notes outside the classroom. According to Wyk and Ryneveld (2018), students may have access to notes as well as gain access to additional educational resources outside the confines of the classroom.

While some faculty members viewed smartphone apps as more helpful than desktop computers, others felt that computer programs were easier to use compared to the smartphone apps like a computer screen and keyboard. For these respondents, the smartphone apps are more or less assisting tools but cannot replace the desktop computer.

Some faculty members saw the use of smartphones as problematic in that they eroded the borders existing between faculty members and students due to the expansion of unofficial communication. This was perceived to create problems emanating from lack of the traditional distance between students and instructors.

Q 3 In the research context, what are students' attitudes toward the use of smartphone apps for educational purposes within the Blackboard educational environment?

The third research question sought to determine the usage of smartphone apps in education from the students' perspective. This segment of the study was researched through a quantitative survey of the students in order to determine their attitudes towards the use of smartphone apps. The survey findings reveal that smartphone usage for educational purposes is influenced by five major factors namely, gender, age, class standing, brand of smartphone, and mobile operator.

7.3.5 Students' attitudes toward the use of smartphone apps for educational purposes

In order to explore the reality of using smartphone apps in learning, a quantitative survey was conducted with students from the SEU who were asked to responses to 15 statements in the questionnaire. The statements presented the positive engagements of students towards smartphone apps. The investigation's findings illustrate that the top five uses of smartphone apps by the students are checking emails (73.5%), browsing the internet (59.3%), communicating with instructors and classmates (53.1%), accessing class lectures (37.3%), and general pursuit of learning (35.5%). The results reveal a general positive engagement with smartphone apps for educational purposes. However, revealing little understanding was seen on the role of smartphone apps in replacing desktops, use in formal training, use in submitting assignments, sharing of resources, accessing the university's learning management system. These findings suggest that the sampled students have a generally wide acceptance of mobile learning. A majority of students have a positive perception of the usefulness of mobile phones for learning purposes. However, there is some limited awareness of the role of smartphone apps on several applications in learning. Thus, there is a need to engage in greater educational efforts in order to enhance the students' appreciation of the importance of e-learning.

Students' demographic characteristics were also considered to determine their impacts on attitudes toward the use of smartphone Apps for educational purpose. With respect to gender, the attitude of students towards smartphone usage for

educational purposes was not found to vary significantly between male and female students. However, there was significant difference between the usage of smartphone apps between male and female students for use of smartphones in submitting assignments and creation of a better learning environment. A Chi-square test on the stakeholders' engagement in the use of smartphone apps revealed that male students' usage of smartphone apps was generally similar to that of their female counterparts. This is in line with the associative theory, highlights that a diverse team is often required to accomplish a certain purpose. These results suggest that the usage of smartphone apps among male and female students does not differ significantly. Both male and female students find the applications useful for their learning experiences.

An analysis of variations in smartphone usage with age revealed that significant statistical differences existed between the respondents' responses on various aspects of stakeholders' engagement in the use of smartphone apps for educational purposes. Specifically, significant differences existed in three statements: use of Smartphone in classroom helps in sharing resources; use of smartphone improved communication with instructors and classmates; smartphone reduces dependency on the desktop. Students of different ages had different perceptions of whether using smartphones in classroom helps in sharing more resources ($p < 0.05$). This could be due to the potential differences in the levels of research conducted by students of different ages. Generally, older students would find smartphone apps more relevant in research activities while the younger ones would find smartphone apps more relevant in submitting assignments and non-educational purposes. Significant differences were also reported on the use of smartphone apps in improving communication with instructors and classmates based on ages. Those within the age brackets of 18-26 years reported different perceptions smartphone usefulness in communication with instructors and classmates. On the other hand, those aged above 31 years had different perceptions from other students on the usefulness of smartphone apps in replacing desktop computers. Again, this could be due to the potential differences in the usage of desktop computers in research activities. Students aged 31 and above would most likely be greater usage of desktop computers for research purposes. Younger students would most likely not be actively engaged in higher level research that requires desktop computers.

In terms of class standing, students' attitudes towards smartphone apps usage for educational purposes were not found to differ significantly. No significant differences existed between the attitudes of students across different classes for most of the questions. However, the use of smartphone apps in sharing of resources was significantly different across the first year, second year, third year and fourth year groups. This was only reported in the first year group (mean = 3.81) where utilization of smartphone apps in sharing of resources was found to vary significantly. This could be because first year students may not have started engaging in major research activities and therefore would attach less value to smartphones as information sharing tools.

Variations in students' attitudes according to the brands of smartphones used were also investigated. The findings revealed the existence of significant differences between the usage of smartphone apps for educational purposes based on the brand of smartphone used. Out of the fifteen statements, nine were reported to be significant on various brands such as Apple and Others. The significant factors reported in this study included the use of smartphone in conducting scientific research, use of smartphones in checking emails, role of smartphones in creating a better learning environment, use of smartphones in accessing class lectures, and the role of smartphones in improving communication. In addition, significant differences existed on the role of smartphones in accessing the learning management system, role of smartphones in increasing flexibility in access to resources, and smartphones role pursuit of learning outside the classroom ($P<0.05$ in all cases).

Users of the Apple brand of smartphones reported significant differences on usage of smartphone apps in checking emails, role of smartphones in creating a better learning environment, use of smartphones in accessing class lectures, and the role of smartphones in improving communication. Also, Apple users reported significant differences on the role of smartphones in accessing the learning management system, role of smartphones in increasing flexibility in access to resources, and smartphones role pursuit of learning outside the classroom. Significant differences were also reported on the use of smartphones in facilitating scientific research for users of others mobile devices.

The results of this study suggest that the brand of smartphone used has a strong impact on the attitudes of students towards the usage of smartphones for educational purposes. Significant differences were reported predominantly for Apple users where significant differences exist for nine statements followed by others users where only statement 1 is reported to be significantly different. The findings of this study suggest that different smartphone brands are associated with the attitudes of students regarding smartphone usage for educational purposes. This could be due to the existence of different functionalities and features among different brands of smartphones. Apple devices could be seen as having advanced features and functionalities that enhance the ability of users to access multiple services from the device. In consistent with the technology acceptance model (TAM), these results suggest that Apple devices have multiple technical factors that enhance user satisfaction and therefore encourage the rate of technology adoption. The perceived usefulness of Apple devices among students could explain its preference and adoption as predicted by the technology acceptance model. According to Al-Samarraie et al. (2017), the adoption of e-learning among students could be influenced by factors such as usefulness of a system and task-technology fit. In the case of smartphone brands, Apple's advanced features seem to resonate well with the students surveyed in this study.

Finally, the students' attitudes towards smartphone apps usage for educational purposes were explored to examine the mobile operator's differences. Students were users of the mobile operators: STC and other operators. The results show that significant differences existed on students' attitudes based on mobile operators only for use of smartphones to improve communication, use of smartphones in increasing flexibility, and facilitating outside class learning. These results suggest that mobile operators services could have a significant impact on the extent of adoption of smartphone apps in learning. Specifically, users of different mobile operator services perceived the roles of smartphones in communication, increasing flexibility, and facilitating outside class learning differently with significant differences being reported for users of Mobile only. All the significant differences for mobile operators were reported for Mobile only. This implies that the different mobile operators have different levels and forms of services, which subsequently influences the students' perceptions of the usefulness of the technology.

Overall, the survey findings show that there is a high acceptance of smartphone apps for educational use among students. Most of the participants agreed that they used smartphone apps for various reasons such as conducting scientific research, submitting assignments, checking their emails, engaging in educational discussions, accessing lecture materials, and sharing resources. Other identified applications include accessing the learning management system, outside the class learning, and browsing the internet. The smartphones also give additional functionalities such as enhancing the flexibility of learners, reducing dependence on desktop computers, improving communication, and creating a better learning environment. Finally, the results of the study reveal that most students accept that the university offers adequate training. Except for the brand of smartphone used, no significant differences existed in the usage features based on the age, gender, class, and mobile operators.

These observations are consistent with previous findings in literature, which shows that e-learning is beneficial to students' learning abilities. For instance, Wuensch et al. (2008) have established that students prefer e-learning to face-to-face learning due to the convenience afforded by the e-learning platforms. Similarly, Pande et al. (2016) have reported that e-learning facilitates easy access to information at the students' convenience. Moreover, Ellis, Ginns, and Piggott (2009) have demonstrated that e-learning offers enhanced interactivity among students, while Salter et al. (2014) reported that e-learning helped to increase the students' knowledge acquisition. This is similar to the observation made in this study on smartphone apps' benefits in learning, research, and interactions between students and faculty members. Besides, Martín-Rodríguez et al. (2015) have established one of the important success factors for online learning is the feeling of connectedness among students, educators, and the course content. Similar to these observations, the current study has established that students value smartphones' capabilities in connecting with fellow students and faculty members.

Q4 In the research context, what is the nature of the use of smartphone apps on the learning process and collegiate working within the case study University?

7.4 Impact of Using Smartphone Apps on the Learning Process and Collegiate Working

This research question highlights the impact of using smartphone apps on the learning process and collegiate working of students at SEU. Both positive and negative impacts were noted as detailed below.

7.4.1 Improved Memory and Understanding

One of the prominent themes evident in this study concerning the effects of utilizing smartphone apps on the student's learning process was the reported improved performance in classwork and assignments and the majority of respondents see smartphone apps as noticeably enhancing the educational process, for example, when searching for a particular piece of information on the university website, the Saudi Digital Library, or other external applications, as well as following classes, easily and quickly communicating with staff and students . The outcome is consistent with other reports that illustrate using smartphone apps enabled foreign language students in higher education institutions to retain an average of 89 words more than students who did not use them (Wu, 2014). Students' ability to retain new words when learning a foreign language using smartphone apps is attributed to the student's exposure to a variety of media available in different apps. In addition to the diverse multimedia students in SEU are exposed to when using smartphone apps, the exposure to an extensive pool of readily available learning materials and private information (Bomhold, 2014) may explain improved performance in assignments.

7.4.2 Increased Engagement in Class

A significant number of students reported having increased their engagement and participation in learning activities and some of the respondents reported that Students have become cleverer in their approach to things they want to have knowledge on and can get any piece of information very quickly by use smartphone apps.when required to use smartphone apps during class. These results are supported by Rezaei et al. (2018) findings that the usage of smartphone apps by undergraduate students assisted them in intensifying class participation, confidence in classwork, and the capacity to learn vocabulary. The availability of different contexts and varying interpretations of a subject on smartphone apps

helps increase the understanding of topics that would be challenging when provided in theory form only. According to Van Mierlo et al. (2012) on cognitive load theory in e-learning, increased participation in class when using smartphone apps is influenced by germane cognitive load. The germane cognitive load refers to information and activities that foster the learning process, elaborating on information through audio-visuals.

7.4.3 Improved Communication

A major theme in this study's findings was that the use of smartphone apps was reported to be beneficial for communication between those in the University. In particular, the interviews with faculty members revealed that most agreed on the beneficial role of smartphone applications in enhancing learning-related communication. Students reported that they enjoyed effective communication with other students and faculty members through the use of the mobile apps. The use of smartphone apps was found to foster positive information exchange between staff members and students on many fronts. As some respondents noted, most of the communication had shifted to online forms such as emails, which were instant and more effective than face-to-face means. Smartphone apps also facilitated communication between faculty members themselves who enjoyed greater opportunities for information exchange through discussion groups on the Blackboard app. This is similar to the findings of Al-Emran et al. (2016) who noted that mobile apps improved communication in educational settings between students and faculty members. Similarly, Sheriff (2015) has reported improved communication from use of mobile apps by faculty members. The use of instant messaging was shown to improve the abilities of faculty members in communicating with their peers. In the current study, student-student communication benefits were also reported since students reported high use of emails and chats.

7.4.4 Improved Learning Opportunities

The use of smartphone applications was found to improve learning opportunities to students within the University. The faculty members interviewed in this study generally believed that the apps offered greater flexibility and opportunities for students to acquire knowledge. In particular, students benefited from the use of

smartphone apps when conducting scientific research and accessing online resources. Most students believed that the apps enhanced their access to the learning environment. According to Shaw and Tan (2015), the use of mobile technology in education has facilitated greater knowledge acquisition and students' participation in the learning process. Moreover, Moravec et al. (2015) have demonstrated that mobile applications are helpful for improving the learning performance of students. Thus, the findings of this study are consistent with those of other studies that report an improvement in the learning process.

7.4.5 Enhanced Convenience in Learning

The majority of students considered the Blackboard app to be a convenient tool for their learning. They noted that the app made learning easy since they could access learning materials required for their university courses from home. The smartphone apps also enabled students to access virtual classes from any location of their convenience. Students' responses show that there was positive engagement with smartphone apps for educational purposes. The opportunities offered by instant messaging also improved learning convenience by allowing learners to obtain information rapidly from their lecturers. The ability to access educational websites and digital libraries was noted as a useful contribution of smartphone apps. With improved access to online resources, students also reported additional benefits of faster research and capabilities to do assignments. The convenience of mobile apps is well reported in literature. For instance, Pande et al. (2016) have demonstrated that e-learning promotes easy access to information at the students' convenience. Similarly, Wuensch et al. (2008) argue that the e-learning platforms are much more convenient in educational settings compared with the traditional face-to-face learning.

7.4.6 Smartphone Applications Facilitating Professional Communication and Communities of Practice.

As discussed in section 7.3.4.1, the faculty members reported that smartphone applications had generally helped to enhance communication with their colleagues. This extended beyond the simple transmission of information about University business and administrative matters, to include helping facilitate and sustain professional groups through enhanced communication. Smartphone

applications enabled efficient and complex communication that supported meetings and continuous communication between specialist groups. In this way, the use of smartphone applications is helping facilitate professional networks and communities of practice. Such CoP are flexible social constructs that allow members to organise and share knowledge and information to suit their shared objectives (Wenger 2004). Jennifer Preece (2003) provides a useful definition of CoPs.

> *Originally the term COP was used widely to include almost any community that came together to discuss a specific topic; they included business, education, health communities and others. Typically, the term is now associated with professional, work-oriented groups who are often associated with or hosted by companies and government agencies* (Preece, 2003, p. 72).

Communities of practice can emerge organically from shared interests and goals or can be set up for specific purposes with varying levels of formality (Lave and Wenger, 1991; Wenger 1998). Of particular interest for this study is that the use of smartphone applications appears to be contributing to a virtual community of practice (VCoP) (Hall & Graham, 2004; Dubé *et al*, 2005; Ardichvili *et al*, 2006; Kimble & Hildreth, 2005) and even a mobile community of practice (MCoP) as theorized by Kietzmann et al (2013). In the latter, members of the CoP communicate with one another via mobile devices and the associated applications to collaborate whether as sustained groups or shorter-term associations. In this study these CoP groups were largely bounded within the same organisational setting, but it is reasonable to speculate that these academic groups will also use the technology to include other colleagues and associates outside their own University. While an emerging finding, rather than a focus of this study's research questions, the issue of such MCoP and VCoP highlights the importance of smartphone applications and mobile technologies for professional learning and practitioner agency in today's higher education institutions. This is an area that warrants further research, particularly on the dynamics within these types of CoP, impact on professional capital and trajectories and their implications for institutional functioning.

Q5 In the research context, what are the main challenges that confront the students and faculty members in use of smartphone apps for educational purposes, within the Blackboard educational environment?

This final research question explored the challenges that students and faculty members can face in the use of smartphone apps for educational purposes. To explore this research question, interviews were held with faculty members while open-ended questions were included in the questionnaire administered to the students. In the open-ended questions, students were asked to identify some of the challenges they encountered in using smartphone apps for educational purposes. The main challenges identified are discussed in this section.

The technical challenges of using smartphone applications and mobile technology in the learning context that were identified by students included small screen, low internet connectivity, incompatibility with devices, problems in opening files, and limited data storage capacity. Faculty members concurred that these factors could limit the potential of smartphones and applications in their practice.

The technology adoption model (TAM) theory is helpful when understanding the implication of the students' and faculty members' perceptions towards the use of mobile technologies within the higher education context of Saudi Arabia. According to TAM, the perceived ease of usefulness has a strong impact on technology acceptance. The perceived ease of use is the degree to which a technology user believes that the use of a certain technology would be free of effort and helpful (Davis, 1989).

Overall, the convenience of using applications on their smartphones to access learning resources, communicate with others about education matters and to access course information outweighed the perceived technical challenges students and faculty members associated with this technology. Nevertheless, these factors could reduce the perceived ease of use of technology, limiting a more complete adoption of mobile devices in the higher education context. This suggests a need for universities in Saudi Arabia consider such technical issues facing mobile learning systems in order to enhance the acceptance of mobile learning among students and educators.

7.5 Challenges facing the use of smartphone apps in learning

The faculty members and students identified several challenges associated with the use of smartphone apps in learning. These include the small screen sizes of smartphones, low battery life, internet connection problems, high costs of purchasing smartphones, and negative impacts on some students' attention among others.

7.5.1 Technical challenges

Most of the challenges reported by students and faculty members concerning the use of smartphone applications in the learning process were related to technical issues. A majority of students said that they faced challenges in the use of the main University e-learning App: the Backboard App. As most students interacted with this app frequently, they were able to describe the common challenges they faced. These challenges included difficulties in opening files and loading files, compatibility with screen-size and other smart device incompatibility. Previous studies show that such technical problems are a major hindrance to effective e-learning (Al-Samarraie et al., 2017; Islam et al., 2015; Kenan and Pislaru, 2012).

Poor internet speeds emerged as another of the main technical challenges. Students noted that poor connectivity could be a major hindrance to e-learning because it hindered the ability to download files or access learning materials. Faculty members also frequently identified slow internet connectivity as a key hindrance to the optimum use of smartphone apps in learning. Some reported that it was common for internet connections to be lost midway through a lecture resulting in disruption of learning. The problem of slow internet has also been identified in previous studies on mobile learning. For instance, Kenan and Pislaru (2012) found the lack of fast internet as a challenge to effective mobile learning while Al-Harbi (2011) found slow internet connections as one of the major hindrances to the adoption of e-learning in Saudi Arabia.

In addition to slow internet speeds, another technical challenge was the difficulty in opening files on the Blackboard app. Nearly all the students surveyed in this study identified the university app (Blackboard) as problematic with the main

challenge being identified as the difficulties in opening files. Most of the respondents experienced some challenges in opening files from the Blackboard. Some students had difficulties accessing files in certain formats from the app. Others experienced difficulties when attempting to access large volumes of material from the Blackboard app. Some students felt that the Blackboard App was not updated frequently to keep up with new versions of smartphones and applications and some observed that the smartphone devices could not properly display some documents such as the Word files.

From the perspectives of faculty members, the problem of incompatibility of the main University e-learning system and smartphone applications was also highlighted. Most of the faculty members interviewed in this study believed that the university apps were incompatible with certain devices. Therefore, the applications could fail to work properly when installed on smartphones. Some specifically cited incompatibility with PDF files as one of the major concern issues of the use of smartphone apps. In addition, it was also noted that some devices failed to support file storage or downloading of certain programs that faculty members would have wanted to use in teaching. Moreover, faculty members noted that some applications did not have the projector's data transfer capabilities or connectivity.

In line with these observations, research from previous literature suggests that incompatibility of e-learning systems with mobile devices is a major limiting factor to successful implementation of e-learning. The technology acceptance model suggests that the task-technology fit must exist for a technology to be deemed useful to users and adopted (Abdullah and Ward, 2016; Al-Samarraie et al., 2017). The present study shows serious impediments for task-technology fit, particularly around students' complaints about the failure of the Blackboard App to meet their specific needs when accessing via smart and mobile technology. According to Badwelan et al. (2016), incompatibility of mobile operating systems with institutional technology is one of the major challenges facing mobile learning. Islam et al. (2015) noted that one of the major problems of e-learning is the failure by learning institutions to develop well-customized systems that cater to learners and educators' special needs. Kena and Pislaru (2012) have also reported insufficient network infrastructures as one of the major challenges of e-learning.

Similarly, Al-Samarraie et al. (2017) highlighted that poor document quality was another key limitation for effective e-learning implementation.

Technical challenges were also noted regarding the smartphone device itself. While some students identified the Blackboard App as the main problem, others identified the smartphone devices as a hindrance to effective e-learning. Those who identified the smartphone as a limiting factor identified issues such as small screen size and low storage capacity. Previously, the physical limits of mobile devices have been shown to be a limiting factor in the utilization of mobile devices for educational purposes (Badwelan et al., 2016).

One of the smartphone device challenges identified in this study was the smartphone device's screen size. Some students felt that the screen size was too small and therefore lacked comfort when used in reading. Others cited low battery life as a major challenge of using smartphones in learning. These findings are consistent with those in literature that indicate that the physical features of the smartphone can be a limiting factor in e-learning. For instance, Xanthidis et al. (2014) identified the small screen size and low battery capacity as problems of mobile learning in Saudi Arabia. Similarly, Badwelan et al. (2016) have found the small screen size of mobile phones and short battery life as some of the major limiting factors associated with mobile learning in Saudi Arabia.

The limited data storage capacity on smartphones was also identified as a major challenge to effective use of smartphone apps in education. Some students and faculty members felt that smartphones have low storage capacity that is incapable of meeting the high demands of educational activities. Others felt that the limited storage capacity led to difficulties in downloading of files. Most students believed that the smartphone devices are not optimized for storage of large files for educational purposes. One student described how his smartphone’s memory “crashed” after loading educational videos and files. The literature on challenges of e-learning is consistent with the findings of this study. For instance, Badwelan et al. (2016) established that limited memory size is one of the major challenges of mobile learning. Similarly, Kenan and Pislaru (2012) have reported mobile phones’ limited storage size as a limiting factor in mobile learning implementation. These studies suggest that the limited memory size of

smartphone devices could lower the task-technology fit of these devices as tools of e-learning (Al-Samarraie et al., 2017).

There use of virtual lectures can also present challenges for the use of smartphone devices. Some of those interviewed in this study identified challenges related to the virtual lecture system as a hindrance to successful e-learning. The virtual lecture system adopted at the SEU allows holding of lectures as well as interaction between students and their instructors. The system uses a virtual classroom application and tools that facilitate communication between students and their instructors. Some students felt that the virtual lecture system was largely incompatible with smart devices. Others observed technical challenges that made it difficult to utilize the system and some believed that the virtual lecture system suffered too many technical issues that prevented them from enjoying the lecture sessions. Others cited the difficulties in multitasking as the technical challenge associated with the system such as making presentation and using smart board.

The technical challenges identified by participants in this study are similar to those reported in the research literature. Several studies show that technical challenges are the main limitations to successful e-learning in higher education institutions (Islam et al., 2015; Al-Samarraie et al., 2017; Kenan and Pislaru, 2012). Similarly, investigations by Badwelan et al. (2016) have established that technical challenges of e-learning systems are some of the major drawbacks to the adoption of mobile learning in Saudi institutions of higher learning. On their part, Islam et al. (2015) have identified technological challenges relating to incompatibility among devices as a recurring challenge in e-learning. Some functions or features of e-learning systems fail to work properly as expected thus derailing the implementation of e-learning. Al-Samarraie et al. (2017) also note that the operational features of a system such as consistency is a primary determinant of system usefulness.

There are signs that the SEU is aware of many of these technical challenges and issues and is addressing them by having a dedicated IT team that resolves issues for students and faculty members. The university also updates its information systems continuously to maintain the integrity of its e-learning platforms.

7.5.2 Lack of knowledge regarding using smartphone apps

Some of those interviewed believed that lack of knowledge about smartphone apps among faculty members was also a limiting challenge. This aligns with other research that has highlighted that successful e-learning requires academics having appropriate skills, knowledge and confidence to develop and teach on-line and, therefore the importance of effective skills development by their institutions (Ellis, O' Reilly and Debreceny, 1998).

Other faculty members cited the technical challenges with the university website as one of the reasons for their not using smartphone apps successfully in teaching. This is similar to the observation of Islam, Beer, and Slack (2015), which notes the likelihood of technical and technological issues as one of the major challenges that face e-learning systems.

7.5.3 Lack of attention and interaction during virtual classes

For some faculty members, using smartphone apps for educational purposes could have a negative impact on the learning process. One such negative aspect was the reported lack of attention and concentration that using smartphones could have for some students. While this was a minority view, the claim that smartphone use in the learning environment could be a distraction highlights the fact that introducing e-learning is not unproblematic. These findings resonate with previous studies on the effect of e-learning (Alfaraweh and Jusoh, 2017; Klimova, 2019). A smartphone's ability to multitask and switch between different activities can explain the distracting potential of when using smartphone apps for learning (Klimova, 2019). The inability to track student activity on their smartphones and remain undetected during the class may encourage distraction in students, this is in contrast to the use of school computers during a learning session. Poor concentration in class when using smartphone apps may also be explained by the cognitive load theory, which suggests that the cognitive load imposed by the e-learning environment may be too high and, therefore, detrimental to the learning process (Van Maerli, 2012).

In addition, and related to cognitive load issues, the negative impact of smartphone use on attention and concentration in the learning process can be explained by the perceptual load theory, which posits that the processing demands of the current task influence the success or failure of selective attention. Thus, students are likely to lose concentration and attention when they experience difficulties in processing the demands of a task that requires the use of smartphone apps. According to Murphy et al. (2016), early selective attention is associated with the filtering paradigm. In this paradigm, students are bombarded with relevant and irrelevant information and requested to attend to a specific stimulus to provide an specific response. Therefore, the potential lack of attention and concentration can be explained by the loss of focus during a learning process, thereby making the student susceptible to other distractions in their smartphone devices.

Some of those faculty members that believed that the use of smartphone apps encouraged students to become inattentive and inactive during the virtual classes thought that students were more active in face-to-face lectures than virtual classes. This was seen as due to a lack of direct interaction with the faculty members.

The issue of how a lack of face-to-face interaction in e-learning can negatively impact on learner engagement has been discussed in the literature. According to Stern (2004), the lack of emotional interaction between students and their instructors and between students themselves is one of the major limitations of e-learning. The interaction between students and teachers is important because it is part of the normal student development. This aspect is absent in e-learning and therefore makes e-learning ineffective to some students. In an investigation of e-learning in higher education, Ellis et al. (2009) have established that interactions between students and instructors was an important determinant of the success of e-learning. Gray and DiLoreto (2016) have also established that the lack of interaction between educators and students is a major challenge in e-learning systems thus suggesting the need to integrate face-to-face learning with online learning.

Some of the faculty members interviewed in this study believed that smart devices could reduce attention levels because they cause occasional distraction to the

students inside the classroom particularly if they go online to search non-educational material. Those faculty members who believed that smart devices reduced the students' attention believed that some students used the smartphones for personal rather than educational purposes during the lectures.

In order to alleviate the challenge of distraction, one faculty member suggested the need for controlled use of smart devices in order to prevent students from prevent students from accessing non-educational services inside the classroom or during virtual classes. The faculty member stated that,

Similar to the observations made in this study, the literature on smartphone apps in learning has identified students' distraction as one of the major problems of e-learning. Investigations by Winter et al. (2016) have revealed that distractions are a common challenge in e-learning where accessing non-learning material distracts students from full concentration on learning processes.

7.5.4 Mistimed communication

Issues of timing of communicating with students was also identified as a problematic matter that could hinder effective use of smartphone apps in learning. Some of those interviewed believed that there was lack of clarity on when students could contact and communicate with staff via technology. This was exacerbated by a lack of written guidance on the timing of communication with students about learning matters. According to some faculty members, this lack of clarity led to work overload. This, in turn, led to staff being sceptical about the use of smartphones and technology in learning and reluctant to engage fully with technology of mobile learning.

Evidence from literature supports the assertions made by respondents in this study on the challenge of time management and workloads arising from e-learning systems in institutions. Islam et al. (2015) have reported increased workloads in e-learning compared to the traditional face-to-face learning because instructors may have to consult students for long hours including nights and weekends. As noted by the interviewees in the present study, where a framework for communicating with students is lacking, the instructors could be exposed to excessive workloads and work pressures that could negatively affect their optimal

performance. Related to this issue, instructors with large student numbers afforded by introducing e-learning can face challenges of having excess workloads and lack adequate time to offer personalized feedback and training to the students (Nandi et al. (2012).

7.5.5 Absence of incentives to use technology

Some respondents noted that a lack of incentives for students and staff to use smartphones and other technological devices could hinder uptake and use of e-learning. Interviewees noted that some staff and students were reluctant to participate in training and updates on the use of e-learning technology. Some interviewees suggested that this was due to some staff and students not recognizing the importance of mobile learning and, therefore, failing to embrace the technology. Some interviewees suggested that the lack of incentives for staff and students to engage with e-learning technology was an issue and ways to motivate people to engage should be explored.

Aparicio et al. (2016) have suggested that successful e-learning is dependent on the existence of knowledge building communities. Such communities have an awareness and knowledge of the importance of e-learning and actively participate in knowledge acquisition that actively includes the use of technology. In the present study, this type of community is not fully in place and implies that more could be done to promote a knowledge-based culture and mindset that sees technology as a fundamental aspect of learning and professional working. Further research could explore in more detail what incentives would be.

7.6 Conclusion

This study focused on the perceptions of students and their faculty staff to develop an understanding of the reality of smartphone apps usage and their value regarding the learning process and collegiality in the context of higher education in Saudi Arabia. The study also sought to determine the types of challenges that students and faculty members face in the use of smartphone apps for educational purposes within a particular e-learning environment that uses the Blackboard system and associated resources. In order to study the usage of smartphone apps in Saudi Arabia's higher education sector, this study adopted a mixed methods

research approach within a case study university; the Saudi Electronic University. Quantitative research was conducted involving a survey of 324 students from the Saudi Electronic University (SEU) using self-administered questionnaires that assessed the patterns of smartphone apps usage. In addition, a qualitative study was conducted using semi-structured interviews with 13 faculty members. Survey data was subjected to statistical analysis while interview data was analyzed using thematic content analysis.

Faculty members generally report positive views and experiences regarding the incorporation of smartphone applications such as WhatsApp, Twitter, Facebook and Instagram etc in the learning process. This technology is seen helping to enhance the learning process and experience for students and facilitating their learning-related communication and academic research. Students concurred with lecturers' perspective, and generally believed that smartphone applications made a positive contribution to their learning. This included facilitating access to learning materials, engaging in educational discussions and information exchange.

The faculty members reported benefiting from using smartphone applications and mobile technology which contributed to the convenience and efficiency of accessing their material and resources and their communication with students. Importantly, this technology also helped provide platforms to improve their own professional learning and collaboration with colleagues. An emerging finding from the current research is that smartphone applications and mobile devices contributed to faculty members' virtual interaction and networking which supported specialist groups and communities of practice. Some faculty members, particularly older staff were less positive in their views on the value of smartphone applications. A minority of those interviewed that the use of smartphones in the virtual classroom could be a distraction to learning.

While substantial benefits were identified for the use of smartphone applications for educational purposes, numerous challenges were also reported. Students and faculty members expressed the technical challenges that they faced while using smartphone applications in learning, however, these largely concerned ICT infrastructure of the University and internet speeds rather than the nature of the apps themselves. Overall, respondents highlighted problems such as difficulties in opening files, small screen-size, and incompatibility with smart devices. In

addition, poor internet speeds, limited storage capacity of smartphones, and virtual lecture challenges were noted as among the most pressing technical issues. Moreover, user-related issues as well as administrative problems were observed as common hindrances to full utilization of smartphone applications in learning. Specifically, lack of knowledge in use of smartphone apps, mistimed communication, lack of interest in the use of the apps, lack of incentives, and students' distraction from class activities were notable user and administrative barriers to e-learning.

The findings of this study show that smartphone applications have an important role to play in the learning process for higher education. From a scholarly perspective, the study findings show a need for further research into ways of improving the use of smartphone applications as well as the extension of the research in other academic institutions in Saudi Arabia. The practical implications of this study relate to the need for educational administrators, universities and other institutions of higher education for identification of the hindrances to mobile-based learning. They must also provide relevant technical, administrative, and policy support for improving mobile learning. Resolving the challenges highlighted in this study could help to improve the opportunities of smartphone applications in education

The current study has identified several challenges that students and faculty members can face in the use of smartphone apps for educational purposes and which can influence the use of this technology for learning and teaching. The two main types of interrelated challenge are:

Technical issues and challenges. These include smartphones' small screen, limited data storage capacity and internet connectivity. However, perhaps the most serious technical challenge was the reported incompatibility of the university's central e-learning systems and applications, particularly the Blackboard system, with smartphone and mobile applications. This meant difficulty in accessing and opening files. While most of those involved in this study found smartphone applications and mobile technology helpful, such challenges could limit their effective use of the technology for educational purposes and shape their related attitudes.

Dispositional/ attitudinal factors. This largely concerned the attitudes of students and faculty members to using smartphone applications and mobile technology in the learning process and e-learning environment. This study has shown that these attitudes can be influenced by perceptions of utility of the technology, awareness of useful applications, stakeholder confidence in using the technology. In line with the TAM concept, these factors influence perceptions of access and ease of use of the technology and, therefore, the uptake and use of smartphones and applications in the higher education context. Indeed, the TAM conceptual framework has proven particularly useful in understanding the factors underpinning the students' and faculty members' use of mobile technologies within the higher education context of Saudi Arabia.

In addition to the two main types of factors identified in this research, this study has also highlighted another challenge to the uptake and use of smartphone applications and virtual teaching approaches more generally in the Saudi Arabian context. This was cultural factors and norms associated with perceptions of gender interaction. From interview evidence, it appears that for cultural-religious reasons, some female faculty members are reluctant to video record lectures or participate in video meetings and prefer to use audio recordings.

The findings of this study, therefore, show that smartphone applications have an important role to play in the learning process for higher education. From a scholarly perspective, the study findings show a need for further research into ways of improving the use of smartphone applications for learning in higher education. In particular, their articulation with university e-learning systems and the extension of the research to other academic institutions in Saudi Arabia. The practical implications of this study relate to the need for educational managers and practitioners in institutions of higher to assess the hindrances to mobile-based learning. This includes improving relevant technical, administrative, and policy support to facilitate effective mobile learning.

The challenges identified in this study are important factors that Saudi Electronic University management and course leaders will want to address. The University specializes in distance education in the Country, and so it is important that the e-learning interface is as flexible and reliable as possible. While smartphone applications might not have been explicitly designed to articulate with learning

environments but HE and other education institutions, particularly those focused on distance learning, need to look at maximising the extent to which their systems articulate with mobile applications and technology. This has been brought into sharp focus by the COVID-19 pandemic and the related importance of effective technology to provide blended and distance learning where being physically/socially distant is key to public health and social and economic functioning.

Chapter 8 Conclusions and Recommendations

8.1 Introduction

This study gathered data from students and faculty members to develop an understanding of how smartphone applications were used and valued regarding the learning process in the context of higher education in Saudi Arabia. The study also identified numerous challenges that students and faculty members face in the use of smartphone apps for educational purposes within this e-learning environment. This chapter concludes the thesis with a review of the major findings of the study along with a discussion of their implications. The chapter begins with a summary of the major findings with a focus on the five research questions addressed in the study; these were:

1. In the research context, what are faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?

2. In the research context, what are faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purposes within the Blackboard educational environment?

3. In the research context, what are students' attitudes toward the use of smartphone apps for educational purposes within the Blackboard educational environment?

4. In the research context, what is the nature of the use of smartphone apps on the learning process and collegiate working within the case study University?

5. In the research context, what are the main challenges that confront the students and faculty members in use of smartphone apps for educational purposes, within the Blackboard educational environment?

The chapter also provides suggestions for further studies as well as recommendations for professional practice.

8.2 Summary of the Research Findings

This study addressed five major research questions. The findings of this study contain an integration of results obtained from analysis of the case study of Saudi Electronic University, quantitative results from survey data, and qualitative results from interview data. The survey results reveal a wide usage of smartphone apps. On the other hand, interviews with faculty members helped to enhance the understanding of the use of smartphone apps in education and the associated challenges. Also, it was found that the constructivist learning theory, associative theory, and TAM have a useful role in helping us to understand the whole concept of using smartphone apps for learning in higher education, particularly in an institution focused on maximising the use of technology. These findings are summarized along the five research questions below.

> Q1 In the research context, what are faculty members' perceptions of using smartphone apps for educational purposes within the Blackboard educational environment of the case study University?

The first research question examined the perceptions of faculty members on the use of smartphone apps for education purposes. The analysis of the interview data reveals that there are four major themes on the perceptions of faculty members on the use of smartphone apps for learning purposes. In general, faculty members had a positive perception of the role of smartphone apps in education. Faculty members interviewed in this study see smartphone apps as an essential component in the modern learning process because they enable students to access learning content from convenient locations and promote research. The faculty members believe that the SEU's Blackboard application has largely appropriate functionalities that support mobile learning but they report more could be done to improve the articulation of the Blackboard environment with smartphone applications and mobile technology. A majority of faculty members and the surveyed students have a good understanding of the Blackboard app adopted by the SEU. However, some staff members, particularly the older ones, have difficulties in using mobile devices.

One of the major themes that emerged from the interviews with SEU faculty members was the issue of the integration of smartphone apps in the University's e-learning systems. The Blackboard e-learning environment used at the SEU allows

learners to access learning materials. Most of the faculty members believed that the integration of smartphone apps with the University's e-learning systems was beneficial to higher education due to the numerous benefits they offered the educational process. However, Faculty members largely agreed that smartphone apps were yet to be fully integrated into the University's e-learning system.

Most faculty members perceived the smartphone technology as useful part of their teaching work due to their role in supporting communication and interactions with colleagues and students. Indeed, for some tasks, compared to desktop computers, the smartphone was reported to be a more convenient option for use in aspects of their professional work. However, to enhance the integration of smartphone applications in the higher education learning and teaching environment, faculty members suggested the need to develop a special application for the University. This would help improve the articulation and compatibility of smartphone applications and mobile technology with the main university e-learning system, particularly Blackboard. Such a custom-built development would enhance Saudi universities to meet students' unique educational needs.

In addition to the integration of smartphone apps in education, another theme that featured prominently was smartphone apps' role in enhancing the professional skills of faculty members. Faculty members perceived the enhancement of their professional skills as one of the benefits of the use of smartphone apps in the education sector. The findings of this study also indicate that this technology was helping to promote collegiate communication and networking, including sharing of information between faculty members. Not only did the smartphone technology help to make the instructors' jobs easier but it also enhanced collaboration and communication. For instance, faculty members could attend online scientific conferences and communicate and share ideas through professional and academic groups. Furthermore, it was established that smartphone apps helped improve faculty members' professional skills by facilitating access to professional learning opportunities and training. For instance, some faculty members noted that their teaching skills had improved through continuous learning facilitated by e-learning platforms that they had accessed partly using smartphone applications and mobile technology. Respondents specifically cited the Saudi Digital Library as one of the most useful resource for online training. It also emerged that smartphone apps contributed to the development of professional skills of faculty members through

access to specialized groups and chat forums. These groups provide help on professional issues, professional support, and general interaction. In general, smartphone apps were seen to be having a positive role in promoting group activities. However, a limited number of faculty members were sceptical of the role of these groups in improving the professional skills of members. Aparicio et al. (2016) have noted that e-learning promotes professional skills of faculty members through the establishment of Communities of Practice that are essential in bringing together staff members with similar interests for professional development.

Third, the theme of smartphone applications' role in enhancing learning was prominent in the interview discussions. Most of the faculty members believed that smartphone applications played a role in enhancing students' learning process by providing easier and expanded access to course materials and research available in digital libraries, including scientific articles and other academic resources that aid academic research. The faculty members emphasised the impact of smartphones and mobile technology in enhanced learning by increasing the convenience of literature searches and information retrieval.

The findings of this study indicate that faculty members in this Saudi university have largely accepted the positive role of smartphone applications in the education sector and see them as an important component of modern higher education. It will be interesting to explore whether academic staff at other Saudi universities share the same views, particularly those working in institutions that are less focused on the use of e-learning technology. There is an indication that this is probable as research by Al-Gahtani (2016) reveals that e-learning has gained wide acceptance among key stakeholders in the education sector in Saudi Arabia.

> Q2 In the research context, what are faculty members' perceptions regarding the extent to which students are using smartphone apps for educational purposes within the Blackboard educational environment?

The perceptions of SEU instructors at the Saudi Electronic University were explored on the extent and nature of student use of using smartphone applications for learning purposes. Faculty members revealed that use of smartphone applications by students in the higher education learning context appeared mainly to enhance their communication, complementing traditional communication

methods. Most of the faculty members were of the opinion that smartphone applications had made an important contribution to communication, which is an essential element of the educational process. The faculty members generally agreed that smartphone apps had changed how students in the learning process interacted and communicated.

From the perspective of faculty members, the major use of smartphone apps in the university learning environment is communication. Faculty members see communication between students as well as communication between students and faculty members as the major use of smartphone applications. It is interesting that faculty members and students mainly focus on the communication aspects of smartphone applications in the university context, including checking emails and on-line group discussions, rather than some of the more sophisticated uses of this technology in learning such as information retrieval, analysis, preparing assignments etc.

In addition, faculty members believed smartphone applications played an important role in promoting communication between faculty members and students. With digital applications, faculty members could respond to students' queries promptly and, in some cases, instantly. Smartphone applications were also seen as having a positive role in expediting communication with students by facilitating instant communication. For instance, WhatsApp and other instant messaging services enabled the university instructors to share information with students as well as engage with students in real time.

Communication between students and instructors was further promoted by the e-learning functionalities that enabled students to access virtual classes and online learning materials without having to visit the university campus. This eased the communication process since there was no longer the need to travel to meet instructors. In addition, smartphone apps were demonstrated to have a positive role in facilitating the planning of meetings between students and instructors.

Faculty members also thought that smartphone applications promoted access to knowledge both from inside and outside the classroom. Inside the classroom, smartphone devices facilitated the note taking activity as well as facilitating access to information relevant to the topic being discussed in the classroom.

Outside the classroom, faculty members believed that students benefitted by accessing information and educational materials online as well as virtual classes. However, some faculty members raised concerns over the potential of smartphones to erode existing boundaries of communication between students and faculty members. For example, some students could engage in formal and informal communication with instructors, even at late-night hours, thus pressurising staff. Nevertheless, most of the faculty members perceived the smartphone technology as an essential component in the current higher education learning environment.

> Q 3 In the research context, what are students' attitudes toward the use of smartphone apps for educational purposes within the Blackboard educational environment?

The extent of the use of smartphone apps among university students was determined through a quantitative survey of 324 Saudi university students. The survey findings reveal a wide usage of smartphone apps by Saudi university students. One of the major uses of smartphone apps was found to be the checking of emails where 73.5% of respondents responded positively. In addition, 59.3% of the respondents used the apps for purposes of browsing the internet while 53.1% used the apps to communicate with fellow students and instructors. Another major use of the smartphone apps was accessing class lectures where 37.3% of respondents agreed to while 35.5% agreed to using the apps for general learning activities. Other major uses of smartphone apps by students include participation in students group discussions (35.5%), access to educational materials (32.4%), increasing the flexibility of access to resources (30.2%), and engagement in scientific research activities (29.9%). One of the less frequent uses of smartphone apps included the submission of assignments (15.4%).

The survey findings further demonstrate that the use of smartphone in learning as well as the students' attitudes towards the significance of smartphone apps were influenced by factors such as age, class level, smartphone brand, and mobile operator. However, no significant differences were observed on the responses of smartphone usage between male and female students thus revealing that gender may not be an important factor in smartphone usage.

The significant differences existed between the responses of students of different ages and the use of smartphone apps for educational purposes. For instance, older students used smartphone apps more in research while their younger counterparts used the applications more in submitting assignments and engaging in non-educational activities.

Class standing was also seen to be an important factor in influencing the students' attitudes towards smartphone use in education. For instance, first and second-year class students had higher frequencies of responses for "using smartphone apps to submit assignments" compared to third and fourth-year class students. Furthermore, the students' attitudes towards the use of smartphone apps for educational purposes was influenced by the brand of smartphone devices. Apple emerges as the second-year students' popular device used for educational purposes. Apple device users also had a greater propensity to appreciate smartphones' role in increasing flexibility of accessing resources, creating a better learning environment, and learning outside the classroom. While it is unclear why students who use Apple smartphones are more likely than others to appreciate the use of applications in their learning, we can speculate that Apple operating systems might be more compatible with learning activities and purposes.

There was a statistically significant difference between the students' engagement in the use of smartphone applications for educational purposes and mobile operators they used, with STC emerging as the preferred mobile operator for learning purposes. STC is seen as offering particularly effective coverage and so this might explain its popularity among students.

Overall, the survey findings reveal a high level of acceptance of smartphone apps and the appreciation of technology's role in enhancing learning among students.

> Q4 In the research context, what is the nature of the use of smartphone apps on the learning process and collegiate working within the case study University?

Students generally reported that smartphone applications made a positive contribution to their learning. This included facilitating access to learning materials, engaging in educational discussions and information exchange. Faculty members concurred with this perspective and generally report positive views and

experiences regarding the incorporation of smartphone applications such as WhatsApp, Twitter, Facebook and Instagram etc in the learning process. The faculty members also reported benefiting from using smartphone applications and mobile technology which enhanced the efficiency of accessing course material and resources and their communication with students. This technology also helped provide platforms to improve their own professional learning and collaboration with colleagues. This included their virtual interaction and networking which supported specialist groups and communities of practice.

The search engine apps on smartphone devices also expose students to a myriad of learning information, helping them with varying elaborations of concepts and visual explanation of the process learned in class.

Another reported positive impact of the use of smartphone applications in the learning environment was on improved participation and engagement in the classroom (virtual or otherwise). Most faculty members note that using smartphone apps encourages students to be more involved in-class tasks, which, when coupled with direct lecturer input, increases concentration for classes that would have been challenging if it were only delivered orally.

However, a limited number of faculty members reported that the use of smartphone apps could negatively impact the learning process and work of SEU students if they used the applications for non-educational purposes in class and became distracted. This is further summarised under the section on Research Question 5 in this Chapter.

> Q5 In the research context, what are the main challenges that confront the students and faculty members in using smartphone apps for educational purposes, within the Blackboard educational environment?

While the usage of smartphone apps for educational purposes was largely seen to be beneficial as evidence from interviews and surveys reveal, students and faculty members still face numerous challenges. The interviews and surveys reveal that students and faculty members still face numerous challenges. The challenges associated with smartphone usage were mainly identified through interview discussions with faculty members and open-ended questions directed towards students.

From the faculty members' perspective, one of the major challenges identified as the hindrance to smartphone apps' successful usage in learning was a slow internet connection. Moreover, students also believed that slow internet speed was a major hindrance to e-learning due to the difficulty in downloading files and accessing learning materials. In addition to slow internet speeds, respondents also noted the challenge of lack of knowledge as a major threat to smartphone apps usage in education. Some respondents cited faculty members' lack of knowledge on smartphone apps as a limiting factor in e-learning since such faculty members could not transfer e-learning benefits to learners due to their personal limitations. The associative theory is useful here, in that it provides an analytical insight on how the experience of e-learning, including the use of apps, can influence students' engagement of learning and their ability to learn when use of such technology is a positive and rewarding experience. Students experience challenges regarding the use of e-learning technologies, which increases dissatisfaction and hampers their cognitive ability to learn.

Incompatibility of certain apps with devices was noted as a challenge to e-learning. Some faculty members felt that certain applications were incompatible with some mobile devices, which made it difficult for faculty members to offer effective training. Another problem that was identified as potentially hindering successful e-learning in the Saudi higher education institution was the lack of interest or reticence among some faculty members in appearing on virtual classes. This issue was particular to female instructors. This implies a need for the development of a solid policy for guiding instructional design of e-learning systems that explores and takes this issue into account. Al Gamdi and Samarji (2016) note that lack of proper instructional design support are among the major challenges that affect e-learning in Saudi Arabia's higher education institutions.

A limited number of faculty members reported that the use of smartphone apps could negatively impact the learning process and work of SEU students if they used the applications for non-educational purposes in class and became distracted. The importance of ensuring students' engagement in class and the learning process suggests the need for the University to develop institution-oriented apps that could track task progress when using smartphones. This could reduce the likelihood of distraction from the learning tasks.

Faculty members also perceived issues of the timing of communication as a challenge associated with the use of smartphone apps in education. Some saw the lack of clarity on timing of interactions with students and hours of communication outside of main business hours as an issue that led to increased working hours and workloads.

The present study's findings imply that while smartphones and their associated applications have a utility and potential in the e-learning higher education environment, there continue to be many challenges, particularly from a technical perspective. Smartphones and other mobile devices are manufactured with optimization for calls, chats, and other light-duty functionalities. Hence, they are likely to suffer challenges and limitations when used in e-learning. In addition, institutional policies for e-learning are largely limited in most learning institutions since e-learning is a new concept. According to Al Gamdi and Samarji (2016), universities need to overcome the technical challenges of e-learning before taking advantage of pedagogical opportunities created by smartphone apps. If these findings are, indeed, applicable more widely within the Country, then these current technical challenges associated with e-learning hinder the full adoption of e-learning in Saudi institutions.

Finally, the TAM and associative theories are helpful and relevant conceptual frameworks to understand the processes and behaviours involved in the use of smartphone technology in this learning environment. They provide a relevant analytical lens to help understand how attitudes and behaviours regarding the use of technology in learning are influenced by perceptions of usefulness and whether the experience is a positive and rewarding experience. They also reveal the importance of social interaction and processes that shape how technology is used by groups to communicate, to share knowledge and facilitate collaborations.

8.3 Recommendations from the Study

If the findings of this study are indicative of the situation regarding the use of smartphone apps and mobile technology in the learning process, several recommendations are proposed. First, there is a need for Saudi universities and

colleges to invest in training and support for their students and staff on how to best use smartphone apps and mobile learning in the learning process. One of the issues that was identified in this study was a limited understanding of the usefulness of smartphone apps among some students. Moreover, some faculty members also lacked a solid understanding of how best to use mobile devices in the learning process and lacked the skills to transfer to their students. These challenges show the need for a greater focus on training to equip students and staff with appropriate e-learning and mobile learning skills that will enable them to take advantage of smartphone technology's functionalities. This is in line with findings from Naveed et al. (2017) who note that one of the critical success factors for the development of e-learning in universities in Saudi Arabia is training for users, thus emphasizing the need for further training of students and faculty members on smartphone app usage in education.

In addition to user training, there is a need for Saudi universities to develop customized e-learning systems that articulate more fully with the range of smartphone apps and mobile technologies. One of the significant themes of the interview discussions with faculty members was the need to have a special application for SEU. The faculty members felt that the usability and integration of smartphone apps in learning would be enhanced if the University had its own special application for serving the educational purposes of its students and staff members. The faculty members suggested that such an application could be fully operated by the university in order to meet the needs of the university users. Currently, most Saudi universities use the Blackboard e-learning system and app, which, this study indicates can lack sufficient custom features for the pedagogical needs of Arab or Middle East students.

Moreover, there is a need to establish clearer rules and regulations for guiding the use of smartphone apps for educational purposes. One of the concerns that faculty members raised in this study was the challenge posed by some students' being distracted during the learning process due to the use of smartphones for non-educational purposes during classes. Therefore, Saudi universities should come up with appropriate rules and policies for regulating the use of smartphones and other mobile devices within the classroom settings. This would restrict the access to social media sites such as Snapchat, WhatsApp, Facebook, YouTube, and Twitter for non educational purposes during class activities. There were also concerns

among faculty members over the lack of appropriate guidelines for communication between students and staff members, with some students communicating with their instructors outside of official hours. Therefore, there is a need for clearer guidelines and regulations to specify when faculty members can be contacted by students.

It is also recommended that Saudi universities hire sufficient technical support staff to provide help to students and faculty members. The findings of this study highlight technical challenges associated with the Blackboard app as some of the major hindrances to successful e-learning at the Saudi Electronic University. Students highlighted several challenges, including difficulties in opening files, failure to load certain files, and incompatibility with smart devices. In order to resolve this problem, Saudi universities should ensure that they have an adequate technical team to offer support to users as well as working on how to improve the integration of the main university e-learning systems with mobile apps and technologies. This recommendation on technical support is in line with other research findings. Technical support for users has been identified as one of the key success factors for successful e-learning in Saudi Arabia (Naveed et al., 2017; Islam et al., 2015).

From the university's perspective, there is a need for investment to enhance the IT infrastructure to better support e-learning. The students surveyed in this study highlighted several technical issues that limited their ability to use smartphones in learning. Key among this was slow internet connectivity. Saudi universities could resolve this challenge by installing powerful fibre internet connections within the university campus. Universities should work with government entities to secure support and financing in rolling out strong network connections. Universities should also ensure that their campuses have adequate power connections and abundant power sockets to ensure that students access power conveniently in order to deal with the challenge of low battery life.

The findings of this study show that mobile devices currently in the market can be limited for learning purposes. Rather, these devices are optimized for other functionalities such as call, internet browsing, chat, and other social interaction uses. These devices suffer the challenges of small screen sizes and low storage capacities as highlighted by Saudi students surveyed in this study. Therefore, it is

recommended that manufacturers of smartphone devices increase their research and development efforts in order develop devices that could be optimized for e-learning. For example, manufacturers of smartphones could make devices with longer battery life, better screen resolution, larger screen size, and larger internal storage that were reasonably priced or discounted for educational users.

Finally, there is a need for Saudi universities to encourage the establishment of equitable online communities to support e-learning. This research has shown the value of smartphone apps and mobile devices in supporting communication that helps foster communities of practice and collaboration for faculty members and students. However, due to the lack of the physical interaction component in e-learning, universities need to ensure that all learners are included in an inclusive learning community in order to ensure that some learners are not left behind. According to Berth et al. (2015), online communities play a critical role in influencing the success of e-learning by encouraging discussions and support from fellow students. Therefore, there is a need for Saudi universities to leverage on the opportunities offered by these communities to encourage greater and more inclusive uptake of e-learning.

8.4 Suggestions for Further Research

The present study adds to the existing body of knowledge in education by enhancing the understanding of how smartphone apps contribute to the learning process in higher education in Saudi Arabia and how this can be enhanced. The study also highlights the range of substantial challenges that students and faculty members can face during mobile learning and teaching, respectively. However, several other areas should be explored in future research endeavours in order to complement and advance the knowledge presented in this study. First, the present study's source of data on the understanding of smartphone usage from faculty members' perspectives came from in-depth interviews with faculty members from the Saudi Electronic University. While this provided detailed insights on the nature of smartphone apps usage in the higher education e-learning environment and many of the findings align with wider research on e-learning in Saudi Arabia, there are still questions about how typical the findings from the current study are. While qualitative studies provide rich information context, quantitative studies allow the statistical exploration of research topics in order to determine a generalisable

understanding of a situation as well as exploring the statistical the association between key variables. Therefore, future studies should include representative quantitative surveys to obtain data on the research questions from a larger sample of faculty members. The present study's results would help inform survey questions that would enable the exploration of the quantitative perspective of various aspects of e-learning in Saudi Arabia. Results from such a quantitative study could provide additional information that would help inform accurate decisions at the institutional and government level on promotion of e-learning.

Comparative studies should also be conducted in future in order to compare e-learning in Saudi Arabia with e-learning in other Middle East countries as well as developed countries such as the United States, United Kingdom, Germany, France, Japan, and Australia. Such comparative studies may be a good source of “lessons learnt” that could offer innovative ideas of enhancing e-learning in Saudi Arabia bearing in mind contextual caveats. Since e-learning and other modern technologies are widely employed in these developed countries, comparative studies could offer useful insights on ways on enhancing e-learning and overcoming the associated challenges in Saudi Arabia.

The present study focused on a case study of mobile learning at the Saudi Electronic University that used qualitative interviews with faculty members and a quantitative survey of students from the same institution. While the sample size was large enough to allow generalization of the research findings within the case study institution; the SEU, there is need for future studies to investigate how smartphone apps can enhance the learning process in higher education in Saudi Arabia more widely by examining in-depth evidence from several Saudi universities that differ from the SEU. The Saudi Electronic University was selected for the case study in the present research due to its pioneer role in electronic learning and its focus on e-learning in delivery of teaching and learning. Future studies should explore the research problem by comparing e-learning at SEU with other universities that follow the traditional face-to-face learning in order to develop an understanding of the issues and challenges of e-learning in these institutions. Moreover, an expansion of the sample of institutions explored may provide rich comparative information that may further promote the development of knowledge on e-learning in Saudi Arabia.

The findings of this study incentivize researchers in computing and software development fields to investigate the development of devices, software, systems, and applications optimized for teaching and learning within the e-learning context. The findings of the present study reveal that students and instructors can experience major challenges in mobile learning and teaching due to technical limitations associated with the present mobile learning systems. Challenges such as incompatibility of e-learning apps with smart devices, low battery life, small screen sizes, and poor internet connectivity are some of the issues that require careful research attention in the future. Software developers as well as academicsparticularly in Saudi Arabia, need to research and develop systems and mobile applications that are optimized for use by Saudi or Arab students in order to ensure optimum benefits are derived from e-learning.

- The present study focused on the realities and challenges of smartphone usage for educational purposes in a higher education case study in Saudi Arabia. The findings reveal a wide acceptance of mobile learning in Saudi Arabia's higher institutions of learning. This study looked at the nature of smartphone apps and mobile technology in the learning process but did not focus on how it influenced students' learning outcomes. Therefore, future studies should explore this topic and related the pedagogical aspects of mobile learning. This could include further research looking at how students interact with learning materials in digital form.

- which teaching methods are effective in e-learning as well as the effective ways of integrating mobile devices into teaching and learning in order to derive maximum benefits of mobile phone functions.

- What is the ideal mix of face-to-face learning with virtual lectures for effective learning In different contexts. For instance, the Saudi Electronic University currently uses a 70:30 mix of online and face-to-face teaching. Future studies should explore whether fully online academic programs are beneficial compared to blended learning within the context of Saudi Arabia.

References

Abdullah, F. and Rupert, W. (2016). Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors. Computers in Human Behavior, 56, 238-256.

Abeele, M., Ralf, W. and Rich, L. (2018). Mobile media and social space: How anytime, anyplace connectivity structures everyday life. Media and Communication, 6.2, 5-14.

Alahmari, A. (2017). The state of distance education in Saudi Arabia. Quarterly Review of Distance Education, 18.2, 91-98.

Al-Asmari, A. and Shamsur Rabb Khan, M. (2014): E-learning in Saudi Arabia: Past, present and future. Near and Middle Eastern Journal of Research in Education

Albalawi, M. (2007). Critical factors related to the implementation of web-based instruction by higher-education faculty at three universities in the Kingdom of Saudi Arabia. The University of West Florida. pp. 23–24.

Alebaikan, R. and Salah, T. (2010). Blended learning in Saudi universities: challenges and perspectives. ALT-J 18.1, 49-59.

Al-Emran, M. & Shaalan, K. (2015). Learners and educators attitudes towards mobile learning in higher education: State of the art. In 2015 International Conference on Advances in Computing, Communications and Informatics (ICACCI) (pp. 907-913). IEEE.

Al-Emran, M., Elsherif, Hatem M. and Khaled, S. (2016). Investigating attitudes towards the use of mobile learning in higher education. Computers in Human Behavior 56: 93-102.

Alenezi, A. (2018). Effectiveness of training program in enhancing E-assessment through Tablets and Smartphones: A case study of Saudi Arabia. IJERI: International Journal of Educational Research and Innovation 11, 1-17.

Al-Fahad, FN. (2009). Students attitudes and perceptions towards the effectiveness of mobile learning in King Saud University, Saudi Arabia. The Turkish Online Journal of Educational Technology 8: 111-119.

Alfarani, L. (2015). Influences on the Adoption of Mobile Learning in Saudi Women Teachers in Higher Education. International Journal of Interactive Mobile Technologies 9: 58-62.

Alfawareh, H, and Shaidah, J. (2017). The Use and Effects of Smartphones in Higher Education. International Journal of Interactive Mobile Technologies (iJIM) 11.6 , 103-111.

Algahtani, A. (2011). Evaluating the E ectiveness of the E-learning Experience in Some Universities in Saudi Arabia from Male Students' Perceptions. Doctoral thesis, Najran University.

Algahtani, Said S. (2016). Empirical investigation of e-learning acceptance and assimilation: A structural equation model. Applied Computing and Informatics 12.1: 27-50.

Algamdi, M. A., and A. Samarji. (2016). Perceived barriers towards e-Learning by faculty members at a recently established university in Saudi Arabia. International Journal of Information and Education Technology 6.1: 23.

Alhajri, R. (2016). Prospects and challenges of mobile learning implementation: A case study. Journal of Information Technology & Software Engineering, 6(5), 1-8.

Alhalafawi, W. (2011). E-learning innovated applications. Qairo, Dar Afikir Alarabi.

Al-Harbi, Al-Siraihi, K. (2011). E-Learning in the Saudi tertiary education: Potential and challenges. Applied Computing and Informatics 9.1 , 31-46.

Alharbi, O., et al. (2017). Instructor Acceptance of Mobile Learning in Saudi Arabia: A Case Study of Hail University." International Journal of Business and Management 12.5, 27.

Al-Hunaiyyan, A., Al-Sharhan, S. and Alhajri, R. (2017). A new mobile learning model in the context of the smart class rooms environment: a holistic approach. Int. J. Interact. Mob. Technol. 11, 39–56.

Alinizi, S. (2012). The degree of mobile phones applications use by the University of Taibah in the Kingdom of Saudi Arabia and their obstacles to use (Unpublished master's thesis). Graduate Faculty of Louisiana State University, Louisiana.

Aljaber, A. (2018). E-learning policy in Saudi Arabia: Challenges and successes. Research in Comparative and International Education 13.1, 176-194.

Aljaloud, A., William, B. and Paul, K. (2018). Factors that influence teachers' decisions to use smartphone clicker apps to enhance teacher-student interactions in university classrooms in Saudi Arabia. Learning: Research and Practice, 1-20.

Alkhozim, K. (2012). Effectiveness of using the balck board mobile program for mobile learning in interaction and academic achievement of students in the development of methods of teaching mathematics course at Teachers College at King Saud University (Unpublished doctoral dissertation). University of Imam Muhammad, Saudi Arabia.

Ally, M., & Khan, B. H. (Eds.). (2015). International Handbook of E-Learning Volume 2: Implementation and Case Studies. Routledge. p. 262.9

Almahfud, M. Z. (2014). A cross cultural comparison of smartphone use in the United States and the Kingdom of Saudi Arabia. Montana State University.
Al-Maini, Y. (2011). Using technology in EFL in Saudi Arabia. Literacy Information and Computer Education Journal (LICEJ), 2(3), 477-480.
Almajali, D. A., & Al-Lozi, M. (2016). Determinants of the actual use of e-learning systems: An empirical study on Zarqa University in Jordan. Journal of Social Sciences (COES&RJ-JSS), 5, 172-200.
Almutairi, H.(2016). Economic diversification in GCC economies: A heaven for investors. International Journal of Economics and Finance 8.4, 84.
Almutairy S., Davies, T. and Dimitriadi, W. (2015) The Readiness of Applying M-Learning among Saudi Arabian Students at Higher Education. International Journal of Interactive Mobile Technologies, 9: 33-36.
Alqahtani, M, and Heba, M. (2015). Mobile applications' impact on student performance and satisfaction. Turkish Online Journal of Educational Technology-TOJET 14.4, 102-112.
Alqarni, A. (2015). Educational technology in Saudi Arabia: A historical overview. International Journal of Education, Learning and Development 3: 62-69.
Alomari, M. (2014). The degree of the utilization of mobile learning applications by graduate students at the Faculty of Education in Yarmouk University & the obstacles to such utilization. Almanarah, 20(1), 269-300.
Alrasheedi, M. & Capretz, L. F. (2015). An empirical study of critical success factors of mobile learning platform from the perspective of instructors. Procedia-social and behavioral sciences, 176, 211-219.
Al-Samarraie, H., Selim, H., Teo, T., & Zaqout, F. (2017). Isolation and distinctiveness in the design of e-learning systems influence user preferences. Interactive Learning Environments, 25(4), 452-466.
Al-Shehri, Ali M. (2010). E-learning in Saudi Arabia: To E or not to E, that is the question. Journal of family and community medicine 17.3,147.
Alshehri, H, and Farid, M. (2017). Current state on internet growth and usage in Saudi Arabia and its ability to support e-commerce development. Journal of Advanced Management Science 5.2, 127-132.
Altameem, T. (2011). Contextual mobile learning system for Saudi Arabian universities. International Journal of Computer Applications 21.4,21-26.
Alturki, U and Ahmed, A. (2016). Evaluating the Usability and Accessibility of LMS" Blackboard" at King Saud University. Contemporary Issues in Education Research 9.1, 33-44.
Alwraikat, M.A. (2017). Smartphones as a new paradigm in higher education overcoming obstacles. International Journal of Interactive Mobile Technologies (iJIM) 11.4, 114-135.
Ameen, N and Willis, R. (2015). The Effect of Cultural Values on Technology Adoption in the Arab Countries. International Journal of Information Systems.2.
Ansari, M. S. and Tripathi, A. (2017). An Investigation of Effectiveness of Mobile Learning Apps in Higher Education in India. International Journal of Information Studies & Libraries, 2(1), 33-41.
Antwi, S. and Hamza, K. (2015). Qualitative and quantitative research paradigms in business research: A philosophical reflection. European Journal of Business and Management 7.3, 217-225.
Aparicio, M., Bacao, F. & Oliveira, T. (2016). An e-learning theoretical framework. Journal of Educational Technology & Society, 19(1), 292-307.
Aparicio, S., Urbano, D. & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. Technological Forecasting and Social Change, 102, 45-61.
Ardichvili, A., Maurer, M., Li, W., Wentling, T. & Stuedemann, R. (2006). Cultural influences on knowledge sharing through online communities of practice. Journal of Knowledge Management, 10(1), 94-107.Dubé et al, 2005
Arksey, H. and Lisa, O'Malley. (2005). Scoping studies: towards a methodological framework. International journal of social research methodology 8.1, 19-32.
Asiimwe, Edgar N., Åke Grönlund, and Mathias, H. (2017). Practices and challenges in an emerging m-learning environment." International Journal of Education and Development using Information and Communication Technology 13.1, 103-122.
Attia, N. A., Baig, L., Marzouk, Y. I., & Khan, A. (2017). The potential effect of technology and distractions on undergraduate students' concentration. Pakistan journal of medical sciences, 33(4), 860.
Badwelan, A, Steve, D, and Adel A. Bahaddad. (2016). Towards acceptance m-learning approach in higher education in Saudi Arabia. International Journal of Business and Management 11.8 , 12.
Barrett, R, C. (2015). Saudi Arabia: Modernity, Stability, and the Twenty-First Century Monarchy. No. JSOU-15-3. JOINT SPECIAL OPERATIONS UNIV MACDILL AFB FL.
Bates A.W. (2005).Technology, e-learning and Distance Education. Routledge, London.

Bassey, M. (1999). Case Study Research in Educational Settings. Mcgraw-Hill Education (UK).
Beddall-Hill, N. L., Jabbar, A., & Al Shehri, S. (2011). Social mobile devices as tools for qualitative research in education: iPhones and iPads in ethnography, interviewing, and design- based research. J. of the Research Center of Educational Technology, 7(1), 67-90.
Beth, A. D., Jordan, M. E., Schallert, D. L., Reed, J. H., and Kim, M.(2015). Responsibility and generativity in online learning communities. Interactive Learning Environments, 23(4), pp. 471–484. https://doi.org/10.1080/10494820.2013.788035.
Biesta, G. 2010. Pragmatism and the philosophical foundations of mixed methods research. In Handbook of Mixed Methods in Social and Behavioral Research, 2nd ed. Edited by Abbas Tashakkori and Charles Teddlie. Thousand Oaks: Sage, pp. 95–117.
Borba, Marcelo C. & et al. (2016). Blended learning, e-learning and mobile learning in mathematics education. ZDM 48.5, 589-610.
Boruff, J., & Storie, D. (2014). Mobile devices in medicine: A survey of how medical students, residents, and faculty use smartphones and other mobile devices to find information. Journal of the Medical Library Association, 102(1), 22-30. https://doi.org/10.3163/1536-5050.102.1.006.
Bouhnik, D. & Deshen, M. (2014). WhatsApp goes to school: Mobile instant messaging between teachers and students. Journal of Information Technology Education: Research, 13, 217-231.
Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.
Brimble, M. (2016). Why students cheat. An exploration of the motivators of student academic dishonesty in higher education. In: Bretag T (ed) Handbook of academic integrity, p 365. doi: 10.1007/978-981-287-098-8_58.
Burden, K and Matthew, K. (2016). Conceptualising authentic mobile learning. Mobile learning design. Springer, Singapore, 27-42.
Burke, J.R and Anthony J. Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. Educational Researcher 33: 14–26
Calvo, R., Arbiol, A. & Iglesias, A. (2014). Are all Chats suitable for learning purposes? A study of the required characteristics. Procedia Computer Science, 27, 251-260.
Campbell, S.W and Rich, L. (2017). Mobile communication: Bringing us together and tearing us apart. Mobile Communication. Routledge, 11-26.
Castells, M. (2001). The rise of the network society (2nd ed.). Oxford ; Malden, Mass: Blackwell Publishers.
Chanchary, Farah, H. and S. A. M. I. U. L. Islam. (2011). Mobile learning in Saudi Arabia–prospects and challenges.
Chang, V.(2015). The role and effectiveness of e-learning for the industry. Lambert.
Cheng, Y. (2011). Antecedents and consequences of e-learning acceptance. Information Systems Journal, 21(3), 269-299.
Cho, M. and Tobias, S. (2016). Should instructors require discussion in online courses? Effects of online discussion on community of inquiry, learner time, satisfaction, and achievement. International Review of Research in Open and Distributed Learning, 17(2), pp. 123-140.
Chung, Hsin-Hui, Shu-Chu Chen, and Min-Hsiu Kuo. (2015). A study of EFL college students' acceptance of mobile learning. Procedia-Social and Behavioral Sciences 176, 333-339.
CIA (2019). Middle East: Saudi Arabia. Accessed January 14, 2019 <https://www.cia.gov/library/publications/the-world-factbook/geos/sa.html>
Clough, G. and Ferguson, R. (2010). Virtual Worlds are Authentic Sites for Learning in Virtual Worlds: Controversies at the Frontiers of Education. (eds Sheehy, K., Ferguson, R. and Clough, G.) Nova Science Publishers, New York.
Cochrane, T. and Roger, B. (2010). Smartphones give you wings: Pedagogical affordances of mobile Web 2.0. Australasian Journal of Educational Technology 26.1.
Cochrane, P. (2018). The economics of the hajj. Retrieved from: https://www.accaglobal.com/an/en/member/member/accounting-business/2018/07/insights/economics-hajj.html.
Conole, G., Dyke, M., Oliver, M. and Seale, J. (2004). Mapping pedagogy and tools for effective learning design , Computers and Education.
Conrad, D. (2004). University instructor's reflections on their first online teaching experience. JALN, 8(2).
Cowan, David. (2018). The Coming Economic Implosion of Saudi Arabia: A Behavioral Perspective. Springer.
Creswell, JW. & Plano Clark, VL. (2011). Designing and Conducting Mixed Methods Research (2nd ed.). London: Sage Publications Ltd.
Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Boston, MA: Pearson.

Creswell, J W. (2009). Research Design: Qualitative, Quantitative, and Mixed Methods Approach, 3rd ed. Thousand Oaks: Sage.
Creswell, J W. (2013). Qualitative Inquiry and Research Design: Choosing among Five Approaches, 3rd ed. Thousand Oaks: Sage.
Creswell, J. W. (2013). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Washington, DC: SAGE.
Creswell, John W., and J. David Creswell. (2017.). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.
Creswell, John. W.(2003). Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks, California: Sage Publications.
Crosslin, Matt, et al. (2018). Customizable Modalities for Individualized Learning: Examining Patterns of Engagement in Dual-Layer MOOCs. Online Learning 22.1,19-38.
Dasgupta, M. (2015). Exploring the relevance of case study research. Vision 19.2, 147-160.
Daudt, Helena ML., Catherine van Mossel. and Samantha J, Scott. (2013). Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. BMC medical research methodology 13.1, 48.
Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology.MIS Quarterly 13(3):319–340.
Deegan, R. and Paul, R. (2010). A classification of m-learning applications from a usability perspective. Journal of the Research Center for Educational Technology 6.1, 16-27.
De Lucia, Andrea, et al. (2012). A collaborative augmented campus based on location-aware mobile technology. International Journal of Distance Education Technologies (IJDET) 10.1, 55-73.
Denscombe, M. (2002). Ground Rules for Good Research. Open University Press, Buckingham.
Dhaheri, L. and Ezziane, Z. (2015). Mobile learning technologies for 21st century educators: opportunities and challenges in the UAE. International Journal of Mobile Learning and Organisation, 9(3), p.218.
Dixon-Woods M, Shaw R L, Agarwal S, Smith J A. (2004). The problem of appraising qualitative research. Qual Saf Health Care. 2004;13:223–5.
Dreher, A. (2006). Does globalization affect growth? Evidence from a new index of globalization. Applied economics, 38(10), 1091-1110.
Ebiye, E. V. (2015). Impact of SmartphonesTablets on the information seeking behaviour of medical students and staff of Niger Delta university Bayelsa state-Nigeria. Library Philosophy and Practice, 0_1.
El-Hussein, M. & Cronje, J. (2010). Defining mobile learning in the higher education landscape. Educ. Technol. Soc. 13, 12–21.
Ellis, A., O'Reilly, M., and Debreceny, R. (1998). Staff development responses to the demand for online teaching and learning. Southern Cross University, ePublication@SCU. http://epubs.scu.edu.au/tlc_pubs/39/

Ellis, R. A., Ginns, P. & Piggott, L. (2009). E-learning in higher education: some key aspects and their relationship to approaches to study. Higher Education Research & Development, 28(3), 303-318.
El Mallakh, Ragaei. (2015). Saudi Arabia: Rush to Development (RLE Economy of Middle East): Profile of an energy economy and investment. Routledge.
Emdad, A., Badamas M., and Mouakket, S. (2009) Factors and impacts of low utilization of Internet: The case of Arab countries. Journal of International Technology and Information Management, vol.18 (3/4), pp. 299320.
Engelbrecht, E. (2005). Adapting to changing expectations: Post-graduate students' experience of an e-learning tax program. Computers and Education, 45(2), 217-229. doi:10.1016/j.compedu.2004.08.001.
Foley, S. (2017). When Oil Is Not Enough: Sino-Saudi Relations and Vision 2030. Asian Journal of Middle Eastern and Islamic Studies Vol 11.1.
Fischer, H., Heise, L., Heinz, M., Moebius, K. & Koehler, T. (2015). How to identify e-learning trends in academic teaching: Methodological approaches and the analysis of scientific discourses. Interactive Technology and Smart Education, 12(1), 31-43.
Forster, N. (2017). The Rise of Women Managers, Business Owners and Leaders in the Arabian Gulf States. Cambridge University Press.
Franklin, T. (2011). Mobile learning: At the tipping point. TOJET: The Turkish Online Journal of Educational Technology 10(4), 261- 275.
Friedman, T. (2006). The World is Flat. London: Penguin Books.
García, B., Welford, J. and Smith,B.M. (2016). Using a smartphone app in qualitative research: the good, the bad and the ugly." Qualitative Research 16(5) , 508-525.

Gasaymeh, AlMothana M. (2017). Faculty Members' Concerns about Adopting a Learning Management System (LMS): A Developing Country Perspective. Eurasia Journal of Mathematics, Science and Technology Education 13.11, 7527-7537.
Gillett-Swan, J. (2017). The challenges of online learning: Supporting and engaging the isolated learner. Journal of Learning Design, 10(1), 20-30.
Glesne, C. (2011). Becoming qualitative researchers: An introduction (4th ed.). Boston, MA: Pearson.
Godwin-Jones, R. (2011). Emerging technologies: Mobile apps for language learning. Language Learning and Technology, 15(2), pp. 2-11.
Gray, J. A. & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. International Journal of Educational Leadership Preparation, 11(1), n1.
Grinin, L. (2005). Globalizacija i nacional'nyj suverenitet, Istorija i sovremennost', Vypusk No. 1/2005, retrieved from: http://www.socionauki.ru/journal/articles/145683/.
Gruzd, A., Staves, K. & Wilk, A. (2012). Connected scholars: Examining the Role of Social Media in Research Practices of Faculty using the UTAUT Model. Computers in Human Behavior, 28(6), 2340-2350. https://doi.org/10.1016/j.chb.2012.07.004
Hahn, J. (2014). Undergraduate research support with optical character recognition apps. Reference Services Review, 42(2), 336-350.
Hall, B. & Snider, A. (2000). Glossary: The hottest buzz words in the industry.
Hall, F. (2012). Mixed Methods: In search of a paradigm. In Le, T. and Le, Q. Conducting Research in a Changing and Challenging World Nova Science Publishers Inc.
Hall, H. & Graham, D. (2004). Creation and recreation: motivating collaboration to generate knowledge capital in online communities. International Journal of Information Management, 24, 235-246
Hara, B. (2010). Learning-centered pedagogy. Retrieved June 1, 2018, from http://chronicle.com/blogs/profhacker/learning-centered-pedagogy/25052
Hashim, H., Yunus, M. M. & Embi, M. A. (2018). Learning through mobile: exploring the views of polytechnic ESL learners. Teaching and Learning English in Multicultural Contexts (TLEMC), 2(1).
Heflin, Houston ., Jennifer., Shewmaker. and Jessica Nguyen. (2017). Impact of mobile technology on student attitudes, engagement, and learning. Computers & Education 107,91-99.
Heine, J. & Thakur, R. (Eds.) (2011). The dark side of globalization. Tokyo/New York/Paris: United Nations University Press.
Himmelsbach, T. (2013). A survey on today's smartphone usage. GRIN Verlag.
Hinze, A., Vanderschantz, N., Timpany, C., Cunningham, S. J., Saravani, S. J. & Wilkinson, C. (2017). Use of mobile Apps for Teaching and Research, Working Paper: 01/2017.
Harrison, Helena., et al. (2017). Case study research: foundations and methodological orientations. Forum Qualitative Sozialforschung/Forum: Qualitative Social Research. Vol. 18. No. 1.
Hart, C. (2018). Doing a Literature Review. London: SAGE Publications.
Hubackova, S. (2015). History and perspectives of elearning. Procedia-Social and Behavioral Sciences, 191, 1187-1190.
Huitt, W., Huitt, M., Monetti, D., Hummel, J., (2009). A systems-based synthesis of research related to improving students' academic performance. In: Paper Presented at the 3rd International City Break Conference sponsored by the Athens Institute for Education and Research (ATINER). Athens, Greece, October 16–19.
Huitt, W., Monetti,D. and Hummel,J. (2009). Designing direct instruction." version of chapter published in C. Reigeluth and A. Carr-Chellman, Instructional-design theories and models 3.
Hwang, G. J., Tsai, C. C., & Yang, S. J. H. (2008). 'Criteria, strategies and research issues of context-aware ubiquitous learning'. Educational Technology & Society, 11(2), 81-91.
Ibrahim, Nahla, K., et al. (2018). Mobile Phone Addiction and Its Relationship to Sleep Quality and Academic Achievement of Medical Students at King Abdulaziz University, Jeddah, Saudi Arabia. Journal of research in health sciences 18.3.
Intriligator, MD. (2003). Globalization of the World Economy: Potential Benefits and Costs and A net Assessment. Los Angeles: Milken Institute.
Intriligator, M. (2017). Globalisation of the World Economy: Potential Benefits and Costs and a Net Assessment. Economics of Globalisation. Routledge, 85-94.
Iqbal, S and Ijaz, A. Qureshi. (2012). M-learning adoption: A perspective from a developing country. The International Review of Research in Open and Distributed Learning 13.3, 147-164.
Iqbal, S, Muhammad, N and Imran, R. (2017). Mobile Phone Usage and Students' Perception towards M-Learning: A Case of Undergraduate Students in Pakistan. International Journal of E-Learning & Distance Education, 32, 1.
Islam, N., Beer, M., & Slack, F. (2015). E-learning challenges faced by academics in higher education. Journal of Education and Training Studies, 3(5), 102-112.

Islim, O.F. and Nese, S. C. (2017). Technology and college students: What faculty members think about the use of technology in higher education." Malaysian Online Journal of Educational Technology 5.2 ,34-50.
Jones, A. C., Scanlon, E. & Clough, G. (2013). Mobile learning: Two case studies of supporting inquiry learning in informal and semiformal settings. Computers & Education, 61, 21-32.
Johnson, B., & Christensen, L. (2014). Educational research quantitative qualitative, and mixed approaches (5th ed.). Thousand Oaks, CA: SAGE.
Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. Journal of mixed methods research, 1(2), 112-133.
Jones, C., Aoki, K., Rusman, E. and Schlusmans, K (2009). A comparison of three Open Universities and their acceptance of Internet Technologies. In Proceedings of the 23rd ICDE World Conference on Open Learning and Distance Education, 7-10 June 2009, Maastricht, Netherlands.
Jubien, P. (2013). Shape Shifting Smart Phones: Riding the Waves in Education. Canadian Journal of Learning and Technology, 39(2), n2.
KACST. (2018). Research and Development Technology Leaders Program. Accessed February 17, 2019 from: https://www.kacst.edu.sa/eng/RD/Pages/Technical-Leaders-Preparation-Program.aspx
Kattoua, Ta., Al-Lozi, M. and Alrowwad, A. (2016). A review of literature on E-learning systems in higher education. International Journal of Business Management & Economic Research 7.5, 754-762.
Kenan, T., Pislaru, C., & Elzawi, A. (2012). Analysing the effectiveness of e-learning based on national and international cultures and approaches to pedagogy. In: 17th UKAIS Conference on Information Systems, 2012, 27 28 March 2012, New College, Oxford University.
Khaddage, F. Christensen, R. Lai, W. Knezek, G. Norris, C. and Soloway, E. (2015). A model driven framework to address challenges in a mobile learning environment. Educ Inf Technol, 20(4), pp.625-640.
Kietzmann, J; Plangger, K; Eaton, B; Heilgenberg, K; Pitt, L; Berthon, P. (2013). "Mobility at work: A typology of mobile communities of practice and contextual ambidexterity" (PDF). Journal of Strategic Information Systems. 3 (4): 282–297
Kim, J., Ilon, L., & Altmann, J. (2013). Adapting smartphones as learning technology in a Korean university. Journal of Integrated Design and Process Science, 17(1), 5-16.
Kim, S. E., Kim, J. W., & Jee, Y. S. (2015). Relationship between smartphone addiction and physical activity in Chinese international students in Korea. Journal of behavioral addictions, 4(3), 200-205.
Kimble, C; Hildreth, P. (2005). Dualities, distributed communities of practice and knowledge management. Journal of Knowledge Management. 9 (4): 102–113
Kirkpatrick, K., & Balsam, P. D. (2016). Associative learning and timing. Current opinion in behavioral sciences, 8, 181-185.
Koohang, A., Riley, L., Smith, T., & Schreurs, J. (2009). E-learning and constructivism: From theory to application. Interdisciplinary Journal of E-Learning and Learning Objects, 5(1), 91-109.
Koole, M. (2009). A Model for Framing Mobile Learning. In M. Ally (Ed.), Mobile Learning Transforming the Delivery of Education & Training (pp. 25-47).
Koole, M., & Ally, M. (2006). Framework for the Rational Analysis of Mobile Education (FRAME) Model: Revising the ABCs of Educational Practices. The International Conference on Networking, International Conference on Systems and International Conference on Mobile Communications and Learning Technologies (ICN/ICONS/M 2006), pp. 216-216. Mauritius: IEEE.
Krotov, V. (2015). Critical Success Factors in M-Learning: A Socio-Technical Perspective. CAIS, 36, 6. learning to undergraduate midwifery students from a practice based perspective. Nurse Education in Practice, 14(2).
Kuimova, M. V., Anastasiya, K. and Alexey, T. (2016). E-learning as a means to improve the quality of higher education.learning to undergraduate midwifery students from a practice based perspective. Nurse Education in Practice, 14(2).
Kukulska-Hulme, Agnes, and John Traxler (2019) Design principles for learning with mobile devices. In: Beetham, Helen and Sharpe, Rhona eds. Rethinking Pedagogy for a Digital Age: Designing for 21st Century Learning. 3rd edition. Routledge, pp. 181–196.
Kivunja, C. and Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts, International Journal of Higher Education, 6(5), 26-41.
Lam, P., Lam, S. L., Lam, J, & McNaught, C. (2009). Usability and usefulness of eBooks on PPCs: How students' opinions vary over time. Australasian journal of educational technology, 25(1).
Lave, J. & Wenger, E. (1991). Situated learning: Legitimate peripheral participation, Cambridge: Cambridge University Press
Lee, S., et al. (2018). The framework for factors affecting technology transfer for suppliers and buyers of technology in Korea. Technology Analysis and Strategic Management 30.2, 172-185.

Lee, Y., Hsieh, Y., & Ma, C. (2011). A model of organizational employees' e-learning systems acceptance. Knowledge-Based Systems, 24(3), 355-366.
Le Pelley, M. E., Mitchell, C. J., Beesley, T., George, D. N., & Wills, A. J. (2016). Attention and associative learning in humans: an integrative review. Psychological Bulletin, 142(10), 1111.
Li, K. C., Lee, L. Y. K., Wong, S. L., Yau, I. S. Y., & Wong, B. T. M. (2018). Effects of mobile apps for nursing students: learning motivation, social interaction and study performance. Open Learning: The Journal of Open, Distance and e-Learning, 33(2), 99-114.
Ling, R. (2017). The reconstruction of space and time: Mobile communication practices. Routledge.
Lincoln Y S, Lynham S A, Guba E G. (2011) Vol. 4. Sage Publications. Paradigmatic controversies, contradictions, and emerging confluences, revisited. The Sage Handbook of Qualitative Research; pp. 97–128.
Liu, Tsung-Yu, Tan-Hsu Tan. and Yu-Ling Chu. (2010). QR code and augmented reality-supported mobile English learning system. Mobile multimedia processing. Springer, Berlin, Heidelberg, 37-52.
Liu, Y., Li, H. and Carlsson, C. (2010). Factors driving the adoption of m-learning: An empirical study. Computers & Education, 55(3), pp.1211-1219.
Loch, K. D. Straub, D. W. and Kamel, S (2003) Diffusing the Internet in the Arab world: the role of social norms and technological culturation. IEEE Transactions of Engineering Management, 50(1), pp. 45-63.
Lopez-Perez, M. V., M. C. Perez-Lopez. and L. Rodriguez-Ariza. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes: ELSEVIER, Computers and Education, v. 56, p. 818-826.
Luna-Nevarez, C. and Enda, McGovern. (2018). On the Use of Mobile Apps in Education: The Impact of Digital Magazines on Student Learning. Journal of Educational Technology Systems, 0047239518778514.
Mahboob, A. and Tariq, E. (2014). English in the kingdom of Saudi Arabia. World Englishes 33.1 ,128-142.
Marks, D. and Yardley, L. (2004). Research methods for clinical and health psychology. SAGE.
Martín-Rodríguez, Ó., Fernández-Molina, J. C., Montero-Alonso, M. Á. and González-Gómez, F. (2015). Main components of satisfaction with e-learning.
Masoumi, D. (2010). Quality in e-learning within a cultural context: The case of Iran (Doctoral dissertation, Göteborgs universitet).
Masrom, M. (2007). Technology acceptance model and e-learning. Technology, 21(24), 1-11
Mayes, T. and Sara de Freitas. (2007). Learning and e-learning: the role of theory. Rethinking pedagogy for a digital age. Routledge, 33-45.
Maxcy, S.J (2003). Pragmatic threads in mixed methods research in the social sciences: The search for multiple modes of inquiry and the end of the philosophy of formalism. In Handbook of Mixed Methods in Social and Behavioral Research. Edited by Abbas Tashakkori and Charles Teddlie. Thousand Oaks: Sage, pp. 51–89.
McCarty, S., Takeshi, S. and Hiroyuki, O. (2017). Aoyama Gakuin University Case Study: Blended Learning and Flipped Classrooms Utilizing Mobile Devices. Implementing Mobile Language Learning Technologies in Japan. Springer, Singapore, 71-92.
McCombs, B. (2011). Learner-Centered Practices: Providing the Context for Positive Learner Development, Motivation, and Achievement (Chapter 7). Handbook of Research on Schools, Schooling, and Human Development. Mahwah, NJ: Erlbaum.
Mcconatha, D., Praul, M. & Lynch, M. J. (2008). Mobile learning in higher education: An empirical assessment of a new educational tool. Turkish Online Journal of Educational Technology-TOJET, 7(3), 15-21.
McKim, C. A. (2017). The value of mixed methods research: A mixed methods study. Journal of Mixed Methods Research, 11(2), 202-222.
Mehdipour, Y. & Zerehkafi, H. (2013). Mobile learning for education: Benefits and challenges international. International Journal of Computational Engineering Research, 3(6), 93-101.
Mellar, H., Peytcheva-Forsyth, R., Kocdar, S., Karadeniz, A. & Yovkova, B. (2018). Addressing cheating in e-assessment using student authentication and authorship checking systems: teachers' perspectives. International Journal for Educational Integrity, 14(1), 2.
Melhuish, K. and Garry, F. (2010). Looking to the future: M-learning with the iPad.1-16.
Mendoza, Jessica S., et al. (2018). The effect of cellphones on attention and learning: The influences of time, distraction, and nomophobia. Computers in Human Behavior 86, 52-60.
Meyrick J. (2006) What is good qualitative research? A first step towards a comprehensive approach h to judging rigour/quality. J Health Psychol. 11:799–808.
Ministry of Foreign Affairs. (2017). Saudi Arabia and political, economic and social development. Retrieved from: https://www.saudiembassy.net/sites/default/files/WhitePaper_Development_May2017.pdf

Mínguez, A. M., & Hernán, C. S. (2009). Online Virtual Communities as a New Form of Social Relations: Elements for the Analysis. In M. Cruz-Cunha, E. Oliveira, A. Tavares, & L. Ferreira (Eds.), Handbook of Research on Social Dimensions of Semantic Technologies and Web Services (pp. 435-447). Hershey, PA: IGI Global. doi:10.4018/978-1-60566-650-1.ch022
Mitchell, B. and Alfuraih.A. (2018). The Kingdom of Saudi Arabia: Achieving the Aspirations of the National Transformation Program 2020 and Saudi Vision 2030 Through Education." Journal of Education and Development 2, 36.
Moravec, T., Stepanek, P., & Valenta, P. (2015). The Influence of Using E-Learning Tools on the Results of Students at the Tests. Procedia Social and Behavioural Sciences, 176, 81-86.
Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. Journal of mixed methods research 1.1, 48-76.
Morgan, D.L. 2014. Integrating Qualitative and Quantitative Methods: A Pragmatic Approach. Thousand Oaks: Sage.
Mortera-Gutiérrez, Fernando. (2006). Faculty best practices using blended learning in e-learning and face-to-face instruction. International Journal on E-learning 5.3 , 313-337.
Mothibi, G. (2015). A Meta–Analysis of the Relationship between E-Learning and Students' Academic Achievement in Higher Education. Journal of Education and Practice, 6 (9), 6-10.
Muñoz-Organero, M., Muñoz-Merino, P. J. and Kloos,C.D. (2012). Sending learning pills to mobile devices in class to enhance student performance and motivation in network services configuration courses. IEEE transactions on Education 55.1, 83-87.
Mutalemwa, D. K. (2015). Does globalisation impact SME development in Africa?. African Journal of Economic and Management Studies 6.2, 164-182.
Myers, M. D. (2013).Qualitative research in business and management. Sage.
Nagel, L. & Kotzé, T. (2010). Supersizing e-learning: What a CoI survey reveals about teaching presence in a large online class. The Internet and Higher Education, 13(1–2), 45−51.
Namey, E. Guest, G.Thairu, L. and Johnson, L. (2008). Data Reduction Techniques for Large Qualitative Data Sets. In: G. GUEST, ed., Handbook for Team-based Qualitative Research. Plymouth: Altamira Press.
Nandi, D., Hamilton, M. & Harland, J. (2012). Evaluating the quality of interaction in asynchronous discussion forums in fully online courses. Distance education, 33(1), 5-30.
Narayanasamy, F. S. and Jarina, M. (2013). Adaptation of mobile learning in higher educational institutions of Saudi Arabia. International Journal of Computer Applications 69.6.
National Center for e-Learning. (2016). Advisory Services. Retrieved from: https://www.elc.edu.sa/?q=en/content/97
National Center for e-Learning. (2016). Digital Content Services. Retrieved from: https://www.elc.edu.sa/?q=en/content/613
National Center for e-Learning. (2016). National Center for e-Learning: About Us. Retrieved from: https://www.elc.edu.sa/?q=en/aboutus
National Center for e-Learning. (2016). Teaching Services. Retrieved from: https://www.elc.edu.sa/?q=en/content/98
Neil, Emily, and Dale, S. (2017). A Look at Saudi Arabia Vision 2030. The Washington Report on Middle East Affairs 36.1 ,53.
Norries, C., Hossain, A and Soloway. (2011) E. "Using smartphones as essential tools for learning: A call to place schools on the right side of the 21st century". Educational Technology, 51.3: 18-25.
Northey, G., Bucic, T., Chylinski, M. & Govind, R. (2015). Increasing student engagement using asynchronous learning. Journal of Marketing Education, 37(3), 171-180.
Naveed, Q. N., et al. (2017). A mixed method study for investigating critical success factors (CSFs) of e-learning in Saudi Arabian universities. International Journal of Advanced Computer Science and Applications, 8.5.
OECD. (2005). E-learning in tertiary education [Online]. Available at www.oecd.org/edu/ceri/35991871.pdf. (Accessed 15 February 2019).
Pande, D., Wadhai, V.M. & Thakare, V.M. (2016). E-learning system and higher education. International Journal of Computer Science and Mobile Computing, 5 (2), 274 - 280.
Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types, The international review of research in open and distributed learning, 12(2) 78-102.
Patten B., Sánchez I.A. & Tangney B. (2006), Designing collaborative, constructionist and contextual applications for handheld devices, Computers & education, 46(3), 294-308.
Pechenkina, E. (2017). Developing a typology of mobile apps in higher education: A national case-study. Australasian Journal of Educational Technology, 33(4).
Peterson, J., et al. (2017). Understanding scoping reviews: Definition, purpose, and process. Journal of the American Association of Nurse Practitioners 29.1, 12-16.
Potrafke, N. (2015). The evidence on globalisation. The World Economy 38.3, 509-552.pp. 220-224.

Prasad, M.R., Gyani, J. and Murti, P.R.K. (2012). Mobile cloud computing: Implications and challenges. Journal of Information Engineering and Applications, 2(7), pp.7-15.
Preece, J. (2003). Tacit knowledge and social capital: Supporting sociability in online communities of practice. Proceedings of I-KNOW 2003, 3rd International Conference in Knowledge Management. Graz, Australia, July 2-4. In K. Tochtermann and H. Maurer (eds), 72-78
PwC (2017). Understanding the GCC Education Sector – a country by country guide. Retrieved from: https://www.pwc.com/m1/en/industries/education/publications/education-country-profile-ksa.pdf
Qi, H. and Gani, A. (2012). Research on mobile cloud computing: Review, trend and perspectives. Second International Conference on Mobile Cloud Computing (MCC)In Digital Information and Communication Technology and its Applications (DICTAP).University of Malaya, Malaysia May, Kuala Lumpur: IEEE.
Qureshi, I. A., Ilyas, K., Yasmin, R. & Whitty, M. (2012). Challenges of implementing e-learning in a Pakistani university. Knowledge Management & E-Learning, 4(3), 310.
Rao, B. B. & Vadlamannati, K. C. (2011). Globalization and growth in the low income African countries with the extreme bounds analysis. Economic Modelling, 28(3), 795-805.
Rehan, M, et al. (2018). Waste to biodiesel: A preliminary assessment for Saudi Arabia. Bioresource technology 250, 17-25.
Reisetter, M., LaPointe, L. & Korcuska, J. (2007). The impact of altered realties: Implications of online delivery for learners' interactions, expectations, and learning skills. International Journal on E-learning, 6(1), 55-80.
Robertson, R. (2003). The three waves of globalization: A history of a developing global consciousness. Zed Books.
Rock, Adam J., et al. (2016). Teaching research methods and statistics in elearning environments: Pedagogy, practical examples, and possible futures. Frontiers in psychology 7, 339.
Rose, G., and Straub, D. (1998) Predicting General IT use: applying TAM to the Arabic world. Journal of Global Information Technology, vol.6, pp. 39-46. 1998
Rouibah, K. and H. Abbas. H (2010) Effect of Personal Innovativeness, Attachment Motivation and Social Norms on the Acceptance of Camera Mobile Phones: An Empirical Study in an Arab Country. International Journal of Handheld Computing Research, vol.1 (4), pp. 41-62.
Rouibah, K. and Hamdy, H (2009) Factors Affecting Information Communication Technologies Usage and Satisfaction: Perspective From Instant Messaging in Kuwait. Journal of Global Information Management. vol.17 (2), pp. 1-29.
Rouibah, K., Abbas, H. and Rouibah, H S. (2011) Factors affecting camera mobile phone adoption before eshopping in the Arab world. Science Direct, vol.33 (3), pp. 271-283.
Rugh, William A. (2002). Education in Saudi Arabia: choices and constraints. Middle East Policy 9.2, 40-55.
Sabah, N. M. (2016). Exploring students' awareness and perceptions: Influencing factors and individual differences driving m-learning adoption. Computers in Human Behavior 65, 522-533.
Saeed, S., et al., eds. (2016). Design solutions for user-centric information systems. IGI Global.
Salmon, G. (2003). E-moderating : The key to teaching and learning online (2a edición ed) Routledge Falmer London.
Salter, S., Karia, A., Sanfilippo, F., & Clifford, R. (2014). Effectiveness of E-Learning in Pharmacy Education. American Journal of Pharmaceutical Education, 78 (4), 1-12.
Samimi, P., & Jenatabadi, H. S. (2014). Globalization and economic growth: Empirical evidence on the role of complementarities. PloS one, 9(4), e87824.
Saudi Electronic University. "About SEU: History Timeline" Web: <https://www.seu.edu.sa/sites/en/AboutSEU/Pages/HistoryTimeline.aspx>
Saudi Vision 2030. (2019). Saudi Vision 2030. Accessed January 14, 2019 https://vision2030.gov.sa/en/foreword
Savin-Baden, M. & Major, C. (2012). Qualitative research: The essential guide to theory and practice. Oxon, UK: Routledge.
Scherer, R, Fazilat, S. and Jo Tondeur. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education." Computers & Education 128: 13-35.
Scholtz, B. & Kapeso, M. (2014). An m-learning framework for ERP systems in higher education. Interactive Technology and Smart Education, 11(4), 287-301.
Seifert, T. (2015). Pedagogical applications of smartphone integration in teaching: Lecturers, pre-service teachers and pupils' perspectives. International Journal of Mobile and Blended Learning (IJMBL), 7(2), 1-16.
Shahmoradi, Leila, et al. (2018).The challenges of E-learning system: Higher educational institutions perspective." Journal of education and health promotion 7.
Shannak, R. O. (2013). Key issues in e-banking strengths and weaknesses: the case of two Jordanian banks. European Scientific Journal, ESJ, 9(7).

Shannon-Baker, P. (2016). Making paradigms meaningful in mixed methods research. Journal of Mixed Methods Research 10.4, 319-334.
Sharples, M., Milrad, M., Arnedillo S. I. & Vavoula, G. (2009). Mobile Learning: Small devices, big issues. In N. Balacheff, S. Ludvigsen, T. de Jong, A. Lazonder, & S. Barnes (Eds.), Technology enhanced Learning: Principles and products (pp. 233e240). Heidelberg: Springer.
Sharples, M. (2013) Mobile learning: research, practice and challenges. Distance Education in China, 3(5), pp. 5-11.
Shaw, C. M. and Sanda A. Tan. (2015). Integration of Mobile Technology in Educational Materials Improves Participation: creation of a novel smartphone application for resident education. Journal of surgical education 72.4 ,670-673.
Sheriff, Ray E. (2012). An evaluation of students' and lecturers' use of technologies: an engineering case study. engineering education 7.1 ,33-46.
Shim, Jung P., et al. (2011). Twitter, Google, iPhone/iPad, and Facebook (TGIF) and smart technology environments: how well do educators communicate with students via TGIF? CAIS 29,35.
Sidebotham, M., Jomeen, J., and Gamble, J., (2014). Teaching evidence based practice and research through blended.
Simonson, M. and Seepersaud, D. J. (2019). Distance Education: Definition and Glossary of Terms, 4rd Edition. Charlotte, NC: IAP, Inc.
Smith, L. and Abouammoh, A. (2013). Higher Education in Saudi Arabia: Achievements, Challenges and Opportunities. Springer Science & Business Media.
Smith, S. D. & Caruso, J. B. (2010). The ECAR study of undergraduate students and information technology, p. 118. Colorado: Educause.
Solimeno, A., Mebane, M. E., Tomai, M. & Francescato, D. (2008). The influence of students and teachers characteristics on the efficacy of face-to-face and computer supported collaborative learning. Computers & Education, 51(1), 109-128.
Soon, L. (2011). E-Learning and M-Learning. International Journal of Mobile and Blended Learning, 3(3), pp.43-58.
Southard, S., Meddaugh, J. and France-Harris, A. (2015). Can SPOC (self-paced online course) live long and prosper? A comparison study of a new species of online course delivery. Online Journal of Distance Learning Administration, 18(2), 8.
Stacy, E. M. and Jeff, C. (2015). Note-taking and handouts in the digital age. American journal of pharmaceutical education 79.7,107.
Statistica (2019). Internet user penetration in Saudi Arabia from 2015 to 2022. Retrieved from: https://www.statista.com/statistics/484930/internet-user-reach-saudi-arabia/
Stern, B. S. (2004). A comparison of online and face-to-face instruction in an undergraduate foundations of American education course. Contemporary Issues in Technology and Teacher Education 4.2. 196-213.
Stiglitz, J. E. (2002). Globalization and its discontents. London: Penguin Books.
Stiglitz, J. E. (2004). Globalization and growth in emerging markets. Journal of Policy Modeling 26(4), 465-484.
Straub, D., Loch, K. and Hill, C. (2001) Transfer of Information Technology to the Arab world: A test of Cultural Influence Modeling. Journal of Global Information Management, vol.9 (4), pp. 6-28.
Sun, H. & Zhang, P. (2006). The role of moderating factors in user technology acceptance. International Journal of Human-Computer Studies, 64, 53–78.
Tan, Abby, et al. (2017). Embracing Globalisation and Ensuring Relevance in Providing Quality Education. Advanced Science Letters 23.2, 768-772.
Tandi Lwoga, E. & Questier, F. (2014). Faculty Adoption and Usage Behaviour of Open Access Scholarly Communication in Health Science Universities. New Library World, 115(3/4), 116-139. https://doi.org/10.1108/NLW-01-2014-0006
Tao, K. and Paulette, E. (2018). Mobile APPs and Global Markets. Theoretical Economics Letters 8.08. 1510.
Tarhini, A., Hassouna, M., Abbasi, M. S. & Orozco, J. (2015). Towards the Acceptance of RSS to Support Learning: An empirical study to validate the Technology Acceptance Model in Lebanon. Electronic Journal of e-Learning, 13(1), 30-41.
Tashakkori, A. T. and Charles Teddlie. C (1998) Mixed Methodology: Combining Qualitative and Quantitative Approaches. Applied Social Research Methods Series, 46; Thousand Oaks: Sage Publications.
Teddlie, C. and Abbas Tashakkori, A. (2009) Foundations of Mixed Methods Research. Thousand Oaks: Sage Publications
Tindell, D. R. & Bohlander, R. W. (2012). The use and abuse of cell phones and text messaging in the classroom: A survey of college students. College Teaching, 60(1).1-9.
Tomei, L. (2006). The impact of online teaching on faculty load: Computing the ideal class size for online courses. Journal of Technology and Teacher Education, 14(3), 531-541.

Tondeur, J., van Keer, H., van Braak, J. & Valcke, M. (2008). ICT integration in the classroom: Challenging the potential of a school policy, Computers & Education, vol. 51, no.1, pp. 212–223.
Traxler, John. (2016). Inclusion in an age of mobility." Research in Learning Technology 24.
Traxler, John. (2018). Learning with mobiles in the digital age. Pedagogika 68.3: 293-310.
Traxler,John.(2016). Mobile learning and social networking." Wiley Handbook of Learning Technology: 390-405.
Ulrichsen, Kristian Coates, ed. (2018). The Changing Security Dynamics of the Persian Gulf. Oxford University Press.
Valk J.H., Rashid A.T. & Elder L. (2010), Using mobile phones to improve educational outcomes: An analysis of evidence from Asia. The Int. review of research in open and distributed learning, 11(1), 117-140.
Van Wyk, M. and Linda van, R. (2018). Affordances of mobile devices and note-taking apps to support cognitively demanding note-taking. Education and Information Technologies 23. 1639-1653.
Vaughan, N. (2014). Student engagement and blended learning: Making the assessment connection. Education Sciences, 4(4), 247-264.
Vázquez-Cano, E. (2014). Mobile distance learning with smartphones and apps in higher education. Educational Sciences: Theory and Practice, 14(4), 1505-1520.
Venkatesh, V., Brown, S. A. and Bala, H. (2013) bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. MIS quarterly, 37(1), 21-54.
Venkatesh, V., Morris, M., Davis, G and Davis, F (2003) User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, vol.27 (3), pp.425478. 2003
Venkatesh, V., Thong, J and Xu, X. (2012) Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, vol.36 (1), pp. 157- 178.
Vinci, M. L. , Daniela, C. and I. L. Vinci. (2007) Possibilities of application of e-tools in education: mobile learning. Proc. Conf. on ICT for Language Learning, Florence, Italy.
Waters, S., Joshua, K. and Darrian, B. (2016). Apps-olutely perfect! Apps to support Common Core in the history/social studies classroom. The Social Studies 107.3 ,1-7.
Weegar, M. A., & Pacis, D. (2012, January). A Comparison of two theories of learning-behaviorism and constructivism as applied to face-to-face and online learning. In Proceedings e-leader conference, Manila.
Weimer, M. (2013). Learner-Centered Teaching: Five Key Changes to Practice. John Wiley & Sons.
Welsh, E. T., Wanberg, C. R., Brown, K. G. & Simmering, M. J. (2003). E-learning: Emerging uses, empirical results and future directions. International Journal of Training and Development, 7(4), 245-258. doi:10.1046/j.1360-3736.2003.00184.
Wenger, E. (1998). Communities of practice: Learning, meaning, and identity. Cambridge University Press. https://doi.org/10.1017/CBO9780511803932
Wenger, E. (2004, January/February). Knowledge management as a doughnut: Shaping your knowledge strategy through communities of practice, Ivey Business Journal, 1-8
Wilson, P. W. and Douglas F. Graham. (2016). Saudi Arabia: The Coming Storm: The Coming Storm. Routledge.
Woodcock, B., Middleton, A. and Nortcliffe, A. (2012). Considering the Smartphone Learner: an investigation into student interest in the use of personal technology to enhance their learning. Student Engagement and Experience Journal, 1(1).
Wu, W. H., Wu, Y. C. J., Chen, C. Y., Kao, H. Y., Lin, C. H., and Huang, S. H. (2012) Review of trends from mobile learning studies: A meta-analysis. Computers & Education, 59(2), 817-827.
Wuensch, K. L., Aziz, S., Ozan, E., Kishore, M., & Tabrizi, M. (2006). Pedagogical characteristics of online and face-to-face classes. In E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (pp. 2422-2429). Association for the Advancement of Computing in Education (AACE).
Wuensch, K., Aziz, S., Ozan, E., Kishore, M., & Tabrizi, M. H. (2008). Pedagogical Characteristics of Online and Face-to-Face Classes. International Journal on E-Learning, 3 (7), 523-532.
Xanthidis, D., Syed Waqee,W., and Paul, N. (2013). E-Learning in Saudi Universities, Challenges and Issues. e-Learning Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity , 2013 Fourth International Conference on. IEEE.
Yamada, M. (2018). Can Saudi Arabia Move beyond. The Middle East Journal 72.4, 587-609.
Zajda, J. (2015). Globalisation and its impact on education and policy. Second International Handbook on Globalisation, Education and Policy Research. Springer, Dordrecht. 105-125.
Zhang, H., Philip Wing, K.C. and Christopher Boyle, eds. (2014). Equality in education: Fairness and inclusion. Springer.

Appendix 1A: The structure of interview - Scoping study (English)

Interview schedule

(University President or supervisors on the branches or deans the colleges)

1. Does the university use mobile learning and smart phone applications in learning?

    1. Can you give some examples?

    2. Why you use mobile learning can you speak to me about main reasons?

2. Does the university do programs and applications that help students to find academic or research information if so, what applications do they use?

    1. Please give examples? And how they are used?

3. Is the university to allow male and female undergraduate students in their use of mobile learning inside and outside of the classroom to support their learning?

    1. Please explain the university's thinking?

    2. How do you plan to overcome the difficulties?

(Instructors)

1. What are the university instructors' general experiences in using mobile learning and smartphone in higher education?

1. Please give some examples of successes and problems?

2. What are the instructors' views about students use smartphone in education?

1. Please explain your thinking?

(Students):

1. Do students use smartphone applications for education or communication and entertainment?

1. Please give examples from inside the classroom and outside the classroom?

2. What are the problems and difficulties faced by students in the use of mobile learning in the university and outside the university please give examples?

3. Do the using mobile learning apps help students find academic or research information enough? Please give examples for particular apps?

Appendix 2A: The structure of interview – Main study English)

Interview schedule

1. What are the faculty members' perceptions toward using smartphone Apps for educational purposes?

1. *Do your Smartphone Apps help you to access the learning management system in your university? Please give examples?*
2. *Do you use your Smartphone to read your university news, communication with colleagues, administration and etc.? Please give examples?*
3. *Does your Smartphone help you improve your professional skills in teaching, communication with students and work activities? Please give examples?*
4. *Do you use your Smartphone Apps for collaboration with students in and out of the class, and for receiving assignments? Please give examples?*
5. *How do you develop your own professional skills through the use of smartphones? Please give examples?*
6. *What do you think about your university's responsibilities regarding the integration of smartphone Apps? Do you suggest any incentives? Can you explain them?*
7. *De you think should be the university must provide smartphones to faculty members' and students as education tool? Please give examples?*

2. What extent students are using smartphone Apps for educational purpose from the faculty members' perceptions?

8. *Do you have any concerns about using smartphones in your courses? In regard to the knowledge delivery to your students in your classroom? Please give examples?*
9. *Do you think the Students using smartphone Apps in learn promotes learning for finding sufficient academic or research information? Please give examples for particular apps?*
10. *Can you talk about the role of smartphones on learning and pedagogy, if any? Please give examples?*
11. *Do you think that smartphone Apps can be major learning tool in education? Please give examples?*

3. What are the main challenges that confront the students and faculty members in use of smartphone Apps for educational purposes?

12. *Are there any challenges that you or your students confront using Smartphone Apps for education purposes? Please give examples?*
13. *Could you highlight any advantages of using Smartphone Apps for education purposes? Please give examples?*

Appendix 2B: The structure of interview – Main study (Arabic)

University of Glasgow

College of Social Sciences

1. What are the faculty members' perceptions toward using smartphone Apps for educational purposes?

ما هي تصورات أعضاء هيئة التدريس نحو استخدام تطبيقات الهواتف الذكية للأغراض التعليمية؟

1. Do your Smartphone Apps help you to access the learning management system in your university? Please give examples?

   هل هاتفك الذكي يساعدك على الوصول إلى نظام إدارة التعلم في جامعتك؟ يرجى إعطاء أمثلة

2. Do you use your Smartphone to read your university news, communication with colleagues, administration and etc.? Please give examples?

   هل تستخدم هاتفك الذكي لقراءة الأخبار جامعتك، والتواصل مع الزملاء في العمل والإدارة وغيرها؟

   يرجى إعطاء أمثلة؟

3. Does your Smartphone help you improve your professional skills in teaching, communication with students and colleagues, work activities? Please give examples?

   هل هاتفك الذكي يساعدك على تحسين المهارات المهنية الخاصة بك في التدريس، والتواصل مع الطلاب والزملاء، وأنشطة العمل؟ يرجى إعطاء أمثلة؟

4. Do you use your Smartphone Apps for collaboration with students in and out of the class, and for receiving assignments? Please give examples?

   هل تستخدم تطبيقات الهاتف الذكي الخاص بك للتعاون مع الطلاب داخل وخارج الطبقة وتلقي المهام؟ يرجى إعطاء أمثلة؟

5. How do you develop your own professional skills through the use of smartphone? Please give examples?

   كيف يمكنك تطوير المهارات المهنية الخاصة بك من خلال استخدام الهاتف الذكي؟ يرجى إعطاء أمثلة؟

6. What do you think about your university's responsibilities regarding the integration of smartphone Apps in education? Do you suggest any incentives? Can you explain them?

   ما رأيك بمسؤوليات جامعتك فيما يتعلق بدمج تطبيق الهواتف الذكية في التعليم ؟ هل تقترح أي حوافز؟ هل يمكنك شرح ذلك؟

7. De you think should be the university must provide smartphones to faculty members' and students as education tool? Please give examples?

هل تعتقد أنه يجب على الجامعة أن توفر الهواتف الذكية لأعضاء هيئة التدريس والطلاب كأداة تعليمية؟ يرجى إعطاء أمثلة؟

2- What extent students are using smartphone Apps for educational purpose from the faculty members' perceptions?

ما مدى استخدام الطلاب لتطبيقات الهواتف الذكية لأغراض تعليمية من وجهه نظر أعضاء هيئة التدريس؟

8. Do you have any concerns about using smartphones in your courses? In regard to the knowledge delivery to your students in your classroom? Please give examples?

هل لديك أي مخاوف بشأن استخدام الهواتف الذكية في محاضراتك ؟ فيما يتعلق إيصال المعلومة لطلابك في المحاضرة داخل الفصل الدراسي ؟ يرجى إعطاء أمثلة؟

9. Do you think the Students using smartphone Apps in learn promotes learning for finding sufficient academic or research information? Please give examples for particular apps?

هل تعتقد أن الطلاب الذين يستخدمون تطبيقات الهواتف الذكية في التعلم يعزز التعلم للعثور على معلومات أكاديمية أو بحثية كافية؟ يرجى إعطاء أمثلة لتطبيقات معينة؟

10. Can you talk about the role of smartphones on learning and pedagogy, if any? Please give examples?

هل يمكنك التحدث عن دور الهواتف الذكية في التعلم والتربية، إن وجدت؟ يرجى إعطاء أمثلة؟

11. Do you think that smartphone Apps can be major learning tool in education? Please give examples?

هل تعتقد أن تطبيقات الهواتف الذكية يمكن أن تكون أداة تعليمية رئيسية في التعليم؟ يرجى إعطاء أمثلة؟

3- What are the main challenges that confront the students and faculty members in use of smartphone Apps for educational purposes?

ما هي التحديات الرئيسية التي تواجه الطلاب وأعضاء هيئة التدريس في استخدام تطبيقات الهاتف الذكي للأغراض التعليمية؟

12. Are there any challenges that you or your students confront using Smartphone Apps for education purposes? Please give examples?

هل هناك أي تحديات تواجهها أنت أو طلابك باستخدام الهاتف الذكي لأغراض التعليم؟ يرجى إعطاء أمثلة؟

13. Could you highlight any advantages of using Smartphone Apps for education purposes? Please give examples?

هل يمكن تسليط الضوء على أي مزايا استخدام الهاتف الذكي لأغراض التعليم؟ يرجى إعطاء أمثلة؟

Appendix 3A: Plain language statement-Interview (English)

Plain Language Statement

Study title and Researcher Details

My name is Abdullah Awadh M Aljaber. I am a student at the University of Glasgow. For my doctoral studies I am carrying out a research project. The title of the project is:

The reality of using smartphone applications for learning in higher education of Saudi Arabia

This research is supervised by Prof Victor Lally at the University of Glasgow (victor.lally@Glasgow.ac.uk, telephone: 0141 3303424) and Mr Kevin Lowden of the University of Glasgow (email: Kevin.Lowden@glasgow.ac.uk, telephone: 01413303493).

Thank you for taking the time to read this.

Invitation

I would like to invite you to take part in this research study. Before you decide whether you would like to take a part it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with me if you wish. Please feel free to ask questions about anything about which you are unclear. If you would like to have more information, please contact me. Please take your time to consider whether you wish to take part.

The purpose of the study

The main purpose of the study is to understand the use of mobile technology in teaching and learning through examining current and actual uses of mobile technology for educational purposes. The study will also highlight obstacles involved in the implementation of mobile technologies in university in Saudi Arabia. In addition, this research aims to help in developing better use of smartphones in higher education and to investigate instructors and students uses and experiences with mobile technology and smartphones in education.

What is required of you?

I would like to interview you for approximately 60 minutes, and make a recording of the interview. This will take place by arrangement with you. The interview will be face to face or conducted by skype or phone at a mutually convenient time. The data from this interview may be used in my doctoral thesis, and also any publications arising from it. You may request a copy of these documents from myself when the research is completed.

8.4.1.1.1 How participant's personal details will be kept confidential

8.4.1.1.2 The data will be gathered and coded by numbers or letters rather than the names of participants, and once the data has achieved its purpose, it will be destroyed. Access to computer files to be available by password only and, after analysis, the data will be destroyed in the presence of the researcher and the supervisors.

Please note that assurances on confidentiality will be strictly adhered to unless evidence of wrongdoing or potential harm is uncovered. In such cases the University may be obliged to contact relevant statutory bodies/agencies.

Organisation funding the research
Saudi Arabian Embassy
This project has been considered and approved by the Social Sciences/School of Education Research Ethics Committee at the University of Glasgow, UK

Contact for Further Information
For further information, please contact Prof Victor Lally at the University of Glasgow (victor.lally@Glasgow.ac.uk, telephone: 0141 330 3036) and Mr Kevin Lowden of the University of Glasgow (email: Kevin.Lowden@glasgow.ac.uk, telephone: 0141 330 3493). If you have any concerns regarding the conduct of this research project you can contact the College of Social Sciences Ethics Officer, Dr Muir Houston, email: Muir.Houston@glasgow.ac.uk

Appendix 3B: Plain language statement - Interview (Arabic)

بيان اللغة

عنوان الدراسة وتفاصيل الباحث

اسمي عبد الله عوض مشعل الجابر. أنا طالب في جامعة غلاسكو. لدراسة الدكتوراه أحمل مشروعا بحثيا.

عنوان المشروع:

واقع استخدام الهواتف الذكية للتعلم في التعليم العالي في المملكة العربية السعودية.

ويشرف على هذا البحث البروفيسور فيكتور للي من جامعة غلاسكو (victor.lally@Glasgow.ac.uk ، الهاتف: ٠١٤١ ٣٣٠٣٤٢٤) والسيد كيفن لودن من جامعة غلاسكو (البريد الإلكتروني: Kevin.Lowden@glasgow.ac.uk ، رقم الهاتف: ٠١٤١٣٣٠٣٤٩٣).

أشكركم على أخذ الوقت لقراءة هذا.

دعوة

وأود أن أدعوكم للمشاركة في هذه الدراسة البحثية. قبل أن تقرر ما إذا كنت تريد أن تأخذ جزءا من المهم بالنسبة لك أن تفهم على ماذا يجري البحث وعلى ما سينطوي. يرجى أخذ الوقت الكافي لقراءة المعلومات التالية بعناية ومناقشتها معي إذا كنت ترغب في ذلك. لا تتردد في طرح الأسئلة حول أي شيء غير واضح. إذا كنت ترغب في الحصول على مزيد من المعلومات، يرجى أن تأخذ (aaljaber388@gmail.com/a.aljaber.1@research.gla.ac.uk يرجى الاتصال بي (وقتك للنظر في ما إذا كنت ترغب في المشاركة.

الغرض من الدراسة :

استخدام تطبيقات الهاتف النقال في التعليم والتعلم من خلال دراسة الغرض الرئيسي من هذه الدراسة هو أن نتعرف على واقع الاستخدامات الحالية والفعلية لتكنولوجيا الهاتف النقال لأغراض تعليمية. فإن الدراسة أيضا تسلط الضوء على العقبات التي تشارك في تنفيذ التقنيات النقالة في الجامعات في المملكة العربية السعودية. وبالإضافة إلى ذلك، يهدف هذا البحث إلى مساعدة في تطوير استخدام أفضل التطبيقات للهواتف الذكية في التعليم العالي والتحقق من أستخدام أعضاء هيئة التدريس والطلاب والخبرات مع تكنولوجيا الهاتف النقال والهواتف الذكية في التعليم.

منك : ما هو المطلوب

أرغب بإجراء مقابلة معك والتي تستغرق ستون دقيقة تقريبا كما أود تسجيل المقابلة وهذا سيكون بعد الترتيب معك للوقت المناسب وسيتم إجراء المقابلة وجهاً لوجه أو عن طريق الهاتف في وقت يناسب الطرفين . ويمكن أستخدام البيانات في أطروحتي للدكتوراة ، وأي منشورات تنشأ عن ذلك تستطيع طلب نسخة من هذه الوثائق مني عندما يتم الأنتهاء من البحث.

كيف سيتم الاحتفاظ بسرية المعلومات الشخصية المشاركين

سيتم جمع البيانات وترميزها بواسطة الأرقام أو الحروف بدلا من أسماء المشاركين، مرة واحدة وعندما تحقق البيانات الغرض منها، سيتم تدميرها والوصول إلى ملفات الكمبيوتر لتكون متوفرة من خلال كلمة السر وبعد التحليل سيتم تدمير البيانات في وجود الباحث والمشرفين فقط .

ملاحظة

أن الضمانات المتعلقة بالسرية سيتم التقيد التام بها ما لم يتم الكشف عن اي مخالفات أو محتمل الضرر. في مثل هذه الحالات الجامعة قد تضطر إلى الاتصال الهيئات النظامية / الوكالات ذات الصلة.

تمويل البحث

سفارة المملكة العربية السعودية.

وهذا المشروع وافقت عليه كلية العلوم الاجتماعية التربية والتعليم لجنة أخلاقيات البحوث في جامعة غلاسكو، المملكة المتحدة.

للحصول على معلومات إضافية

لمزيد من المعلومات، يرجى الاتصال على البروفيسور فيكتور للي في جامعة غلاسكو (البريد victor.lally@Glasgow.ac.uk) والسيد كيفن لودن من جامعة غلاسكو ، الهاتف: ٠١٤١ ٣٣٠٣٤٢٤ . المملكة المتحدة، هاتف: ٠١٤١٣٣٠٣٤٩٣)Kevin.Lowden@glasgow.ac.الإلكتروني:

إذا كان لديك أية مخاوف بشأن سير هذا المشروع البحثي يمكنك الاتصال كلية العلوم الاجتماعية أخلاقيات الموظف، الدكتور مويرMuir.Houston@glasgow.ac.uk هيوستن، البريد الإلكتروني:

Appendix 4A: Participation consent form- Interview (English)

Consent Form

Title of Project :The reality of using smartphone applications for learning in higher education of Saudi Arabia

Name of Researcher: Abdullah Aljaber

1. I confirm that I have read and understand the Plain Language Statement for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.
3. I hereby consent to the interview being audio-taped.
4. I agree / do not agree (delete as applicable) to take part in the above study.

Confidentiality/anonymity

I acknowledge that all participants will be referred to by pseudonym.

Dependent relationships

I acknowledge that there will be no effect on my grades/employment arising from my participation or non-participation in this research.

Data usage and storage

- The material will be treated as confidential and kept in secure storage at all times.
- The material will be destroyed once the project is complete.
- I agree to waive my copyright to any data collected as part of this project.

CONSENT

I agree to take part in this research study ☐

I do not agree to take part in this research study ☐

Name of Participant …… Signature……..

Date …….

Name of Researcher ……Signature ……..

Date ……

End of consent form ……

Appendix 4B: Participation consent form – Interview (Arabic)

University of Glasgow
College of Social Sciences

نموذج الموافقة

عنوان البحث :

واقع استخدام تطبيقات الهواتف الذكية للتعلم في التعليم العالي في المملكة العربية السعودية

اسم الباحث: عبد الله الجابر

١. أؤكد أنني قد قرأت وفهمت البيان التوضيحي للدراسة المذكورة أعلاه، وأتيحت له الفرصة للمشاركة.

٢. أنا أفهم أن مشاركتي طوعية وأنا حر في الانسحاب في أي وقت، دون إبداء أي سبب.

٣. أنا أوافق على إجراء المقابلة وتكون مسجلة.

السرية / عدم الكشف عن هويته

أقر بأن جميع المشاركين سوف يشار إليهم باسماء مستعاره ولن يكون هناك أي تأثير على العمل عند مشاركتك أو عدم المشاركة في هذا البحث.

استخدام البيانات وتخزينها

سيتم التعامل مع المواد على أنها سرية ويحتفظ بها في التخزين الآمن في جميع الأوقات.

سيتم حذف المواد مرة واحدة بعد اكتمال المشروع.

أنا أوافق على التنازل عن حقوقي في التأليف والنشر لأي البيانات التي تم جمعها كجزء من هذا المشروع.

موافقة

أنا أوافق على المشاركة في هذه الدراسة البحثية ( )

أنا لا أوافق على المشاركة في هذه الدراسة البحثية ( )

اسم المشارك ..... التوقيع .....

التاريخ .....

اسم الباحث

عبد الله بن عوض الجابر

التوقيع .....

التاريخ .....

نهاية استمارة الموافقة

Appendix 5A: The structure of the questionnaire (English and Arabic)

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Section 1: Demographic Information (students' characteristics)

القسم الأول : معلومات أساسية

1. Do you own a Smartphone?
   هل تملك جاهز ذكي
a. Yes
   نعم
b. No
   لا

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

If you answered yes, continue to question 2.

إذا الأجابة **لا** أمل التوقف عن إكمال الأستبيان إذا الأجابة **نعم** أذهب للسؤال الثاني لإكمال الأستبيان.

2. Please indicate your gender?
   الرجاء حدد جنسك

a. Male ذكر

b. Female أنثى

3. Please specify your age?
   الرجاء حدد عمرك
   a. 18-22
   b. 23-26
   c. 27-30
   d. 31and more

_____

4. What is your class standing?
   في أي عام دراسي تدرس

a. First year السنة الأولى

b. Second year السنة الثانية

c. Third year السنة الثالثة

d. Fourth year السنة الرابعة

5. What is the brand of your Smartphone?

ماهي شركة جهازك الذكي

a. Apple أبل

b. Samsung سامسنج

c. Motorola موتورولا

d. Nokia نوكيا

e. Blackberry بلاك بيري

f. Other

6. Who is your mobile operator?

من هي الشركة المشغلة لجهازك

a. Stc الأتصالات السعودية

b. Mobile موبايلي

c. Zain زين

d. Other

Section 2: students' attitudes toward the use of smartphone Apps for educational purposes

القسم الثاني: مواقف الطلاب تجاه استخدام تطبيقات الهواتف الذكية للأغراض التعليمية

Statements البيان	Never أبداً	Rarely نادراً	Sometimes أحياناً	Often غالباً	Always دائماً
1.Using smartphone helps for scientific research استخدام الهاتف الذكي يساعد على البحث العلمي					
2.I use my smartphone Apps to submit assignments استخدام تطبيق هاتفي الذكي لتقديم المهام					
3. I use my smartphone to check out my email **استخدام هاتفي الذكي لمراجعة بريدي الإلكتروني**					
4. Smartphone creates a better environment for learning **الهاتف الذكي يخلق بيئة أفضل للتعلم**					
5. Using Smartphone in class helps in sharing more resources from searches and learn **يساعد استخدام الهاتف الذكي في الفصل في مشاركة المزيد من المصادر في عمليات البحث والتعلم**					
6. I use smartphone for discussions through educational students groups or forums **استخدم الهاتف الذكي للمناقشات من خلال مجموعات الطلاب التعليمية أو المنتديات**					
7. I use my smartphone to access lecture notes or other course materials **استخدم هاتفي الذكي للوصول إلى مذكرات المحاضرات أو المواد الأخرى**					
8. I use my smartphone to access / listen to class lectures **أستخدم هاتفي الذكي للوصول أو الاستماع إلى المحاضرات**					
9. Using the smartphone can improve communication with faculty members and classmates **استخدام الهاتف الذكي يُمكن تحسين التواصل مع الأساتذة وزملاء الدراسة**					

Statements البيان	Never أبداً	Rarely نادراً	Sometimes أحياناً	Often غالباً	Always دائماً
10. I use my smartphone to access the learning management system in my university **أستخدم هاتفي الذكي للوصول إلى نظام إدارة التعلم في جامعتي**					
11. The use of smartphone can increase flexibility of access to resources **يُمكن استخدام الهاتف الذكي زيادة مرونة الوصول إلى المصادر**					
12. I use my smartphone to browse the internet for information **أستخدم هاتفي الذكي لتصفح الإنترنت للحصول على معلومات**					
13. I use smartphone outside of class to pursue learning **أستخدم هاتفي الذكي خارج الصف لمتابعة التعلم**					
14. My university provides formal training , on how to use smartphone apps					
15. With smartphone I do not need to depend on desktops **مع الهاتف الذكي أنا لا أحتاج إلى الاعتماد على أجهزة الكمبيوتر**					

Section 3: The issues and challenges confront by students in use of smartphone Apps for educational purposes

القسم الثالث: القضايا والتحديات التي يواجهها الطلاب في استخدام تطبيقات الأجهزة الذكية في التعليم

14. Are there any challenges that you confront using Smartphone Apps for education purposes? Please give examples?

هل هناك أي تحديات تواجهها باستخدام تطبيقات الهاتف الذكي لأغراض تعليمه ؟ يرجى إعطاء أمثلة؟

15. Could you highlight any advantages of using Smartphone Apps for education purposes? Please give examples?

هل يمكن أن تذكر أي مزايا لأستخدام تطبيقات الهاتف الذكي لأغراض تعليمه؟ يرجى إعطاء أمثلة

Appendix 6A: Plain language statement- Questionnaire (English)

University of Glasgow
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Plain Language Statement

Study title and Researcher Details
My name is Abdullah Awadh M Aljaber. I am a student at the University of Glasgow. For my doctoral studies I am carrying out a research project.

The title of the project is:
The reality of using smartphone applications for learning in higher education of Saudi Arabia

This research is supervised by Prof Victor Lally at the University of Glasgow (victor.lally@Glasgow.ac.uk, telephone: 0141 3303424) and Mr Kevin Lowden of the University of Glasgow (email: Kevin.Lowden@glasgow.ac.uk, telephone: 01413303493).
Thank you for taking the time to read this.

Invitation

I would like to invite you to take part in this research study. Before you decide whether you would like to take a part it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with me if you wish. Please feel free to ask questions about anything about which you are unclear. If you would like to have more information, please contact me. Please take your time to consider whether you wish to take part.

The purpose of the study

The main purpose of the study is to understand the use of mobile technology in teaching and learning through examining current and actual uses of mobile technology for educational purposes. The study will also highlight obstacles involved in the implementation of mobile technologies in university in Saudi Arabia. In addition, this research aims to help in developing better use of smartphones in higher education and to investigate instructors and students uses and experiences with mobile technology and smartphones in education.

What is required of you?

I would like to you fill out the attached questionnaire (online questionnaire) which takes ten minutes. The data from this questionnaire may be used in my doctoral thesis, and also any publications arising from it. You may request a copy of these documents from myself when the research is completed.

8.4.1.1.3 How participant's personal details will be kept confidential

The data will be gathered and coded by numbers or letters rather than the names of participants, and once the data has achieved its purpose, it will be destroyed. Access to computer files to be available by password only and, after analysis, the data will be destroyed in the presence of the researcher and the supervisors.
Please note that assurances on confidentiality will be strictly adhered to unless evidence of wrongdoing or potential harm is uncovered. In such cases the University may be obliged to contact relevant statutory bodies/agencies.

Organisation funding the research
Saudi Arabian Embassy
This project has been considered and approved by the Social Sciences/School of Education Research Ethics Committee at the University of Glasgow, UK

Contact for Further Information
For further information, please contact Prof Victor Lally at the University of Glasgow (victor.lally@Glasgow.ac.uk, telephone: 0141 330 3036) and Mr Kevin Lowden of the University of Glasgow (email: Kevin.Lowden@glasgow.ac.uk, telephone: 0141 330 3493). If you have any concerns regarding the conduct of this research project you can contact the College of Social Sciences Ethics Officer, Dr Muir Houston, email: Muir.Houston@glasgow.ac.uk

Appendix 6B: Plan language statement- Questionnaire (Arabic)

University of Glasgow
College of Social Sciences

بيان اللغة

عنوان الدراسة وتفاصيل الباحث

اسمي عبد الله عوض مشعل الجابر. أنا طالب في جامعة غلاسكو. لدراسة الدكتوراه أحمل مشروعا بحثيا.

عنوان المشروع:

واقع استخدام الهواتف الذكية للتعلم في التعليم العالي في المملكة العربية السعودية.

ويشرف على هذا البحث البروفيسور فيكتور للي من جامعة غلاسكو (

victor.lally@Glasgow.ac.uk (البريد والسيد كيفن لودن من جامعة غلاسكو (الهاتف: ٠١٤١ ٣٣٠٣٤٢٤ ، الإلكتروني: Kevin.Lowden@glasgow.ac.uk.(٠١٤١٣٣٠٣٤٩٣ ، رقم الهاتف:

أشكركم على أخذ الوقت لقراءة هذا.

دعوة

وأود أن أدعوكم للمشاركة في هذه الدراسة البحثية. قبل أن تقرر ما إذا كنت تريد أن تأخذ جزءا من المهم بالنسبة لك أن تفهم على ماذا يجري البحث وعلى ما سينطوي. يرجى أخذ الوقت الكافي لقراءة المعلومات التالية بعناية ومناقشتها معي إذا كنت ترغب في ذلك. لا تتردد في طرح الأسئلة حول أي شيء غير واضح. إذا كنت ترغب في الحصول على مزيد من المعلومات، يرجى الاتصال بي aaljaber388@gmail.com/a.aljaber.1@research.gla.ac.uk

يرجى أن تأخذ وقتك للنظر في ما إذا كنت ترغب في المشاركة.

الغرض من الدراسة :

الغرض الرئيسي من هذه الدراسة هو أن نتعرف على واقع استخدام تطبيقات الهاتف النقال في التعليم والتعلم من خلال دراسة الاستخدامات الحالية والفعلية لتكنولوجيا الهاتف النقال لأغراض تعليمية. فإن الدراسة أيضا تسلط الضوء على العقبات التي تشارك في تنفيذ التقنيات النقالة في الجامعات في المملكة العربية السعودية. وبالإضافة إلى ذلك، يهدف هذا البحث إلى مساعدة في تطوير استخدام أفضل التطبيقات للهواتف الذكية في التعليم العالي والتحقق من أستخدام أعضاء هيئة التدريس والطلاب والخبرات مع تكنولوجيا الهاتف النقال والهواتف الذكية في التعليم.

منك : ما هو المطلوب

تعبأت الاستبانه المرفقه بالرابط (الاستبيان عبر الإنترنت) والتي تستغرق عشر دقائق . ويمكن أستخدام البيانات في أطروحتي للدكتوراة ، وأي منشورات تنشأ عن ذلك تستطيع طلب نسخة من هذه الوثائق مني عندما يتم الأنتهاء من البحث.

كيف سيتم الاحتفاظ بسرية المعلومات الشخصية المشاركين

سيتم جمع البيانات وترميزها بواسطة الأرقام أو الحروف بدلا من أسماء المشاركين، مرة واحدة وعندما تحقق البيانات الغرض منها، سيتم تدميرها والوصول إلى ملفات الكمبيوتر لتكون متوفرة من خلال كلمة السر وبعد التحليل سيتم تدمير البيانات في وجود الباحث والمشرفين فقط .

ملاحظة

أن الضمانات المتعلقة بالسرية سيتم التقيد التام بها ما لم يتم الكشف عن اي مخالفات أو محتمل الضرر. في مثل هذه الحالات الجامعة قد تضطر إلى الاتصال الهيئات النظامية / الوكالات ذات الصلة.

تمويل البحث

سفارة المملكة العربية السعودية

وهذا المشروع وافقت عليه كلية العلوم الاجتماعية التربية والتعليم لجنة أخلاقيات البحوث في جامعة غلاسكو، المملكة المتحدة

للحصول على معلومات إضافية

لمزيد من المعلومات، يرجى الاتصال على البروفيسور فيكتور للي في جامعة غلاسكو الهاتف: ٠١٤١ ٣٣٠٣٤٢٤) والسيد كيفن لودن من جامعة غلاسكو (البريد: victor.lally@Glasgow.ac.uk(المملكة المتحدة، هاتف: ٠١٤١٣٣٠٣٤٩٣). Kevin.Lowden@glasgow.ac

إذا كان لديك أية مخاوف بشأن سير هذا المشروع البحثي يمكنك الاتصال كلية العلوم الاجتماعية أخلاقيات الموظف، الدكتور موير هيوستن، البريد الإلكتروني: Muir.Houston@glasgow.ac.uk

Appendix 7A: Research ethics approval

University of Glasgow
College of Social Sciences

College Research Ethics
Request for Amendments - Reviewer Feedback
Ethics Committee for Non-Clinical Research Involving Human Subjects

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Application Details

Staff Research Ethics Application ☐ Postgraduate Student Research Ethics Application ☒

Application Number: 400160040

Applicant's Name: Abdullah Awadh M Aljaber

Project Title: Effects of using smartphones in learning in higher education in Saudi Arabia

Original Date of Application Approval: 05/12/2016

End Date of Application Approval: 10/05/2019

Date of Amendments Approved: 30/10/2017

Outcome: Amendments Approved

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Reviewer Comments