School of Information Systems

A Conceptual Framework for the Effective Implementation of E-learning for Universities in Saudi Arabia

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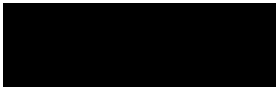**of**
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Declaration

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This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262), Approval Number # **HRE2018-0531**

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Abstract

Nowadays, E-learning plays a significant role in the education system because, for the purposes of teaching and learning, it integrates information and communication technologies (ICTs) that have become a part of everyday life for individuals, businesses and organisations. E-learning can provide the transition from a traditional learning model to a more innovative and flexible one, and can alleviate the constraints imposed by time and the need to be physically present, and can lead to less stressful teaching and learning. In a country like the Kingdom of Saudi Arabia, where the population is extensively widespread, the potential of E-learning warrants examination. Although the universities in Saudi Arabia are implementing E-learning initiatives, the overall usage of E-learning is less than satisfactory. However, there still seem to be significant gaps in the research on the effective implementation of E-learning. Therefore, this research is motivated by the need to understand the current status of E-learning usage in Saudi universities and investigate the factors that can be harnessed to promote the effective implementation of E-learning, and by the need to have a conceptual E-learning framework and recommendations as a blueprint to guide the universities in Saudi Arabia in their implementation of successful and sustainable E-learning.

In order to realise the aims of this study, firstly, an initial conceptual framework was derived from the literature review. Methodologically, a mixed-methods approach is adopted and, in particular, a sequential explanatory research design comprising two phases of data collection: quantitative and qualitative. For the collection of quantitative data, a questionnaire survey was designed and administered to develop and validate initial factors and provide an improved list of factors and sub-factors for the E-learning framework. An online survey was conducted with a sample population of 704 (586 students and 118 academics) from Saudi universities. On a five-point Likert scale ranging from "strongly disagree" to "strongly agree", the participants indicated their level of agreement or disagreement with questionnaire items; the values obtained from this scale were used to measure the initial research framework factors. Exploratory factor analysis (EFA) was applied to the quantitative data using SPSS version 25 to reduce the number of latent variables, to ensure a consistent interpretation of the survey data, and to determine the final number of factors for inclusion in the final framework. The results of this phase were used to develop and refine the framework. It was then examined via qualitative online semi-

structured interviews carried out in non-real-time with the potential users of the framework to ensure that the final framework is effective.

The results derived from the quantitative data provided the basis for the interview phase. Online semi-structured interviews were conducted with 22 academic staff (E-learning experts) who are working in Saudi universities, in order to evaluate and confirm the final set of factors and discuss quantitative findings in more detail, while integrating the findings from the literature. A thematic analysis of the interview data was conducted using NVivo 12 software. Emerging themes and sub-themes from the data analysis were used for a comprehensive approach to obtaining crucial results. The data analysis identified a set of factors which are considered as necessary for effective E-learning implementation, and were included in the E-learning framework. The outcomes of the qualitative phase were summarised and linked to those obtained from the quantitative phase, combining the overall results of the quantitative and qualitative analyses. All of the identified factors - Technical Learning Management Systems, TPTCK, E-learning Management Systems, E-assessment, Students' Readiness, and Personal Management Issues - were seen as vital to the effective implementation of E-learning in Saudi universities. Following the analyses, the final framework was developed.

This research makes two main contributions. First, it provides a conceptual framework comprising the key factors required to facilitate the effective implementation of E-learning in teaching and learning approaches in the higher education sector of Saudi Arabia. It contributes to the existing literature on the ways that E-learning has been integrated into teaching and learning practices. Second, the research findings align with one objective of the Saudi Vision 2030: to have at least five Saudi universities ranked among the top 200 universities in the world.

The research framework and recommendations provide valuable guidelines for stakeholders and offer them a better understanding of the status of E-learning in their respective tertiary education institution. Furthermore, the framework offers an overview of the factors that need to be considered in order for E-learning to be successful within the higher education environment. The outcomes of this research can be generalised to other developing countries with similar needs for E-learning implementation in future.

This study has several limitations. This research was limited to the Saudi context as it was intended to determine the crucial factors that influence the effective implementation of E-

learning in Saudi universities. Future studies could extend the research context to investigate the feasibility of applying the same framework in developing countries in order to determine whether the framework needed to include more factors or the adjustment of existing ones in order to suit a specific context. Also, this study developed a conceptual framework without a subsequent implementation trial. Therefore, the research methods could be extended by conducting focus groups with academic staff and students, so as to obtain various perspectives which would be representative of a group or an institution.

Publications

- **Alqahtani, A. S.** (2019, February 24). *E-learning Framework for Saudi Universities.* The Eleventh International Conference on Mobile, Hybrid, and On-line Learning, (pp. 17-25). Athens, Greece.

- Issa, T., Jaafari, M. A., **Alqahtani, A. S.**, Alqahtani, S., Issa, T., Maketo, L., & Pervaiz, S. (2021). Benefits and challenges of social networking during COVID-19: personal perspective. *International Journal of Web Based Communities, 17*(2), 135-148.

- Abu-Salih, B., Bremie, B., Wongthongtham, P., Duan, K., Issa, T., Chan, K. Y., Alhabashneh, M., Albtoush, T., Alqahtani, S., **Alqahtani, A. S.**, …. & Albahlal, A (2019, March 15). *Social Credibility Incorporating Semantic Analysis and Machine Learning: A Survey of the State-of-the-Art and Future Research Directions*. In Workshops of the International Conference on Advanced Information Networking and Applications (pp. 887-896). Springer, Cham. https://doi.org/10.1007/978-3-030-15035-8_87

- **Alqahtani, A. S.** (2017). Critical Success Factors In Implementing ITIL in the Ministry of Education in Saudi Arabia: An Exploratory Study. *International Journal of Advanced Computer Science and Applications, 8*(4), 230-240.

Memberships

- Member of the Information Systems Audit and Control Association (ISACA) in 2016-2017.

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Chapter 1: Introduction

1.1 Chapter Introduction

The usage of E-learning in higher education institutions has increased dramatically with the development of a set of E-learning systems to support traditional teaching and learning. Universities are now utilising E-learning platforms to offer a blend of face-to-face classroom education, self-paced learning, live E-learning and distance learning. These platforms provide many benefits to universities. E-learning can help to support social interactions between learners and instructors, and amongst learners. Student-centred learning is focused on strengthening the collaboration and communication skills of students, which will encourage them to better engage in their learning process. In a country like the Kingdom of Saudi Arabia, where the population is widespread, the potential of E-learning should be investigated. Although Saudi universities are implementing E-learning initiatives, the overall usage of E-learning is not satisfactory (Al Gamdi & Samarji, 2016). Moreover, there appear to be significant gaps in the research regarding its effective implementation (see section 1.4). Therefore, the main focus of this research is on the issues associated with the successful adoption of E-learning with the aim of understanding how Saudi universities and their academic staff have implemented this system. The result is the identification of a set of factors necessary to help ensure the effective implementation of E-learning in Saudi universities and the development of a conceptual framework for effective E-learning.

This chapter provides an overview of the main components of this research. Section 1.2 describes the research background; the current use of E-learning in higher education in Saudi Arabia is discussed in section 1.3. The need for a conceptual framework for effective E-learning implementation is explained in section 1.4, followed by the research motivation and objectives, and the formulation of the research questions in section 1.5. In section 1.6, the research significance and theoretical and practical contributions are presented. The research methodology adopted for this study is described in section 1.8. The chapter concludes with an outline of the thesis structure.

1.2 Research Background

Nowadays, the rapid growth of information and communication technologies (ICTs) has reshaped the way that teaching and learning take place in higher education institutions (Al-Azawei et al., 2016; Sife et al., 2007). The ongoing changes in digital technology offer

tremendous opportunities for different sectors such as business, health care, and education to improve living standards. Educational technology is a key player in higher education with an enormous potential to transform the future of university teaching and learning environments (Jeffrey, 2009). Thus, it is essential to research and conceptualize modern technologies with regard to suitable pedagogies before introducing these technologies. ICT is changing the modes of teaching and learning in university education by utilising more modern and effective methods such as E-learning (Selim, 2007a).

In the new era of learning, E-learning has become a vital strategy for the vast majority of educational institutions across the globe. Universities are much more influenced because of modern technology that can strengthen the effectiveness of E-learning. With the widespread usage of the Internet, E-learning became hugely prevalent and many universities include it in their programs (Hassanzadeh et al., 2012). E-learning is a modern technology which has emerged from ICT development and has been defined in the literature in various contexts and in many ways (Anaraki, 2004). According to Dublin (2003) and Rosenberg (2001), the literature on E-learning is vast, making it difficult to obtain a consensual definition. In fact, there is no commonly-accepted definition of E-learning. Dublin (2003, p. 2) states that "everybody knows what you mean when you talk about E-learning; nevertheless, the term E-learning means different things to different people". E-learning relates to the use of Information and Communication Technologies (ICTs) in various education processes to enhance learning and teaching. It offers flexibility in terms of when, how, and where information is delivered by academic staff and received by students (Al-Adwan & Smedley, 2012).

Due to the potential benefits of E-learning, the literature shows an increasing interest in this research area. Noticeably, from 2000 to 2008, there has been an increase in the number of E-learning research papers appearing in many academic disciplines (Hung, 2012). Literature pointed out a shift from E-learning acceptance to E-learning implementation (Fryan & Stergioulas, 2013; Hung, 2012). In developed countries, several studies have been conducted on the implementation of E-learning in higher education. Many universities worldwide have adopted their operational models to implement E-learning technologies in order to remain effective in their teaching and learning activities and have become the benchmark for others. However, developing countries have not yet effectively implemented these technologies (Sife et al., 2007; Ssekakubo et al., 2011; Tarus et al., 2015). In particular, there is an evident delay in the adoption of E-learning by most of the higher education sectors in the Middle

Eastern countries, one of which is Saudi Arabia; moreover, the successful implementation of E-learning is moving very slowly (Al Gamdi & Samarji, 2016; Yamani, 2014).

In Saudi Arabia, the focus region of this study, very few studies have investigated the factors that influence the effective implementation of E-learning. Although a plethora of research has investigated E-learning in the context of Saudi Arabia to various extents, most of these studies have been limited in that they focus on the acceptance and adoption of E-learning technologies (Al-Harbi, 2011; Alhabeeb & Rowley, 2018; Alkhalaf et al., 2012; Naveed et al., 2017). It is also evident that most prior studies related to E-learning are usually conducted from one, at the most two, perspectives. However, few studies have discussed the effective implementation of E-learning in Saudi Arabia (Almaiah & Almulhem, 2018; Quadri et al., 2017). Of specific relevance to this study are the two previous studies conducted in Saudi Arabia. These studies concentrated on the technical side of E-learning systems. Most importantly, for the purposes of this study, the participants in the studies vary. In the context of this study, E-learning has been used in various ways in education. For instance, there are two types of E-learning delivery: synchronous and asynchronous learning. These two types of E-learning are presented in virtual learning environments usually facilitated by learning management systems (types of E-learning are explained in section 2.4). The E-learning environments offer a very interactive and engaging learning approach using various technological tools such as whiteboard, video conferencing, audio chatting, online discussion, and Blackboard (Guri-Rosenblit, 2009; Sife et al., 2007). These technologies allow students and academic staff to engage in effective and flexible interaction.

In an attempt to investigate and analyse E-learning systems and usage in Saudi universities, Quadri et al. (2017) conducted a survey of 257 students and academic staff at Saudi universities. They found that ICT infrastructure and technology decisions made during the implementation process were essential in motivating learners to utilise E-learning. A quantitative study was conducted by Alharthi et al. (2017) investigating the factors that influence faculty members' acceptance and application of E-learning in Saudi Arabian universities. The study results indicated that user satisfaction, user resistance to E-learning technology and the extent of computer self-efficacy are important factors related to E-learning acceptance. To ensure that universities are able to adopt a technology such as E-learning, it is important to identify barriers hampering its implementation, and ways to overcome them (Al-Azawei et al., 2016). In a study conducted by Altameem (2013), many universities fail to use E-learning effectively due to a lack of IT support. Technical support

must be available to facilitate the delivery of course content and to manage any technological difficulties experienced by students (Omoda-Onyait & Lubega, 2011).

Furthermore, lack of time is another main factor that restricts the implementation of E-learning. Several studies found that insufficient time to develop e-courses and concerns about workloads are challenges facing E-learning in higher education (Al-Sarrani, 2010; Al Mulhem, 2014a; Almalki, 2011). For example, Al Mulhem (2014a) studied the barriers that prevent or limit the use of E-learning by academic staff in Saudi universities. The barriers comprised these four factors: lack of time, lack of support, lack of training and staff's negative attitude toward E-learning.

Furthermore, during the course of this research, the globe was hit by the COVID-19 pandemic, which has permanently changed teaching and learning methods. According to Sarker et al. (2019), E-learning will become a crucial part of education. E-learning plays a vital role during COVID-19 by providing education outside the conventional physical classrooms and making teaching more collaborative, effective, and efficient (Almaiah et al., 2020). For instance, students can have direct access to materials via electronic devices; they can interact with peers or instructors through chat groups, video meetings and document sharing; and they can undertake examinations via the Internet (Dhir et al., 2017).

E-learning technology involves more than just introducing new technologies within an organisation (Ashrafzadeh & Sayadian, 2015). In fact, the implementation of new technology does not automatically guarantee the desired results; careful planning, adoption strategies and understanding of users' willingness are essential (ElTartoussi, 2009) to successful implementation. Govindasamy (2001) pointed out that effective E-learning implementation is a means of solving authentic problems related to learning and achievement. However, although E-learning is a developing field of interest in Saudi universities, the universities are still encountering a number of challenges, such as technological issues, that are preventing them from reaping the full benefits of successful E-learning implementation (Al Gamdi & Samarji, 2016).

Accordingly, it is essential to provide effective E-learning systems required by Saudi universities and ensure that they are utilised effectively by these universities. Until recently, to the best of the researcher's knowledge, and based on research into this field of study, limited work has been done to investigate the crucial factors that affect the successful implementation of E-learning in Saudi universities (see more details in section 1.4). In addition, there is no single study that includes each of the factors identified in this research.

Therefore, this study aims to contribute conceptually to E-learning literature and make a practical contribution to the learning environments of Saudi universities by developing an E-learning framework that will help key university stakeholders to maximise their theoretical and academic knowledge of the crucial factors needed for the effective incorporation of E-learning in teaching and learning methods in universities. The Saudi education system, the use of E-learning in Saudi higher education, the research motivation and objectives, questions, significance, and research methodology are discussed in the following sections.

1.3   Education System in Saudi Arabia

Over the last decade, there have been notable improvements in the education system in Saudi Arabia. In particular, regulations and policies have been revised in alignment with the broader vision of the country. The education system in Saudi Arabia has developed to ensure that education becomes more effective, meets the country's religious, economic, and social needs, and eliminates illiteracy among Saudi youth. In 1975, the Ministry of Higher Education was established to supervise the implementation of education policy in higher education. The Saudi higher education sector comprises universities, colleges, and other tertiary institutions. Currently, Saudi Arabia has twenty-nine public and ten private universities located in various geographic regions (Aldiab et al., 2017). Notably, Saudi Arabia is one of the countries in the world spending the largest amount on the education sector.

According to Unnisa (2014), the education and healthcare sectors in Saudi Arabia are prioritised in the national budget, with the education sector accounting for 25% of the total expenditure in the national budget and is considered the highest in the world. In the period 2014 to 2016, the Saudi government increased the budget for higher education from US $53.9 billion in 2014, to around US $55.5 billion in 2015 and $57.7 billion in 2016 (Aldiab et al., 2017) and this money has been spent to increase the number of universities and colleges in Saudi Arabia. Figure 1, shows the increase in the budget for Saudi higher education in those years.
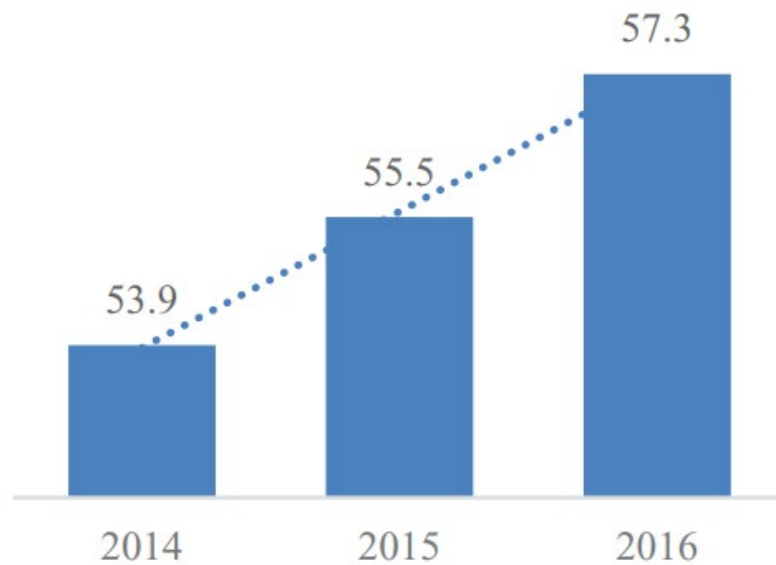
Figure 1: Budget spent on Saudi higher education in billion US dollars (Aldiab et al., 2017)

The Saudi government has invested in information and communication technology (ICT) infrastructure, with the result that the number of Internet users jumped from 200,000 users to 7.7 million by 2008 (AlMegren & Yassin, 2013). In 2015, a report from the Communications and Information Technology Commission (CITC) in Saudi Arabia showed that the number of Internet users increased to around 21.6 million (CITC, 2015). To accommodate the strong demand for higher education, given that 37% of the Saudi population is under the age of 14, and 51% is under the age of 25 (General Authority for Statistics, 2020), new legislation has given more independence to Saudi universities to allow them to meet the high demand for places.

To address this issue, the Ministry of Higher Education has initiated many projects to establish the National Plan for information technology, intended to improve the quality of learning in higher education by encouraging E-learning and distance learning. Therefore, the National Centre for E-Learning and Distance Learning (NCEDL) was established in 2007, with the aim of establishing E-learning systems in the Saudi higher education sector and overseeing the development of E-learning projects in Saudi universities (see section 1.3.1 for details about the responsibilities of this centre. Most Saudi universities have a formal agreement with the NCEDL to establish and run E-learning programs in order to provide university-designed course materials (Al-Asmari & Rabb Khan, 2014).

Another initiative is the Saudi digital library (SDL) established by the Ministry of Higher Education to support E-learning and provide electronic resources for students and academic

staff in Saudi universities (Alzahrani, 2017). The electronic resources include digital books produced by both global universities and commercial publishers.

In Alkhalaf et al. (2012)'s study, it was expected that Saudi Arabia would become one of the fastest developing countries in the world, particularly in establishing E-learning systems in educational institutions. Thus, the Saudi government launched a new vision and strategy to develop education systems. In particular, the objective is for public universities in this country to be among the most advanced in the world by 2030. According to Alharbi (2016), the government aims to have at least five Saudi universities among the top 200 universities in the international rankings by 2030. Therefore, universities must ensure that their teaching methods are sophisticated, and that technology is an integral part of their educational objectives in order for the universities to be recognised and classified internationally. According to Alenezi (2018), the Ministry of Higher Education intends to improve the quality of education in the universities by utilising ICT initiatives and harnessing the potential of E-learning.

Teaching and learning in Saudi higher education face several challenges. According to Hamdan (2013) and Alharbi (2016), the Saudi government strives to overcome the challenges the universities encounter by, for example, improving education quality, productivity and accreditation, and by developing modern curriculum using different technologies to increase the interaction between instructors and students, and focusing on the rigorous development of standards in literacy, numeracy, and skills. In another study, Hamdan (2014) indicated that the teaching and learning process in Saudi higher education failed to improve students' engagement and motivation, develop students' critical thinking ability, or support self-directed learning. Similar to other studies, Alnassar and Dow (2013) pointed out that the main challenges facing E-learning implementation in Saudi universities are: the existing curriculum design does not encourage the critical thinking of students; innovative methods for teaching and improvement are not encouraged; there is inadequate training provided for academic staff and students; student' self-learning is not supported, and problem-solving skills are not expressly taught. Saudi universities are trying to tackle these challenges by developing modern curricula and providing advanced technological education (Smith & Abouammoh, 2013).

1.3.1 E-learning in Saudi higher education (Saudi Vision 2030)

In 2016, Saudi Arabia announced its long-term vision, known as Saudi Vision 2030. The Vision was adopted as a roadmap and methodology focusing on three elements: a prosperous

economy, a dynamic society, and an ambitious country. One of the aims of the Vision is the implementation of a quality-of-life program for citizens in Saudi Arabia; one aspect of this program is that it measures the satisfaction of the citizens. The higher education system in Saudi Arabia receives great attention in Saudi Vision 2030, particularly in terms of recognising the importance of higher education in the worldwide knowledge economy (Saudi Vision 2030, 2016). The quality-of-life program in education is measured by providing high quality education systems, reliable facilities, and training opportunities for all citizens. Vision 2030 aspires to transform Saudi Arabia into a modern country with well-developed education, cultural values, and society. Thus, the Vision's plan involves a shift to modern teaching approaches within a context that would help students and educators adopt and use new technologies such as E-learning.

As a result, the strategic plan undertaken by the Ministry of Education informs the influence of ICT on higher education by supporting the usage of ICT as a key essential tool to fulfil this ambitious plan and improve the technological infrastructure. In particular, the Ministry of Education launched several initiatives to promote the usage of ICT in the education system in Saudi Arabia, which involve improving technology literacy among educators and students in order to ensure a smooth transition from traditional to modern education systems and increase society awareness about the usage of technology in education. However, it is evident that the Saudi higher education system is under some strain, despite the vast amount of money invested. This is attributed to the growing student population and the insufficient number of university places available to accommodate these students (Asiri, 2012). Consequently, E-learning may provide a means of delivering a university education to students who do not secure a place at a university, or who are employed and unable to attend university full-time (Aldiab et al., 2017).

The Ministry of Education sought to enhance E-learning for university-level education by establishing the National Centre for E-Learning and Distance Learning (NCEDL) in 2007. The NCEDL is responsible for development and research to facilitate E-learning in higher education, which involves the National Repository (Maknaz) and the National Learning Management System (named Jusur LMS) managing, saving and sharing learning materials among Saudi universities (Al-Khalifa, 2010). Moreover, this centre serves as a monitoring body that provides and prepares E-learning strategic plans; distributes E-learning applications and solutions to all universities in accordance with the best quality standards; holds meetings, conferences and workshops that will contribute to the development of E-

learning and distance learning; and establishes international links with organisations, agencies, and other entities in the field of E-learning and distance learning.

1.4 The Need for A Conceptual Framework for Effective E-learning Implementation in Saudi Universities

The need for this research is evident after one examines the current studies which were conducted in a specific context. Although modern technologies such as E-learning are familiar to academic staff at universities in both developed and developing countries, there is still inadequate specific research on the development of a comprehensive framework to define, evaluate and facilitate the effective implementation of E-learning. The implementation of E-learning is still in its infancy in many developing countries and in the Middle East in particular (Al-Azawei et al., 2016). E-learning is in the early stage of implementation in Saudi universities (Al-Gahtani, 2016; Almaiah & Almulhem, 2018). According to Hussein (2011), several developing nations are now interested in implementing E-learning systems, but they experience many difficulties related to communicating online with students, course design and many other technical aspects. These problems also apply to Saudi Arabia and other Middle Eastern countries.

Most of the Saudi universities seek to keep pace with the development of E-learning around the world. However, King Saud University, one of the largest Saudi universities, presents only 55% of its courses through E-learning systems (Alharbi et al., 2015). This indicates that there is still a low level of usage of E-learning in universities in Saudi Arabia.

This study is consistent with that of Al Gamdi and Samarji (2016) who reported that the effective implementation of E-learning in many Saudi universities does not seem proportional to the huge government investment in technology for education. Similarly, Al-Gahtani (2016) indicated that most Saudi universities have not yet reached the required level of E-learning usage, and only a few academic staff have implemented this technology. In addition, using the Delphi method, Almaiah and Almulhem (2018) suggest a conceptual framework to identify factors that influence faculty members' acceptance and application of E-learning systems. Four domains and 11 critical success factors were found. The most important factors were website quality, technological factors, top management support and E-learning awareness.

Many studies indicated that a conceptual framework for the implementation of technologies such as E-learning systems is crucial (Andersson & Grönlund, 2009; Fryan & Stergioulas,

2013). Research concentrating on the implementation and usage of E-learning has received little attention and remains relatively inadequate in universities in Saudi Arabia (Alharbi & Drew, 2014). Therefore, there is a need to promote E-learning by making it more effective in the severely constrained context of Saudi Arabia as a developing country, particularly since E-learning research in this context is minimal. This research will investigate the crucial factors that influence academic staff and students to use E-learning system successfully in Saudi higher education.

In an attempt to address the abovementioned concerns, this research concentrated on establishing ways of developing a conceptual framework for strengthening the effective implementation of E-learning. The study sought to examine factors that are suitable for developing a framework to facilitate the effective implementation of E-learning within Saudi universities. With E-learning in universities being so strongly advocated, it is important to propose a framework to assist universities to develop, sustain and integrate E-learning in order to enhance academic staff and student experiences.

Thus, the outcomes of this research align with the Saudi Vision 2030 and may facilitate decision-making in this area by providing information to policymakers in universities, E-learning developers, and ICT departments about the factors required for the successful implementation of E-learning. Whilst this study extends the recommendations of previous studies, it does not presume that E-learning is the solution to current educational problems without a valid assessment of its usefulness and influence. Finally, the final E-learning framework developed in this study provides an overview of driving factors for E-learning implementation in Saudi universities and offers several recommendations to universities to ensure the successful implementation.

1.5   Research Motivation and Objectives

The study is motivated by the need to improve the resources required to meet the strong demand for higher education in Saudi Arabia since there is a lack of academic staff and there are not enough places for students. In order to implement E-learning effectively, higher education providers need to understand the factors that play a vital role in the successful implementation of E-learning. Although the application of E-learning systems is increasing in learning and teaching practices, most models are designed for business settings and generally apply to developed countries. Therefore, it is vital to understand E-learning implementation in the tertiary education context in developing countries.

As will be detailed in section 3.3, the main objective of this research is to provide a conceptual framework comprising factors that drive the effective implementation of E-learning in Saudi universities. The most important factors that influence the E-learning implementation in Saudi universities will be identified, and an E-learning framework for these universities will be developed. This research will benefit stakeholders such as students, academic staff, E-learning developers, and experts in Saudi universities with actionable recommendations that will help to ensure the successful implementation of E-learning in Saudi universities. Further, the proposed framework will provide a conceptual basis for future research to assess the factors that contribute to E-learning implementation in Saudi universities and other higher education institutions. As discussed in Chapter 3, this research sets out to investigate the factors necessary for the effective implementation of E-learning. To fulfil this, the main objectives of the research are to:

- RO1: Identify the factors that must be included when developing an E-learning framework for higher education in Saudi Arabia.
- RO2: Determine the main factors that influence the effective implementation of E-learning in Saudi higher education framework.
- RO3: Investigate the attitudes and opinions of academic staff regarding the use of E-learning for higher education in Saudi Arabia.

To achieve the research objectives, the following research questions have been framed in order to develop a conceptual framework for the effective implementation of E-learning in Saudi universities:

RQ1: What are the factors that should be included in an E-learning framework for higher education in Saudi Arabia?

RQ2: What are the factors that will ensure the effective implementation of E-learning framework in Saudi higher education sector?

RQ3: What are the attitudes and opinions of academic staff towards the use of E-learning for higher education in Saudi Arabia?

1.6   Theoretical Significance

This study is important from the theoretical perspective because it contributes to the current understanding of how E-learning can be effectively implemented in Saudi higher education (see section 3.2.1). The aim of this research is to add to theoretical and academic knowledge

about the key factors needed to facilitate the effective implementation of E-learning in teaching and learning approaches in Saudi Arabia's tertiary education sector. This study began with an examination of the literature and the development of a framework of information system influence on the E-learning setting that incorporates the knowledge and opinions of academic staff and students. The future significance of this finding is based on the existing theories and models related to success, acceptance, and adoption of E-learning in the higher education sector, understanding of the research domain, and the potential future research that it suggests.

The research contribution adds to the extant global literature on how the E-learning system has been implemented for teaching and learning. This research proposes a framework that is a generic representation of what is needed to facilitate the effective implementation of E-learning. In light of this study, the lack of theoretical frameworks to facilitate the effective implementation of E-learning in Saudi universities is of concern. Despite the fact that E-learning research is highly developed, the aim of this research is to address the lack of empirically validated frameworks focusing on the issues of implementation, taking into account the factors required to promote the actual use of E-learning in Saudi universities. The proposed framework was developed in order to assist university stakeholders to ensure that E-learning effective.

The findings of this research will be of great benefit to decision-makers, academic staff, researchers, and PhD and master's degree students in Saudi universities who would benefit from the support of E-learning in their teaching and learning; our findings could also assist other developing countries with similar needs for E-learning implementation in future.

1.7 Practical Significance

The purpose of this research is to identify a set of key factors that influence the effective implementation of E-learning in higher education in Saudi Arabia. This study provides practical guidance to assist the government and higher education institutions to make better use of the many features that E-learning can offer to achieve excellence in digital learning (see section 3.2.2). This research contributes to increasing the understanding of E-learning by developing a framework that provides valuable guidelines on how E-learning can be implemented successfully within the tertiary education setting.

Universities in Saudi Arabia can review what they are currently doing and consider what they should be doing by examining the current status of E-learning and factors affecting it and the opportunities it offers, all of which have been systematically analysed in this

research. The outcomes of the research will provide a conceptual framework that can be utilised as a blueprint for decision-makers, academic staff and universities, enabling them to make more informed decisions when developing a successful E-learning system in their respective universities and in Saudi Arabia in general.

The research framework offers a better understanding of the factors that are currently under-researched and should be given more attention. Moreover, the results of this research align with Saudi Vision 2030 as they can assist the government and higher education sector to develop and meet the need for E-learning implementation in universities.

1.8   Research Design

This research was guided by a pragmatist philosophy. It employs a mixed-methods research design (Explanatory Sequential Design), which involves both quantitative and qualitative methods. An initial quantitative phase was conducted to identify the factors which may prove critical to the proposed framework. The first step was the initial framework obtained from a literature review, from which a survey instrument was developed. An online survey was conducted using Qualtrics survey software to confirm the factors in the initial framework.

Data was collected from academic staff and students to explore and evaluate the identified factors that influence the effective implementation of E-learning in universities in Saudi Arabia. Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS version 25) to run a preliminary analysis and the Exploratory Factor Analysis (EFA). EFA was used to identify a range of common factors that establish the correlation between the original variables and reflect a consistent interpretation of the survey data, different from the original groups. The outcome of the quantitative phase was used to refine the initial framework.

Following the survey phase, semi-structured interviews (an online interview) were conducted with the academic staff (E-learning experts) to gather data necessary to fulfil the research objective and strengthen the data obtained from the online survey findings. A thematic analysis was applied for coding and analysing data using NVivo 12 software. Emerging themes from data analysis were utilised for a comprehensive approach to obtaining crucial findings. The results of the qualitative phase were concluded and linked to the previous phase. Finally, the outcomes of the two phases led to the confirmation of the final framework. A detailed explanation of the research methodology for this research is presented in Chapter 3.

1.9 Structure of the Thesis

The research process workflow is summarised in Figure 12. This thesis comprises six chapters. The structure followed below was deemed suitable to enable a better clarification of how the research questions are answered.

- **Chapter 1:** outlines the background of the research, including the use of E-learning in higher education, motivation for the research, the context of the study (Saudi Arabia), and the objectives of the research and questions. Also, the significance of the research is established, followed by a brief summary of the research design.

- **Chapter 2:** provides a comprehensive and critical review of extant literature related to the research topic. It examines the previous studies of the E-learning system in the higher education sector, which relate to the research topic. This chapter also provides a critical review of the implementation and usage of E-learning factors in a higher educational context to develop the E-learning framework for Saudi universities. The E-learning models and frameworks relevant to this study are defined, and strengthen the conceptual framework theoretically. Then the research gap is identified, and the initial framework is developed. This chapter provides the basis for answering research question one.

- **Chapter 3:** presents the research methodology and the research process. It describes the research design including the paradigm that informed the methodological approach adopted for this research. It also includes a description of the selected mixed-methods approach comprising a quantitative phase followed by a qualitative phase. It discusses in detail the methods utilised for the data collection and analysis techniques and how the research framework is to be confirmed, modified and justified to provide the final framework for this research which allows in-depth discussion of the research questions.

- **Chapter 4:** presents the data collection and analysis for the survey process. It describes how the survey instruments were prepared and administered to the participants, and includes the survey translation and the selection of respondents. It also explains how the data was checked and validated for its appropriateness for further analysis, involving the pilot study. The data collected via an online survey is analysed, followed by a discussion of the findings to refine the E-learning framework further and to make it available for the evaluation by participants. The chapter provides the findings in relation to research question two.

- **Chapter 5:** discusses the interview process. It examines extensively the findings presented in chapter 4 and present the explanatory phase of this study. The factors influencing the effective implementation of E-learning in Saudi universities are investigated by introducing a qualitative inquiry. The findings from the qualitative data analysis are presented and discussed. The results from both quantitative and qualitative analyses are then presented and briefly discussed to improve the framework after its evaluation by the experts. To address research question three, a flexible framework that can be utilised to implement E-learning effectively is proposed.

- **Chapter 6:** is the final chapter of this research. It summarises the research inquiry, and the approaches followed to address it are presented. Then the main findings are listed, and recommendations are offered to stakeholders regarding the implementation of E-learning in Saudi universities. The theoretical and practical contributions of this research are outlined. The research limitations are discussed, and avenues for future research are suggested.

1.10 Chapter Summary

This chapter outlined the background of this research by presenting the use of E-learning in higher education. The main focus of this research is E-learning implementation which was explored in order to acquire a comprehensive understanding of this topic at the organisational level within the context of Saudi Arabian higher education. The chapter discussed the need for understanding E-learning implementation in order to provide effective guidelines for E-learning usage, which are important for both stakeholders and researchers in Saudi Arabia. The research objectives, research questions, and the theoretical and practical contributions were also discussed. An overview of the research design used for this research is provided.

In the next chapter, a comprehensive review of E-learning literature is undertaken to find the research gap and to develop a conceptual E-learning framework for universities in Saudi Arabia.

Chapter 2: Literature Review

2.1 Introduction

The previous chapter introduced the topic of E-learning within the context of Saudi higher education teaching and learning practices. The focus of the research, together with the related questions and objectives were presented. The significance of the research was explained, followed by a brief description of the research process adopted to answer the research questions.

The aim of this study was to develop the awareness of academics and students regarding the use of E-learning technology in Saudi higher education and to identify the factors that influence the success of E-learning in Saudi Arabia, specifically in the public universities. This chapter aims to present a review of the extant E-learning research literature in higher education, how it contributes to educational settings and its possible pedagogy impact. In particular, it considers approaches taken by Saudi universities when integrating E-learning into their education system. This chapter is organised as follows. Section 2.2 explains the literature review process which involves, firstly, locating relevant academic literature on an online database. Then, the concept and definitions of E-learning system are introduced and discussed in section 2.3. Different types and styles of E-learning are outlined in section 2.4. The advantages and disadvantages of E-learning are presented in section 2.5, while section 2.6 discusses the challenges of E-learning implementation in Saudi Arabia. The effective implementation of E-learning and its success are presented in section 2.7. Previous studies on E-learning system are discussed in section 2.8. Furthermore, factors that influence the effective implementation of E-learning will be illustrated in section 2.9 followed by the research gaps and the development of the proposed framework in sections 2.10 and 2.11 respectively. The chapter is summarised in section 2.12.

2.2 Scope of the Literature Review

The successful way to start planning a comprehensive literature review is to consider the extent to which the revision suggested fits in with Cooper (1988)'s taxonomy of literature reviews. According to Cooper, literature reviews have five components: focus, goal, perspective, coverage, organisation and audience. These components are summarised below.

- **Focus of attention:** concentrates on research reporting on factors and outcomes of the implementation of E-learning in the higher education sector. In addition, the focus is on E-learning implementation theories, models and frameworks.

- **The goal of the synthesis:** identifies the main themes for E-learning implementation in the educational settings, synthesising classifying potential factors for an initial framework.

- **Perspective on the literature:** an objective approach to the literature ensures that the research results in the original studies are interpreted accurately.

- **Coverage of the literature:** an exhaustive investigation of the current body of relevant research on the subject is carried out and involves all studies that meet eligibility criteria established for the educational E-learning area.

- **Organisation of the perspective:** A conceptual framework is established, so that articles relevant to the field of interest are collectively addressed.

- **Intended audience:** This research is intended for academics, researchers, PhD and master students in Saudi universities who would benefit from the support offered by E-learning systems, practitioners and policymakers. Various stakeholders are given information about the factors relevant to E-learning implementation in higher education.

To generate the factors that are required in order to develop an E-learning framework for high education in Saudi Arabia, a literature review was conducted, using Cooper (1988)'s framework which comprises these steps: problem formulation; data collection; data evaluation; analysis and interpretation; and presentation of the findings. This approach offers a systematic structure that helps to ensure the validity of the research synthesis.

Several scholarly databases were accessed for the purpose of this literature review. The databases most utilised were Science Direct, ProQuest, IEEE Xplore and SpringerLink. For a comprehensive search of suitable materials for E-learning and education, specific keywords were entered. The keywords used to search for E-learning literature were: "E-learning and higher education", "E-learning and universities", "E-learning use in education" while key terms such as "E-learning", "educational E-learning", "E-learning adoption and acceptance", and "E-learning implementation". The key terms "framework" and "model" were also included in the search words to identify E-learning frameworks and models that had already been developed for educational contexts. In total, the search yielded 150 articles of relevance to the research topic. Because the E-learning area has been the focus of a great deal of research studies and projects, the search was restricted to scholarly works published

in academic textbooks, on the Internet and in journals published between 2001- 2021, giving a better indication of the most recent trends and theories in the field of E-learning. Specifically, this review was conducted to determine the factors that might influence and guide the effective implementation of E-learning in general, and in Saudi Arabia in particular, and to develop an initial conceptual E-learning framework for Saudi universities.

2.3 The Concept and Definitions of E-learning

In higher educational institutions, E-learning is becoming a very relevant and increasingly common method of teaching because of the Internet which enables the sharing of information, and is cost-effective, accessible and generally available (Naveed et al., 2017). The term 'E-learning' is used widely in the literature to describe multiple aspects of the use of information and communication technology (ICT) in a variety of learning and academic contexts. Clark and Mayer (2016) describe E-learning as instruction on a digital device such as a computer or mobile device intended to support learning.

Keramati et al. (2011) maintained that the implementation of E-learning depends on the quality of electronic knowledge sources, and this mode of delivery plays an important role in teaching and learning. Gotthardt et al. (2006) argue that the use of technology in education will create a more creative and innovative environment for students and teachers. Boezerooy (2006) defined E-learning as the use of various technological tools that are web-based, web distributed via e-mail, forums and message boards for the purposes of education. There are also other platforms that allow the student to leave a message for the teacher, and the teacher responds when convenient.

Many concepts such as digital learning or virtual learning, web-based learning, online learning, asynchronous learning networks, networked learning and blended learning that appear in E-learning literature are used interchangeably and offer broad definitions of what E-learning implies. According to Dillenbourg et al. (2002), virtual learning is a set of systems comprising features such as a designed information space, a social space as a place, and active and present learners. Conole et al. (2008) indicated that networked learning could be described as the usage of Internet-based information and communication technologies to make the content available on the Internet, which the learners can use at any time and in any place.

Piccoli et al. (2001) defined the asynchronous learning network as computer-based learning that is a relatively open system that gives learners access to a wide range of resources. The term 'blended learning' or 'mixed learning' was defined by Bonk and Graham (2012, p. 219)

as "the combination of instruction from two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning systems".

2.4 Types of E-learning

There are several ways to classify E-learning types. Some types are classified according to the extent to which they are applied in education and some according to the timing of their interaction. E-learning can generally be divided into two basic types: synchronous and asynchronous learning (Hall, 2008). In synchronous learning, both teachers and students are expected to use the Internet from different locations flexibly and freely to interact with each other at the same time even if they are not at the same place (Chen et al., 2004). That is, the teacher and student interact directly through a communication system which could be instant messaging, phone calls or video links. E-learning research has suggested that students view synchronous learning positively due to the instant feedback they can receive, and they feel more engaged in the online experience (Hrastinski, 2008; Watts, 2016). However, one particular issue with synchronous experiences is that students' other activities and commitments (e.g., jobs) could conflict with live meeting times, which could lead to dissatisfaction with the online environment, disconnection and less engagement (Falloon, 2011).

Conversely, asynchronous learning can be undertaken by the student without the teacher being involved at the same time, and the teacher plays a larger role as facilitator between students. Asynchronous learning is self-directed and self-paced, where the student and the teacher interact via e-mail, forums and message board (Vander Ploeg, 2012). In addition, asynchronous learning is available anytime and anywhere, which is the main advantage of this type of E-learning. It allows students to take time to consider their thoughts, engage deeply with the content, and post their comments on discussion boards (Watts, 2016).

Synchronous E-learning was expanded due to proven demands in various eras like education. There is no physical meeting in E-learning. Synchronous and asynchronous learning tools, such as threaded discussions, instant messaging and blogging, play an important role in humanising online courses by replicating the classroom experience of information exchange and social building, not only between learners and instructors but also among learners (Hall, 2008; Shahabadi & Uplane, 2015) See Figure 2.
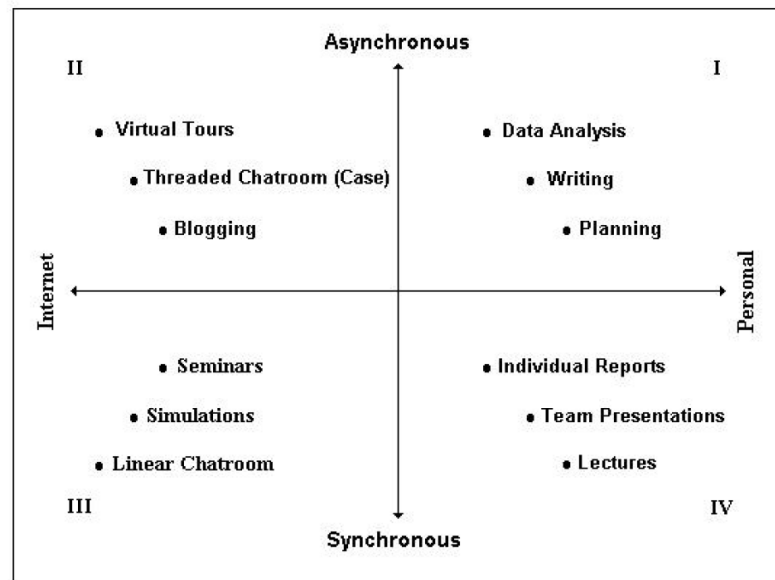
Figure 2: Synchronous and asynchronous as adopted by Hall (2008, p. 283)

In both synchronous and asynchronous learnings, instructions are provided by static means such as PowerPoint lectures, text web pages, video lessons and streaming, and interactive methods such as portal chats, discussions and conferences (Latchman et al., 1998).

2.5 The Advantages and Disadvantages of E-learning

The modern world is a global village, and countries are interconnected economically. Education has been a necessity when dealing with the modern world, and the best solution in many respects is to provide distance education. E-learning is especially well-suited to students living in rural areas around the world, including those in Saudi Arabia, where E-learning is rapidly growing, as well as in other parts of the Middle East (Alrashidi, 2014). In view of the benefits and advantages of E-learning, it is often considered as one of the best options among the range of approaches adopted to expand higher education. The following subsections discuss some advantages and disadvantages of adopting E-learning in higher education, obtained from the literature review.

2.5.1 Advantages of E-learning

Al-Qahtani and Higgins (2013) reported that E-learning can provide flexibility in terms of time and place where the student chooses the time that suits him or her. In addition, E-learning can be cost-effective for students as they do need to travel, and it can also be cost-effective for an institution since it reduces the need for physical classrooms. Hussein (2011) pointed out that E-learning offers several features that enable academic staff to improve their education experience, and provides students with a better learning environment in terms of

course offerings, and user management tools, blogs, quizzes, and announcements. In addition, an E-learning system assists with the organisation of student data, scheduling classes, making student content available, monitoring and reporting on student performance and encouraging student interaction; it also provides testing and evaluation tools.

Lwoga and Komba (2015) listed the advantages of E-learning programmes at universities as: time-saving, cost savings, location-related (off-site) interactions, customised styles of learning, increased knowledge provided by a web-enabled instructor to quickly create course content, conducting any kind of assessments and sharing developed content with peer instructors or learners. Alkhalaf (2013) reported that E-learning can strengthen group collaboration as it enables academic staff and students to be connected via online chats, video conferences, and virtual classes, thereby encouraging students to be more engaged in learning and interaction.

Basak et al. (2016) stated that E-learning can offer opportunities for interactions between academic staff and students by means of discussion forums and by removing barriers that may inhibit participation, such as fear of speaking to others within a physical setting. Hameed et al. (2008) indicated that E-learning can improve the accessibility to a large amount of information, enabling students to access E-learning lectures several times and view the delivered information that is required for a particular course. Hence, this encourages students to use the E-learning system effectively. Research conducted by Alotaibi (2017) revealed that E-learning technology is not only easy to use; it also guides the students in how to approach a specific topic and procedure with regard to the information available on a particular project.

Islamic countries, such as Saudi Arabia, have a conservative society and a different culture. Al-Sheikhly (2012) stated that male professors might face difficulties from a religious perspective when teaching female students, as they cannot teach female students face-to-face; hence, the most convenient way to address this issue is through E-learning technology. Saudi universities can overcome this issue by offering online courses for female students in various faculties.

2.5.2 Disadvantages of E-learning

Despite the various advantages of E-learning that have made it a successful innovation, research has found that it has some disadvantages. For example, despite claims that E-learning can enhance the quality of education, Al-Qahtani and Higgins (2013) pointed out that students in an E-learning environment might suffer from isolation and the lack of direct

social interaction, and therefore require strong motivation and time management skills to reduce this effect. Furthermore, E-learning might pose different challenges to the instructor and student. Because it is a relatively independent mode of learning, students who have poor time management skills may find it difficult to reap the full benefits of E-learning (Alkhalaf, 2013).

E-learning might be less effective than face-to-face interaction in terms of communication, as it makes it difficult for academics to determine whether the students have understood what has been discussed. Asynchronous communication allows the student to remain silent but to respond without a time limit (Al-Qahtani & Higgins, 2013). Moreover, not all disciplines can effectively utilise E-learning in education. For example, scientific fields that require practical hands-on activities may be more difficult to study through E-learning (Maatuk et al., 2021).

2.6 Challenges of E-learning Implementation in Saudi Arabia

Even though E-learning has a variety of advantages and benefits, several challenges are present that may hinder its success in institutions. It could be debated that it still has some weaknesses, with some barriers being specific to academics and students. These challenges include technical issues, Internet issues, student motivation, and time management.

Yemen, Aldowah et al. (2015) investigated the barriers and challenges of using E-learning in a Yemeni public university. They concluded that lack of skills, lack of quality e-content, lack of awareness, lack of foreign language skill, infrastructure issues, and cultural barriers are the major challenges facing the implementation of E-learning.

In Kuwait, Alkharang and Ghinea (2013) adopted qualitative research methods for their study, which led them to identify three main barriers that affect the adoption of E-learning in higher educational institutions: lack of management awareness and support, language barriers, and technological barriers facing academics and managers.

In Saudi Arabia, several important factors create the barriers to the implementation of E-learning. A study conducted by Quadri et al. (2017) investigated the barriers that may affect the successful implementation of E-learning in Saudi universities, and classified the E-learning barriers under four main factors: the instructor, students, infrastructure and technology, and institutional management. Their results showed that lack of time is the most important factor from the instructors' perspective. Whilst the lack of motivation is considered as the most significant factor from the student perspective. In terms of 'infrastructure and technology' and 'institutional management' barriers, low Internet

bandwidth and lack of training in E-learning respectively are considered as the most significant factors hindering the successful implementation of E-learning.

Another barrier can arise when students lack the skill to use the E-learning system (Alkhalaf, 2013). Students need to be trained to acquire the specific skills needed for E-learning (Alrashidi, 2014). Similarly, Alhabeeb and Rowley (2017) focused on the critical success factors for E-learning in Saudi universities. They concluded that support and training are important factors in terms of availability of training in multimedia-related skills and the impact of technology on learning.

Furthermore, according to Al Mulhem (2014a), another barrier that academic staff in Saudi universities face when using E-learning is their attitude towards using the Internet. Lack of technical support leads to problems such as dropped connections, slow downloads, busy signals and lack of ICT skills (Al-Azawei et al., 2016; Al-Senaidi et al., 2009; Al Gamdi & Samarji, 2016; Kisanga & Ireson, 2015; Oleksandra et al., 2016; Quadri et al., 2017; Ssekakubo et al., 2011).

2.7 The Effective Implementation of E-learning and its Success

The most important issue in any project is its ultimate effectiveness. Successful E-learning needs specific conditions in order to function efficiently. For instance, interaction among students and adequate communication media are considered as significant for the successful tackling of learning tasks (Wu and Hwang (2010). However, in this study, a conceptual framework is developed that takes into account the factors that influence the successful implementation of E-learning in Saudi universities.

The influential factors must be understood by those concerned with E-learning implementation in developing countries. Since the majority of E-learning is being conducted in developed countries, we need to know not only the factors that have already been identified and to some extent met in developed countries, but also what additional factors, if any, may be applicable to developing countries.

Chu and Chu (2010) indicate that the current empirical research on effective E-learning does not fully foster a positive relationship between E-learning and learning effectiveness. They debate that there can be moderators between E-learning and the efficiency of learning, so it is important to explore the moderators more comprehensively. In a similar vein, Akaslan et al. (2012) stated that E-learning implementation is based on the purpose of use and the way E-learning is delivered; hence, E-learning usage might not have the same effect on all users, institutions or countries.

Lin et al. (2011) stated the effective use of IT for the delivery of E-learning components of a course is essential for the success and student acceptance of E-learning. In addition, the capacity, quality and resources of university IT infrastructure to deliver courses are critical to the success of E-learning (Selim, 2007a).

2.8 Studies on E-learning System

Although much research has been conducted on the implementation of E-learning, it is interesting to note that almost all previous studies consider other aspects of E-learning development, such as the factors that affect the acceptance and adoption of E-learning, user satisfaction with the E-learning system, and technical factors of E-learning readiness. The implementation of E-learning is likely to remain significantly under-researched due to the lack of a cohesive framework to put together the different aspects of E-learning such as where it is developed, implemented, and used. A review of the literature discloses that many authors in that area have paid great attention to the success of E-learning implementation.

- Selim (2007a) identified eight critical success factors for E-learning that are relevant to the United Arab Emirates (UAE) under the four categories found in the literature review. These categories are: instructor characteristics (attitude towards E-learning, and teaching style), student characteristics (student motivation, interaction, and E-learning course content), technology (IT infrastructure, Internet accessibility), and university support (technical). Selim (2007a) adopted a quantitative research method using confirmatory factor models to specify and validate the categories of critical success factors for E-learning. This study, however, focused on student perspectives and did not consider the perspectives of academic staff. It would be beneficial to obtain the opinions of academic staff and determine their technological knowledge and attitude toward the implementation of E-learning.

- Goi and Ng (2008) proposed a model to investigate the success of E-learning implementation in Malaysia. The study concentrated on eight success factors: course content, web page accessibility, students' participation, website security and support, institution commitment, interactive learning environment, instructor competency, and presentation and design. Goi and Ng (2008) concluded that E-learning opens up new opportunities for many people who are tied up with several commitments, and allows them to learn anytime and anywhere at their convenience.

- Sun et al. (2008) developed a framework to investigate the critical factors affecting the learners' satisfaction with E-learning. They adopted a quantitative approach,

conducting a questionnaire survey to collect data from academics and students at two public universities in Taiwan. The results of the study identified six dimensions covering thirteen factors integrated into one framework. The most important dimension was course quality in the E-learning environment, whereas technological design was the most important dimension in terms of students' satisfaction. However, this framework omits other factors such as training and development programs and the culture of academics and students, which may be crucial to a comprehensive understanding of factors influencing the successful implementation of E-learning system.

- Lee and Tsai (2010) investigated the perceptions of Taiwanese instructors' TPACK of utilising web-based technology. The purpose of their study was to explore teachers' self-efficacy in terms of TPACK. Their results indicated a lack of technology knowledge (TK) about integrating web technologies into their teaching. However, the study omitted other factors such as technological pedagogical knowledge (TPK) and technological content knowledge (TCK) which require more examination to determine how the teacher integrates E-learning to facilitate teaching and improve the delivery of information (course content).

- Bhuasiri et al. (2012) proposed a research framework to identify the success factors for E-learning in developing countries using the Delphi and Analytic Hierarchy Process (AHP) methods. Their framework classified the critical success factors for E-learning into six dimensions. The study findings revealed that the most important factors were curriculum design for learning performance, technology awareness, motivation, and changing students' behaviour. However, the study was limited to investigate the success factors from only two E-learning stakeholders (faculty and ICT experts). The researchers recommended that future researchers take into account other groups of stakeholders in different contexts when developing a conceptual model of E-learning systems.

- Puri (2012) conducted a study on E-learning critical factors at Amity University, India. He used a questionnaire-based survey of 214 students and identified six factors: pedagogical, institutional administrative affairs, technological, evaluation of the learning and teaching environment, resource support, and interface design. However, the study omitted to ascertain the knowledge and skills of students which enabled them to communicate effectively with others using online technologies, and undertake common E-learning tasks.

- In his research, Altameem (2013) focused on the technical aspects of the E-learning system in Saudi higher education. Using qualitative research methods, he identified three main factors crucial to E-learning implementation: the reliability of information and communication technology (ICT) infrastructures, the implementation of security systems, and the availability of technical support for the users of the system. The study focused on technical factors and does not address other ICT factors such as the usability of the E-learning system and the availability of adequate IT resources (hardware and software) which are impacting the success of E-learning implementation.

- Al Mulhem (2014a) investigated the common barriers to E-learning implementation in the Saudi higher education sector. This researcher identified four challenges facing E-learning: academic staff's negative attitudes toward E-learning, lack of time, lack of support, and lack of training. He concluded that the academic staff in Saudi universities face several problems that might deter them from utilising E-learning.

- Alzahrani and Cheon (2015) examined online instructors' technological, pedagogical, and content knowledge (TPACK). They used a quantitative research method and an online survey to collect data. Their study surveyed 46 online instructors and 618 students in their classes at King Abdulaziz University in Saudi Arabia. Their results revealed that the instructors need intensive training in order to understand the relationships between content, pedagogy, and technology so they can teach online courses effectively. In addition, this study stressed the need to examine the online instructors' TPACK by using a qualitative research method to determine their skills and knowledge in regard to online teaching and how they integrate E-learning in their courses. However, this study was limited to male instructors and students and was conducted at only one university.

- Tarus et al. (2015) focused on the challenges experienced by Kenyan public universities in the implementation of E-learning. The study conducted in-depth interviews with 148 staff from three Kenyan universities. The study found several challenges including: inadequate ICT and E-learning infrastructure, financial constraints, lack of adequate Internet bandwidth, and lack of technical skills for E-learning and e-content development. However, the study investigated only the technical side of E-learning systems and involved only the academic staff; it omitted the students' perspectives which are essential for the success of E-learning.

- A study conducted by Aung and Khaing (2015) identified that lack of ICT knowledge, poor network infrastructure and weakness of content development, culture, lack of motivation, lack of training were the main issues that impede the successful implementation of E-learning in developing countries.

- Mulhanga and Lima (2017) claimed that inadequate technical support, lack of IT skills, poor interface design, and cultural barriers were the primary challenges that hinder the successful implementation of E-learning projects in African countries.

- Quadri et al. (2017) conducted a survey to identify the main barriers that affect the successful implementation of E-learning at Saudi universities. The results indicated that the barriers could be classified into four main dimensions namely: students' dimension (lack of ICT skills, lack of E-learning knowledge, lack of English language proficiency, lack of motivation), instructors' dimension (lack of ICT skills, lack of E-learning knowledge, resistance to change, lack of time to develop E-courses, and lack of motivation), infrastructure and technology dimension (inappropriate infrastructure, low Internet bandwidth, lack of technical support), and institutional management dimension (lack of financial support, lack of inadequate policies, lack of training in E-learning, and lack of instructional design). Quadri et al. (2017) found that the infrastructure and technology dimension was the most significant in motivating students to accept and use an E-learning system.

- Alhabeeb and Rowley (2018) have sought to identify the factors that lead to successful E-learning in three universities in Saudi Arabia. They used a qualitative interview method with senior managers with responsibility for implementing E-learning in their universities. Alhabeeb and Rowley (2018) study results indicated nine factors for academics and seven factors for students. Factors common to both groups: student characteristics, instructor characteristics, ease of access, and support and training. In addition, they found that instructor knowledge with learning technologies, student knowledge of computer systems, technical infrastructure and instructional design were significant factors in facilitating the successful acceptance of E-learning in Saudi universities. However, the study ignores many other factors, such as learning attributes and personal factors, that are related to the effective implementation of E-learning.

- Almaiah and Almulhem (2018) developed a framework for determining the success factors of E-learning system implementation. They used the Delphi technique to

collect data from six experts in the field of information systems and E-learning at Saudi universities. Four domains and 11 critical factors were found. The most important factors were website quality factors (website content quality, website design quality, website technical quality, website access speed, and usability), technological factors (E-learning system functionality, E-learning system reliability, and facilitating conditions), administrative factors (top management support) and human factors (student awareness, academic staff awareness).

- Alshehri et al. (2019) investigated the students' perceptions of the Blackboard system in Saudi higher education. The study used a questionnaire survey to collect data from 171 undergraduates at King Khalid University. Alshehri et al. (2019) found that technical support and the availability of software and hardware resources significantly influence the acceptance and use of an E-learning system.

- Almaiah and Alyoussef (2019) proposed a framework to identify the most important factors that affect students' actual usage of E-learning system in Saudi universities. The study employed a questionnaire survey to gather data from 507 undergraduates and postgraduates at King Faisal University. The study results showed that course content support, course design, course assessment and instructor characteristics are the most significant factors in the adoption of E-learning system.

- Vu et al. (2019) developed a framework to investigate the success factors for the implementation of E-learning systems in Vietnamese universities. The study found that infrastructure and technology, pedagogy, management and execution, organisational support, evaluation or assessment, settings and learner characteristics are the main factors for E-learning success.

In summary, the available academic resources or even official reporting on the current state of E-learning in public universities are scarce. In addition, the little research that is available tends to be quantitative, which can identify the problem from a single perspective but cannot provide a more thorough assessment of the current situation. Since all available E-learning models and frameworks cannot be addressed individually, only the most important and prominent models/frameworks were discussed in detail. Table 1 summarises the results of earlier studies related to diagnosing success factors within fields related to the current study and its community.

Table 1: Summary of studies on E-Learning system

Research study	Considered factors	Method used	Purpose of study	Context
Selim (2007a)	Instructor characteristics (attitude towards E-learning, and teaching style), student characteristics (student motivation, interaction, and E-learning course content), technology (IT infrastructure, Internet accessibility), and university support (technical support, training).	Quantitative method using confirmatory factor models	To identify and categorise the E-learning critical success factors.	UAE
Goi and Ng (2008)	Course content, web page accessibility, students' participation, website security and support, institution commitment, interactive learning environment, instructor competency, and presentation and design.	Quantitative method using self-administrated questionnaires	To propose a model to investigate the success of E-learning implementation.	Malaysia
Sun et al. (2008)	Attitude, anxiety, Internet self-efficacy of learner, response timeliness and attitude toward E-learning of instructor, flexibility, quality, and assessment of course, technology and Internet, usefulness and ease of use, interaction.	Quantitative study using a questionnaire survey	To investigate thirteen critical factors to identify which one has the strongest impact on learners' satisfaction in E-learning.	Taiwan

Lee and Tsai (2010)	Technology knowledge (TK), and Technological Pedagogical Content Knowledge-Web (TPCK-W).	Quantitative study using a questionnaire survey	To investigate the perceptions of Taiwanese instructors' TPACK of utilising web-based technology.	Taiwan
Bhuasiri et al. (2012)	Curriculum design, technology awareness, motivation and changing students' behaviour.	The Delphi method and Analytic Hierarchy Process (AHP) methods	To identify the success factors for E-learning in developing countries using the Delphi and Analytic Hierarchy Process (AHP) methods.	Developing countries
Puri (2012)	Pedagogical, institutional administrative affairs, technological, evaluation of the learning and teaching environment, resource support, and interface design.	Questionnaire-based survey	To study critical factors for E-learning at Amity University.	India
Altameem (2013)	ICT infrastructures, implementation of security systems, availability of technical support.	Qualitative research	To examine the technical aspects of an E-learning system and identify three main factors crucial to E-learning implementation.	Saudi Arabia
Al Mulhem (2014a)	Academic staff's attitudes, lack of time, lack of support, and lack of training.	A review of literature	To investigate the common barriers to E-learning implementation in Saudi higher education sector.	Saudi Arabia

Alzahrani and Cheon (2015)	Technology knowledge (TK), Technological pedagogical knowledge (TPK) and TPACK.	Quantitative research method using online survey	To investigate online instructors' technological, pedagogical, and content knowledge (TPACK).	Saudi Arabia
Tarus et al. (2015)	Inadequate ICT and E-learning infrastructure, lack of technical skills on E-learning and e-content development.	Qualitative research: interviews	To determine the challenges experienced by Kenyan public universities in the implementation of E-learning.	Kenya
Aung and Khaing (2015)	Lack of ICT knowledge, poor network infrastructure, weakness of content development, culture, lack of motivation, lack of training.	A review of literature	To identify the main issues that impede the successful implementation of E-learning.	Developing countries
Mulhanga and Lima (2017)	Inadequate technical support, lack of IT skills and poor interface design, and cultural barriers.	Quantitative method	To investigate the challenges that hinder the successful implementation of E-learning projects.	African countries
Quadri et al. (2017)	Students' dimension (lack of ICT skills, lack of E-learning knowledge, lack of English language proficiency, lack of motivation) , instructors' dimension (lack of ICT skills, lack of E-learning knowledge, resistance to	Mixed methods	To identify the barriers that affect the successful implementation of E-learning.	Saudi Arabia

	change, lack of time to develop E-courses, and lack of motivation), infrastructure and technology dimension (inadequate infrastructure, low Internet bandwidth, lack of technical support), and institutional management dimension (lack of financial support, lack of inadequate policies, lack of training in E-learning, and lack of instructional design).			
Alhabeeb and Rowley (2018)	Student characteristics, instructor characteristics, ease of access, and support and training.	Qualitative interview method	To identify the factors that lead to the successful E-learning in three universities.	Saudi Arabia
Almaiah and Almulhem (2018)	Website quality factors (website content quality, website design quality, website technical quality, website access speed, and usability), technological factors (E-learning system functionality, E-learning system reliability, and facilitating conditions), administrative factors (top management	Delphi technique	To develop a framework for determining the success factors of E-learning system implementation.	Saudi Arabia

	support) and human factors (student awareness, academic staff awareness).			
Alshehri et al. (2019)	Technical support and the availability of software and hardware resources.	Questionnaire survey	To investigate students' perceptions of the Blackboard system.	Saudi Arabia
Almaiah and Alyoussef (2019)	Course content support, course design, course assessment and lack of knowledge of faculty members.	Questionnaire survey	To propose a framework to identify the most important factors that affect students' actual usage of E-learning system.	Saudi Arabia
Vu et al. (2019)	Infrastructure and technology, pedagogy, management and execution, organizational support, evaluation or assessment, settings and learner characteristics.	A review of literature	To develop a framework to investigate the success factors for the implementation of E-learning systems.	Vietnam

In developing countries, it is important for those conducting research on E-learning implementation to be aware that the current status of E-learning implementation in educational contexts is quite different from that in developed countries (Andersson & Grönlund, 2009). The development of ICT in education settings is still far behind that in developed countries. Andersson and Grönlund (2009) classified challenges to E-learning adoption in developing countries into four categories: content issues, technological issues, individual issues, and context issues. They indicated that, although these challenges are valid for both developed and developing countries, in developed countries more academic papers concern individuals, whereas in developing countries more papers concentrate on technology and context. In another study, Birch and Burnett (2009) grouped constraints to E-learning implementation and adoption into institutional barriers, pedagogical concerns and individual inhibitors.

However, in developing countries like Saudi Arabia, universities still face a number of challenges that impede their progress. According to Al-Harbi (2011), Saudi universities are still encountering a number of issues that are preventing E-learning from being totally successful. This result is consistent with a study conducted by Al-Gahtani (2016), which stated that universities in Saudi Arabia have not yet reached the required level of E-learning usage, and the overall use of E-learning system fell below the satisfactory level (Aljaber, 2018; Rajab, 2018). Thus, this study will examine the factors that determine the effectiveness of E-learning in the Kingdom of Saudi Arabia, specifically in public universities, and identify the variables influencing its implementation. After the rigorous process of scanning and reviewing the E-learning literature reported in section 2.8, this study identified factors found to provide a foundation for the effective implementation of E-learning system. It appears from the literature that in most educational E-learning studies that have dealt with the subject, these factors have been researched and considered in various ways. The researchers have usually administered survey questionnaires to gather data for analysis by statistical methods. Based on the literature review, the following factors were generated: ICT Factors, Technological Pedagogical Content Knowledge (TPACK), Teaching Principles, Learning Attributes, and Personal Factors (discussed in section 2.9). The following section discusses each of these factors to generate an E-learning framework.

2.9 Factors that Influence the Effective Implementation of E-learning

A comprehensive literature review was conducted of studies on E-learning in higher education environments to identify the factors that must be included in the conceptual framework. The conceptual framework developed for this research was then subjected to further investigation and evaluation through stakeholder feedback. The final model is comprised of a set of factors that are deemed essential to the effective implementation of E-learning in Saudi universities.

As shown in Table 2, the review of the literature yielded several major factors that contribute to the successful implementation of E-learning. These are: Information and Communication Technology (ICT) factors, which are determined by investigating the impact of E-learning implementation on the success of ICT adoption for E-learning in Saudi universities. In addition, the researcher will examine the availability of ICT resources as well as the level of support provided to the stakeholders. Secondly, Technological Pedagogical Content Knowledge (TPACK) will be applied to explore the effects of technology on teaching and academics' staff attitudes. Thirdly, teaching principles are another core factor that must be considered in order to improve the pedagogical skills of academic staff related to content creation for certain subjects, and educational technologies. Fourthly, the learning attributes of E-learning systems will be determined by examining students' interactions and their comments on peer learning on and offline. Finally, personal factors will be examined, which include a set of sub-factors, such as culture, student motivation, and personal management, that may influence the nature of E-learning. The initial conceptual framework, drawn from the existing literature, is divided into two groups of factors: those fundamental factors which address the concrete 'must haves' of effective implementation and those influential factors which must be considered when addressing an E-learning system. Table 2 shows the two categories of factors.

Table 2: Summary of factors considered in this study (derived from the existing literature)

Factor	Sub-factors	Source
ICT Factors	• Internet connectivity • Technical support • Hardware and Software	Al-Adwan and Smedley (2012), Alenezi (2017), Alebaikan and Troudi (2010b), Altameem (2013), Alsabawy et al. (2013), Arkorful and Abaidoo

	• Usability • HCI	(2015), Al Mulhem (2014a), Al-Kahtani, Ryan and Jefferson (2005), Hartshorne and Ajjan (2009), Head (1999), Inan and Lowther (2010), Issa and Isaias (2015), Kabilan and Rajab (2010), King and Boyatt (2015), Liaw et al. (2007), Mokhtar et al. (2007), Mosa, Mahrin and Ibrrahim (2016), Nassuora (2012), Persico, Manca and Pozzi (2014), Quadri et al. (2017), Tarus et al. (2015), Weintrop (2001)
TPACK	• TK • TPK • TCK	Abbitt (2011), Alebaikan and Troudi (2010), Chai, Koh and Tsai (2010), Habowski and Mouza (2014), Hofer and Harris (2012), Lee and Tsai (2010), Maor (2017), Mishra and Koehler (2006), Mokhtar et al. (2007), Niess (2005), Tondeur et al. (2017), Zainal (2016)
Teaching Principles	• Course content • Course design • Learning theories • Teaching strategies • Digital technology • Skills and Knowledge • E-assessment • Training programs	Al-Adwan and Smedley (2012), Alharbi and Lally (2017), Almaiah and Almulhem (2018), Almaiah and Alyoussef 2019), Alruwais et al. (2018), Alshehri et al. (2019), Alsadoon (2017), Odunaike et al. (2013), Al Gamdi and Samarji (2016), Biggs (2011), Dron (2012), Eberly, Newton and Wiggins (2001), El Zawaidy (2014), Kim et al. (2014), Kabilan and Rajab (2010), Llamas-Nistal et al. (2013), Lister (2014), Meyen et al. (2002), Mtebe and Raisamo (2014), Palomba and Banta

		(1999), Pange and Pange (2011), Quadri et al. (2017), Schunk (2012), Sun et al. (2008), Tam (2014), Umana (2018), Veltri et al. (2011), Wells and Wells (2007), Zaili et al. (2019)
Learning Attributes	• Interaction • Peer learning • Reflection (learning process)	Fedynich et al. (2015), Goh et al. (2017), Hsieh et al. (2011), Islam (2013), Maor (2017), Liaw and Huang (2013), Paechter et al. (2010), Rahmawati (2016), Shee and Wang (2008), Wong and Bakar (2009),
Personal Factors	• Culture • Student motivation • Personal management	Alharbi and Lally (2017), Asiri (2012), Alshammari (2015), Al-Adwan and Smedley (2012), Al Mulhem (2014a), Al-Yahya et al. (2015), Baki (2004), Baeten et al. (2010), Hussein (2011), Kawachi (2002), Schunk (1991), Yusuf and Al-Banawi (2013)

In this study, the researcher developed an initial framework the suits the educational environment in Saudi Arabia universities (See Figure 6). This study focuses on gathering the opinions of academic staff and students in order to identify the factors that influence the effective implementation of E-learning system in Saudi universities. The following subsections discuss each of these factors so as to generate the initial E-learning conceptual framework.

2.9.1 ICT Factors

The implementation of E-learning system can be affected by ICT factors. Adequate Internet connectivity, technical support, hardware and software, usability, and human-computer interaction (HCI) are required for the operation and management of an E-learning environment in universities, and to improve teaching and learning outcomes. ICT factors are discussed in the following subsections.

2.9.1.1 Internet connectivity

Liaw et al. (2007) mentioned three basic criteria for E-learning effectiveness. First, E-learning requires Internet technologies to deliver a wide arrange of solutions that increase knowledge and performance via Internet networks in order to update, store/retrieve, distribute or share educational information. Second, E-learning delivers educational materials to the end-user via a computer utilising Internet technology, and gives users more opportunities to engage in self-directed learning environments. Third, E-learning encourages cooperative learning that goes beyond the traditional paradigms of training. According to Arkorful and Abaidoo (2015) and Hartshorne and Ajjan (2009), the Internet has become one of the diverse ways to make resources more accessible for research and learning for academics and students as it enables the sharing of information and knowledge. Fry (2001) noted that technology-based E-learning includes the usage of the Internet and other significant technologies to provide materials for both academics and students and to organise courses in an educational institution.

According to Kabilan and Rajab (2010) and Al-Adwan and Smedley (2012), ICT infrastructures can be used in teaching and learning environments. However, the application of ICT in teaching and learning is challenging not only for the students, academics and instructional materials, but also in regard to the teachers'/lecturers' awareness, acceptance, and technical skills. A suitable infrastructure for ICT development such as the availability of the Internet, extranet, intranet and LAN networks is also necessary for the implementation of E-learning in higher education, especially in developing countries (Al-Adwan & Smedley, 2012; Sife et al., 2007). Hence, it is important that the challenges related to the implementation of E-learning must be dealt with effectively.

Altameem (2013) revealed some of the technical constraints in Saudi several universities, such as inadequate ICT infrastructures, that are preventing the successful development and implementation of E-learning systems. For example, the Internet facility is not available at all times, and the inadequate bandwidths hamper the staff's teaching and the students' learning. There are many issues affecting ICT infrastructure and technology. Quadri et al. (2017) investigated the barriers affecting the successful implementation of E-learning in Saudi universities, using a quantitative survey. They found that 247 participants believed that low Internet bandwidth was the main barrier (highest mean value of 3.67). Other scholars (Al-Azawei et al., 2016; Idris & Osman, 2015; Kenan et al., 2014; Panda & Mishra, 2007; Shaikh & Shamim, 2012; Tarus et al., 2015) agreed that limited access to the Internet is a significant barrier preventing the successful implementation of E-learning.

Furthermore, another of the barriers in Saudi universities is related to academics' negative attitude toward E-learning which involves using the Internet. Al Mulhem (2014a) found that the limited access to the Internet prevents or limits the use of E-learning by academic staff in Saudi universities. Consequently, he concluded that the academic staff's negative attitudes toward E-learning was due to the lack of Internet connectivity or slow Internet speed. Al-Kahtani et al. (2005) studied the use of the Internet by female academic staff in four Saudi universities, finding that the attitude towards the usage of the Internet in teaching may also be influenced by the particular faculty and field of study. However, although the majority of academic staff are highly aware of the importance of the Internet in teaching, the lack of Internet connectivity or frequent interruption still influence the successful implementation of E-learning (Al Mulhem, 2014b; Naveed et al., 2017).

Nassuora (2012) conducted a study on students' acceptance of E-learning in higher education in Saudi Arabia. She used mobile learning as a learning tool via electronic devices such as PADs and smart phones. Nassuora (2012) found that the Internet is considered an essential tool for education, and is more effective and easier to use. She reported that mobile learning allows learners to share information and work collaboratively via e-mail. The findings Nassuora (2012, p. 6) showed that 100% of students used mobile devices, and 86.2% had accessed the Internet via their mobile device.

One of the benefits of the Internet is that it helps to solve the problem of staff shortages in universities through the implementation of E-learning. Via the Internet, interactive courses can be designed and then delivered to students at reduced cost (Altameem, 2013). Liu and Wang (2009) stated that the advantage of E-learning is related to the capabilities of the Internet: sharing of resources, browsing speed, course content delivery, and flexibility of learning, all of which can help to overcome problems of distance and time. Selim (2007b) maintains that the Internet and new technologies such as E-learning can improve the quality of learning by enabling collaboration, access to facilities and the exchange of information regardless of time and space; moreover, course websites can be made available via Blackboard.

2.9.1.2   Technical support

Studies have consistently reported the need for sufficient technical support to ensure the successful implementation of E-learning. Lack of technical support leads to issues such as dropped connections, slow downloads, busy signals and lack of ICT skills (Al-Azawei et al., 2016; Al-Senaidi et al., 2009; Al Gamdi & Samarji, 2016; Kisanga & Ireson, 2015;

Oleksandra et al., 2016; Quadri et al., 2017; Ssekakubo et al., 2011). The Ministry of Education in Saudi Arabia has determined to utilise the features of ICT to improve virtual education through E-learning in most of its higher education institutions (Jabli & Qahmash, 2013). A study conducted by Nawaz and Khan (2012) found that information and communication technologies assist developing countries to decrease their sense of isolation in the world by connecting different communities worldwide through the Internet for the purposes of learning, entertainment and business transactions. Although ICT tools have been provided to facilitate teaching and learning in the higher education sector, they are effective only if technical expertise facilitates the achievement of academic objectives.

An E-learning system needs a robust ICT infrastructure that includes computers, networks, and a technical support department that has ICT professionals to continuously maintain and upgrade the infrastructure, and train or assist both students and academics as required. The need for technical support in E-learning is highly important to ensure that online courses are readily accessible, lecturers and students are competent in the use of the technology, and that they can obtain help to acquire skills and knowledge when required. Technical support personnel require support from management if they are to help achieve the broader community aims (Nawaz & Khan, 2012), provide telecommunication services, and be responsible for the fundamental maintenance of internal connection at reasonable rates. Hence, skills and the quality of technical support affect the success of E-learning projects.

In his study, Alenezi (2017) revealed several obstacles facing faculty members when they try to integrate technology with instruction. For this qualitative research, Alenezi (2017, p. 1809) interviewed eight faculty members, 40% of whom reported that the quality of support was average, while 29% of them reported it as excellent. An early study conducted by Inan and Lowther (2010) noted that over 1300 teachers in Tennessee reported that support ranked second in importance as a factor influencing technology integration; they specified technical support, computer availability, and resources. In addition, technical support was very important in explaining the success or otherwise of technology integration, and it has a significantly high impact on all related factors (Inan & Lowther, 2010).

Technical support involves "installation, operation, maintenance, network administration and security" (Sife et al., 2007, p. 64). If it is not available, then staff and students require some fundamental troubleshooting skills to overcome technical issues involving ICTs. Chen and Bryer (2012) mentioned that lecturers should be able to guide students who are required to apply technology when undertaking an unfamiliar assignment or activity to obtain real-world learning. According to Sirkemaa (2006) and Nawaz and Khan (2012), technical

support is essential for both academics and students. For, academics, all necessary resources and skills should be provided by technical support personnel for the integration of technology into teaching practices. For students, technical support helps them to acquire the skills and knowledge necessary to meet their specific curriculum demands. The research conducted by Alebaikan and Troudi (2010b) examined students' and academics' perception of a new learning environment that comprised online discussion features in the learning management systems (LMSs). Their findings showed that lack of pedagogical and technical support is a problem when using the Web as a medium of instruction, and not all resources needed by lecturers are available within the LMS.

2.9.1.3   Hardware and Software

The availability and adequacy of E-learning materials, hardware and software are the technological components used to measure IT infrastructure services. Alsabawy et al. (2013) studied the role of IT infrastructure services in terms of the success of E-learning systems. The researchers concluded that IT infrastructure was seen in terms of its perceived usefulness, user satisfaction, customer value, and organisational value. In an E-learning context, hardware and software or bandwidth play a crucial role in E-learning outcomes, since online users can use the technology to complete their online tasks in the online learning environment (Keramati et al., 2011). The hardware requirements such as computers and network connection are necessary for successful E-learning implementation; thereafter, the lack of an adequate infrastructure increases the costs of adopting E-learning and it becomes extremely challenging and difficult for students to access the new technology (Mosa et al., 2016).

In the E-learning environment, hardware refers to the physical components of technology that must be available and able to deliver E-learning. For example, computers, networks, and servers enable learners to access online services. According to Mosa et al. (2016), the successful implementation of E-learning is significantly affected by the availability of the required hardware. Tarus et al. (2015, p. 129) revealed that Kenyan universities encountered many challenges in terms of the implementation of ICT and E-learning in teaching and learning. They found that 92% of the participants identified inadequate ICT and E-learning infrastructure as one of the major challenges hindering the implementation of E-learning in Kenyan universities. The successful implementation of E-learning requires at least minimum hardware and software necessary to operate the system. The software includes the information management tools that help the student perform certain tasks (Mosa et al., 2016).

Moreover, the absence or the inadequacy of an ICT infrastructure prevents students and academic staff in developing countries from accessing E-learning (Touray et al., 2013).

Mokhtar et al. (2007) suggested that the lack of resources and ICT equipment such as software and hardware, especially those related to computers, teaching-learning materials and classroom size (Clarke, 2007), lack of professional teacher development (Wells & Wells, 2007), and lack of online IT support (Sife et al., 2007) made instructors less inclined to implement the online-based teaching and learning methods. Also, a critical factor recognised by the students is that more attention needed to be paid by Saudi universities to this aspect of E-learning (Altameem, 2013). Moreover, higher education institutions must invest in the right ICT infrastructure that allows academics and students to readily access the ICT hardware, utilising friendly software and offering permanent technical support (Al-Adwan & Smedley, 2012).

2.9.1.4 Usability

The usability of E-learning is a critical issue, and refers to the ease with which the system can be utilised (Gunesekera et al., 2019). E-learning usability is an important consideration for students and academic staff as it reduces problems such as low student satisfaction and heavy workload of academic staff because of problems that students have with E-learning (Persico et al., 2014; Rodrigues et al., 2019). Moreover, the poor design of an E-learning system leads to the lack of student motivation and impacts on learning outcomes (Zaharias, 2009). To ensure E-learning usability, users should be able to handle the system efficiently and it should be suitable for the intended learning task (King & Boyatt, 2015). Designers need to ensure that the system is easy to use, competent, efficient, satisfying and enjoyable (Issa & Isaias, 2015).

Juristo et al. (2003) found that usability is the main consideration when developing E-learning technology similar to other kinds of software, since usability helps to develop the systems with improved instructional and pedagogical approaches. Bevan and Azuma (1997) mentioned that usability means that the software is simple to learn, effective to use, easy to remember, has few errors, and is subjectively satisfactory (Alotaibi, 2017), as well having performance, acceptance, and learnability.

2.9.1.5 Human-Computer Interaction (HCI)

Battleson et al. (2001) pointed out that usability is a component of Human-Computer Interaction (HCI); it is defined as "the ease with which a user can learn to operate, prepare inputs for, and interpret outputs of a system or component" (Al-Khalifa, 2010, p. 1). HCI is

about the interaction between computers and users (Issa & Isaias, 2015). Hence, an E-learning system that aligns with the needs of students and academics is desirable and more useful. Obviously, lecturers and students should be involved in the HCI development process in order for their reactions and other behavioural factors to have been taken into account when they use the computer (Head, 1999). Therefore, as many Saudi universities have introduced E-learning systems, the current study aims to help the universities in Saudi Arabia in their endeavour to successfully use E-learning systems by discovering the key challenges such as ICT infrastructure, Internet connectivity, technical support, usability and Human-Computer Interaction (HCI) that enable academics and students to use E-learning effectively.

2.9.2 Technological Pedagogical Content Knowledge (TPACK)

In the 21st century, information and communication technology plays an important role in education. Cubeles and Riu (2018, p. 339) pointed out that new technologies have been combined as a learning support and account for 3.5% of the global annual budget of universities. Many universities and colleges in developing countries have used different technologies in their teaching courses in order to facilitate the online learning process and offer high-quality instruction for those involved in E-learning. The integration of technology into education is considered a significant factor as it makes teaching more efficient and successful (Doering et al., 2009). Although most technologies are not designed explicitly for the purpose of learning, lecturers should be aware of which technology tool is suitable for achieving specific learning objectives (Doering et al., 2009; Koehler et al., 2011).

According to Özmantar et al. (2010), when lecturers incorporate the appropriate technology in teaching and apply the technology effectively, their teaching produces better outcomes for students. In previous studies, researchers have agreed that TPACK integrates the relationship between the three knowledge forms such as technology, pedagogy, and content and their intersections (Abbitt, 2011; Harris et al., 2009; Schmidt et al., 2009; Voogt et al., 2013). The technology field in TPACK is considered feasible for implementation in the education environment. Hence, the lecturers' understanding of technology, their pedagogy, and their knowledge of content will enable them to teach effectively with technology.

Many scholars have defined TPACK in previous studies. According to (Harris et al. (2009), TPACK emphasises the connections between technology, pedagogy, and content knowledge, showing how lecturers' understanding of technology, pedagogy, and content can interact with one another to produce effective teaching using educational technologies.

Shulman (1986) and Mishra and Koehler (2006) identified TPACK as a framework for measuring the knowledge of teachers about what must be learned and must be taught, and how to effectively integrate technology into the curriculum. Mishra and Koehler (2006) integrated the third domain and created the technology-based conceptual framework proposed by Shulman (PCK-TPACK) to produce the Technological Pedagogical and Content Knowledge (TPACK). TPACK is a framework that comprises an understanding of the complexity of the relationships between academics, students, content, technologies such as (E-learning), practices, and tools (Archambault, 2008). Furthermore, TPACK includes the lecturers' knowledge of technology integration into the learning environment. As shown in Figure 3, in TPACK, three main knowledge areas of technology integration overlap: Technological Knowledge (TK), Content Knowledge (CK), and Pedagogical Knowledge (PK).

Niess (2005) indicates that the TPACK framework develops lecturers' knowledge of subject content using technologies such as E-learning to facilitate student learning and pedagogical knowledge. Mishra and Koehler (2006) noted that TPACK consists of the integrated forms of knowledge that develop the interaction between these three main forms, namely, technological pedagogical knowledge (TPK) that encourages interactivity among students in E-learning and the understanding of how E-learning can influence learning and teaching, and the technological content knowledge (TCK) that academics use in E-learning to enhance students' skills and their understanding of the concepts in a specific subject matter, and pedagogical content knowledge (PCK) (Alebaikan & Troudi, 2010a; Chai et al., 2010; Habowski & Mouza, 2014). The implementation of the TPACK framework can decrease the complexity of technology integration, and is a significant step in technology integration. According to (Mouza & Karchmer-Klein, 2013), the TPACK framework involves alternative ways that instructional materials can be combined with strategies for solving common challenges faced by instructors during the integration of technology. The TPACK framework is one approach that lecturers can include in their teaching in an effort to manage the process of technology integration more effectively (Martin, 2016). Integrating E-learning technology in education will be most effective when lecturers understand how various platforms enable them to present content in various ways.

In this study, the researcher focuses on the type of knowledge that includes technology (E-learning) such as TK, TPK, TCK, and TPACK since these items are directly related to the study objectives. This study investigates the ways in which academic staff integrate E-learning to facilitate teaching and improve the delivery of information (course content).
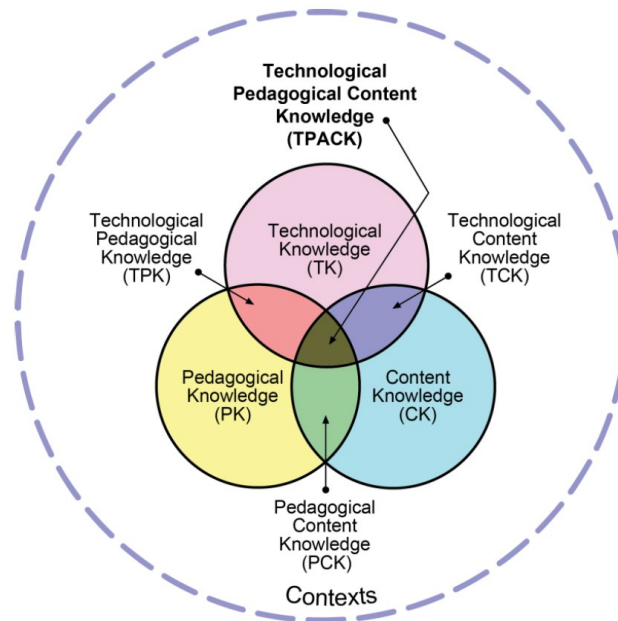
Figure 3: The TPACK framework (source (tpack.org, 2012))

2.9.2.1 Technology Knowledge (TK)

Having technology knowledge means that lecturers understand information technology well enough to implement it productively at work. In the teaching process, TK involves all tools such as Internet, Blackboard, whiteboard or advanced technologies such as virtual reality. In previous studies, TK could involve communication and problem-solving that would be used to transfer skills and knowledge and enable lecturers to perform different tasks utilising information technology and to develop various ways of performing a given task (Abbitt, 2011). In the same context, Mishra and Koehler (2006) indicated that TK includes digital technology tools such as knowledge of the computer hardware in operating systems, and also the ability to utilise a range of software tools such browsers, spreadsheet and e-mail. Furthermore, Zainal (2016) and Mishra and Koehler (2006) agreed that TK refers to the technical knowledge required to install and remove software programs, and the acquisition of skills to learn and adapt to new technologies; hence, it needs to shift with time because technology is continually evolving.

2.9.2.2 Technological Pedagogical Knowledge (TPK)

Technological pedagogical knowledge is an understanding of how teaching strategies can change when specific technologies are used in a particular way (Abbitt, 2011; Erdogan & Sahin, 2010). TPK involves knowing the pedagogical strategies that are offered by different types of technology. Mishra and Koehler (2006, p. 1028) defined TPK as "knowledge of the existence, components, and capabilities of various technologies as they are used in teaching

and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies". Mishra and Koehler (2006) noted that TPK is the knowledge that the use of technology could change the way lecturers teach when they integrate technology into subject content. For instance, lecturers can use collaborative learning as a teaching strategy by utilising social networking programs such as Wiki or various other technology tools, thereby integrating technology with teaching skills and meeting content standards by using technology effectively for teaching and learning (Alzahrani, 2014).

A study was conducted by Habowski and Mouza (2014) to investigate the use of technology for pre-service science teachers in a Mid-Atlantic University in the USA. They found that the pre-service teachers had opportunities to integrate content, pedagogy, and technology in their practice. They used online resources such as YouTube video clips to present topics in biology and physics. Habowski and Mouza (2014) used the TPACK framework for a survey to measure pre-service teachers' knowledge and technology in science. They found that pre-service teachers' TPK is more documented than their TCK. This finding is consistent with that of a study involving experienced teachers (Hofer & Harris, 2012). The researchers concluded that teachers' TPK was more obvious and considerably documented, compared to their TCK. Evidently, the TPACK framework can be used to determine the extent to which academics actually use E-learning in their educational practice. Also, the results could suggest better ways to prepare pre-service instructors for the integration of E-learning in education (Tondeur et al., 2017).

2.9.2.3 Technological Content Knowledge (TCK)

Technological content knowledge refers to the practices and the specific lesson or content using technology. TCK concerns the relationship between technological tools and subject matter, and how technology can be used for educational purposes (Abbitt, 2011). Hence, lecturers have to know the content that is to be presented and the specific technology that will be the most effective. This will assist them to change the way students understand certain content in a specific discipline and obtain the necessary knowledge and skills (Erdogan & Sahin, 2010). The choice of appropriate technologies provides the types of content ideas that can be taught, and makes the learning of subject matter much easier (Schmidt et al., 2009). TCK is an understanding of the way in which technology and content influence each other and are used in discovering content for a specific subject (Mishra & Koehler, 2006). Academics have to understand that subject matter can be changed by the application of specific technologies, and need to know which technologies are the most appropriate for the

conveying of course content (Abbitt, 2011). For example, lecturers can present the steps for editing a photo or writing text by using a tool like PowerPoint.

2.9.3 Teaching Principles

The implementation of E-learning can be influenced by teaching principles. Factors such as course content and course design; learning theories and teaching strategies; skills and knowledge and digital technology; and E-assessment and training programs must be taken into account when designing E-learning materials and related activities, and ensuring the ease of using a learning management system. Factors related to teaching principles are discussed in the following subsections.

2.9.3.1 Course content and Course design

The traditional curriculum design is such that academics focus on content delivery and assessment by means of which the students' knowledge and absorption of the taught material can be ascertained. According to Tam (2014), curriculum designers and academics plan the content according to what they think should be learned, and select the learning activities that are most likely to produce the desired outcomes. They are required to create and develop the learning environments not only so that academics can be proficient in their discipline, but also so that a diversity of resources, methods, technologies can be used. These include E-learning and assessment resources, and e-mail so that the students achieve valuable outcomes. The academics need to change their role from subject-proficient teacher to facilitator of the learning process. In this way, the learning and teaching activities will be aligned with the educational process instead of being just content-driven (Tam, 2014). The focus on learning requires academics to develop the curriculum (Eberly et al., 2001) and establish a course syllabus which clearly demonstrates and documents curriculum intentions (Veltri et al., 2011).

Syllabi can make particular course outcomes clear in the context of broader program outcomes and can direct the students to work when the assignments are due and identify the kind and level of expectations, and the intended learning objectives (Veltri et al., 2011). To ensure the quality of course design, Lister (2014) identified four components that must be included in the design of E-learning and online courses in order to promote student learning: course structure, content presentation, collaboration and interaction and timely feedback. A suitable course design will encourage students to engage with their learning (Dahalan et al., 2013). A study conducted by Kim et al. (2014) found that a clear course structure with supporting tools such as guides, prompts and instructions must be designed to assist students

to prepare for learning and successfully achieve their learning goals. Course content is a major component of E-learning; hence, the quality of course material is important in the E-learning system, and should be relevant and objective (Ali et al., 2018).

In another study, Mtebe and Raisamo (2014) reported that well-designed courses that meet intended learning outcomes are believed to be a good predictor of students doing well in courses offered via an E-learning system. Similarly, Almaiah and Almulhem (2018) indicated that the design of learning content is an important factor determining the acceptance of E-learning. Lecturers can usage E-learning to improve teaching effectiveness (Al-Adwan & Smedley, 2012). Learning materials must be accurate, precise, updated, timely and suitable, and students should be able to have instant access to the latest materials. Sun et al. (2008) found that the quality of course design and course content contributes significantly to E-learning success. Other researchers, Cidral et al. (2018) and Zaili et al. (2019), identified the course attributes affecting the use of E-learning. These attributes are course content, quality of lecture delivery, course structure, adequate contents and clarity of course materials. The effective use of E-learning in delivering courses to students is essential to the success of E-learning as it makes the delivery process as smooth as possible (Cheawjindakarn et al., 2013). Makokha and Mutisya (2016) conducted a study to evaluate the status of E-learning systems in public universities in Kenya. They found that most of the course modules were not interactive at all. The study results revealed that the quality of E-learning is still relatively low with over 60% of the course modules uploading only the lecture notes. The authors added that academic staff used their learning management system (LMS) as a document repository to which materials such as lecture notes, PowerPoint presentations, and essential readings are uploaded.

Although many Saudi universities have introduced the E-learning system, its successful implementation still faces several challenges such as inadequate course design, poor-quality course content, and the lack of online course assessment tools (Alenezi et al., 2011; Almaiah & Almulhem, 2018; Almaiah & Alyoussef, 2019).

2.9.3.2 Learning theories and Teaching strategies

Because an E-learning system is multidimensional, the application of learning theories is vital to the successful implementation of educational programs at all levels. Schunk (2012) defined learning theories as those related to how learning occurs, how the learning content is disseminated, and how well the students learn and understand the new content. The theory of learning is included in one of many epistemological perspectives or paradigms. This

section discusses the educational theories that relate to the core educational functions of E-learning. Many pedagogies and approaches have been suggested and developed in the E-learning literature. Based on the literature, E-learning technologies can fit into and strengthen a variety of educational theories (Dyke et al., 2006; Nagowah & Nagowah, 2009; Pange & Pange, 2011). According to Pange and Pange (2011), most E-learning approaches can be allocated to one of four key classic learning theories: behaviourism, cognitivism, constructivism, or active theory. Figure 4 depicts the relationships between learning theories.
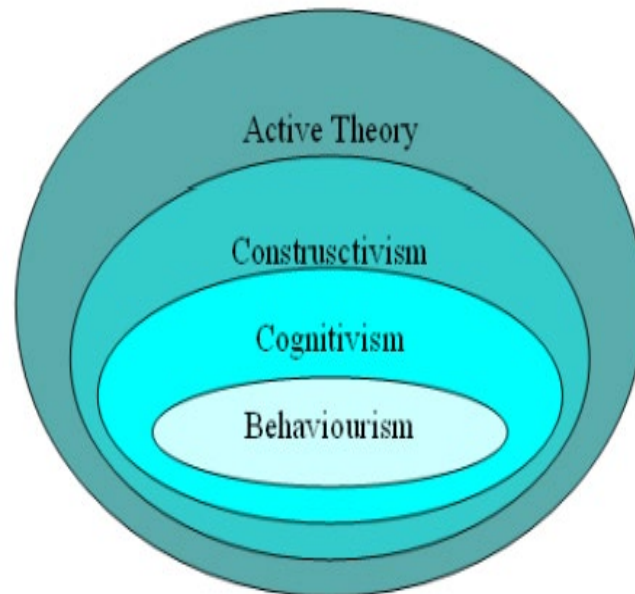
Figure 4: Learning theories relationships adapted from (Pange & Pange, 2011)

E-learning can support the following learning theories:

- **Behaviourism:** Behaviourists focus on the learner's behaviour in response to a stimulus that can be observed quantitatively, disregarding the influence of thought processes (Skinner, 1974). This theory concerns the skills and outcomes of the learning process after the teacher has presented and explained the information. Students should apply and discuss what they have received from the teacher and determine who can utilise these new skills. However, the main weakness of the behaviourism theory is that the focus on external changes of learners that cannot be observed and reinforced does not indicate all aspects of learning. Therefore, cognitive theories of learning have generally replaced behavioural theories in educational practices and research (Pange & Pange, 2011; Vivekananthamoorthy et al., 2014).

- **Cognitivism:** Cognitivists believe that the mental process transforms the information received into knowledge and skills within human memory (Lee, 2010). As a result,

during the learning process, students will use memory, motivation, meta-cognition, and thinking, and engage in other interactive activities. According to Folden (2012), learning style is all about how a student perceives, interacts with, and responds to the learning environment. Aligned with this view, Anderson (2008) claimed that individual differences were significant, and a variety of learning strategies should be available in online instruction to recognise those differences. Cognitivism argues that different learning modes require a personalised teaching method that can maximise learning; otherwise, learning potential will be limited to the student's capacity, or even destroyed (Ally, 2004). Mödritscher (2006) and Alzaghoul (2012) summarised the implication of the cognitivism paradigm for E-learning as follows: E-learning materials should involve interactive activities for the different learning and cognitive styles; the E-learning content should be properly segmented to prevent cognitive overload during processing; the teaching strategy utilised should allow students to retrieve existing information from long-term memory to make sense of new information.

- **Constructivism:** Over the last two decades, the theory of constructivism has informed research and educational strategies (Pange & Pange, 2011). This theory focuses on knowledge construction based on the student's prior experience (Koohang et al., 2009). Keengwe et al. (2014) stated that learning activities that assist students to contextualize the information need to be applied in E-learning instruction. Hence, the instructor's role is not to observe and assess, but to engage with students whenever they are undertaking activities and posing questions to students to encourage inductive reasoning. Constructivists emphasise situated learning, which sees learning as contextual and proposes strategies enhancing multi-contextual learning to ensure that students can apply the information broadly (Mödritscher, 2006). In an E-learning context, social constructivism utilises tools such as blogs, Wiki, discussion forums and any other collaborative services.

- **Active learning:** This theory is an instructional strategy that engages students in the learning process, enabling them to achieve a better understanding of the content (Pange & Pange, 2011). Active learning theory is similar to constructivism theory. E-learning requires an environment that engages students in active learning. With E-learning, students actively and collaboratively present their individual views, knowledge and opinions to create new knowledge via social discussion, while the

instructor acts as a facilitator, guiding, mentoring, evaluating students' progress and providing feedback to them (Koohang et al., 2016).

In short, it is vital to note that not all learning theories can be applied to E-learning design. The literature has documented that the constructivist theory is well-aligned with E-learning design because it allows students to engage actively in the process of knowledge construction (Koohang et al., 2009). However, although learning theories have been applied to the design of some E-learning systems, in order for E-learning to be successful, other important features must be considered and included in the system's design.

Dron (2012) pointed out that pedagogies are, in a true and essential sense, the area of study relating to teaching and education strategy; and technologies are a series of techniques and tools designed for education. For instance, technologies involve the use of computers, discussion boards, virtual classrooms, and institutional constructions. The adoption or acceptance of new technologies (like E-learning) needs to create pedagogical concepts that could not be applied without technology and takes into account the current and future needs of the students, which are essential in a digital world (Andrews, 2011). To use new technologies and create digital pedagogies, we need to know what to use, how to use, and when, and for what purpose. In the education field, academics and students have access to the Internet. So, there is a need to change their knowledge about the utilisation of the technology so that it is more useful. In regards to using E-learning in higher education, Meyen et al. (2002, p. 40) stated that the pedagogy of online teaching involves "teaching methods related to the presentation of experiences, engagement of learners, reinforcement, motivation, an organisation of teaching tasks, feedback, evolution, and curriculum integration".

2.9.3.3 Skills and Knowledge and Digital technology

According to Lawless and Pellegrino (2007) and Dron (2012), knowledge sharing has assumed more significance than the knowledge itself. Therefore, creating digital pedagogies will shift the concentration from technology and skills to one that enables connectivity, knowledge processing, interaction, and the development of knowledge via the digital world. Palomba and Banta (1999) stated that academics deliver to students course content that is determined by what should be learned in order to achieve the desired learning outcomes, and by whether their expected learning outcomes are produced and reinforced by a particular academic course. In the same vein, Biggs (2011) pointed out that the teaching and learning activities should be aligned with the learning outcomes, which are measured by the

assessment system. The alignment of these three components will ensure the coherence in the curriculum in terms of the desired learning outcomes which should correspond with the teaching and learning activities, and the assessment tasks should be consistent (Biggs, 2011; Tam, 2014). In principle, E-learning design must meet the needs of students, and it should be measurable by means of indicators related to specific learning activities. According to Umana (2018), the academic community must believe that digital devices that are implemented at universities are a necessity and convenient to use. The usage of digital applications will be perceived as indispensable by the academic community if the applications can assist them to accomplish most of their tasks easily and more efficiently. The digital applications that are utilised as content multimedia in E-learning such as e-books, digital documents, PDF files, video, images, and e-assessment can enrich and supplement the information provided through E-learning (see Figure 5).

Figure 5: Multimedia contents on E-learning system adapted from (Umana, 2018)

Reviews of literature reveal that student knowledge of computer systems, academic staff knowledge of learning technologies and technical skills are the most important factors that influence the successful acceptance of E-learning in Saudi Arabia (Alhabeeb & Rowley, 2017). Alshehri et al. (2019) reported that there exist some issues related to academic staff and students when using E-learning include lack of computer skills and lack of experience with E-learning by both academic staff and students. These issues can make both academics and students more unwilling to accept an E-learning system. Furthermore, in order to ensure effective performance in a university E-learning environment intermediated by a learning management system, it is important to identify and evaluate the skills and knowledge required by students when engaging with the system (Parkes et al., 2013).

2.9.3.4 E-assessment and Training programs

E-assessment (electronic assessment) is defined as the usage of electronic media to determine a learner's educational status with respect to the variables of interest or intended learning outcomes (Gilbert et al., 2011). In contrast, another study by Llamas-Nistal et al. (2013) defined E-assessment as a process of gathering information about students' performance in order to monitor their progress. There are a number of E-assessment types: formative, summative and diagnostic assessments (Stödberg, 2012). Formative assessment is used in a course or program as a diagnostic tool that is intended to provide students with feedback on their progress to strengthen their learning and motivation (Sadler, 1998). In contrast, summative assessment indicates a student's level of achievement by making a judgement or determining a final grade (Sitthisak et al., 2008). Diagnostic assessment is an in-depth assessment that determines the strengths and weaknesses of each skill in order to identify priorities and students' needs (Sewell, 2004). It assists to determine what students can already do within the aims of the curriculum.

To create an effective E-assessment, reliability and validity are key considerations. According to Osuji (2012), an accurate assessment helps to ensure that the result will be reliable, valid, credible, usable and interpretable. Ensuring the reliability and validity of an exam is one of the challenges when utilising E-assessment (Gilbert et al., 2009). To ensure reliability and validity, the computer system must be working well and the questions should enable the more capable students to be distinguished from those who are less capable.

A series of efforts have been made to improve E-assessment as a means of evaluating student achievement of the intended learning outcome (Gilbert et al., 2011). With increasing interest in E-learning and E-assessment, universities have adopted E-assessment to obtain accurate and faster methods of evaluating student achievements, rather than traditional measures (e.g., paper-based tests). E-assessment offers many advantages. For example, Alruwais et al. (2018) reported that E-assessment provides direct and immediate feedback to students, improves student performance, reduces the time and effort required of the instructor, and is cost-effective. A study by Alsadoon (2017) investigated the students' perceptions of E-assessment at the Saudi Electronic University which has included this type of assessment in its learning management system. The study found that students had positive attitudes towards E-assessment and valued the instant feedback and unbiased grading, to name just two of its features. However, E-assessment is not without drawbacks (Alruwais et al., 2018). There is a lack of technology experience among personnel and poor ICT infrastructure, especially in developing countries; also, it is difficult to score students' responses to open-ended

questions. In a recent study, Almaiah and Alyoussef (2019) indicated that some faculty members failed to create online quizzes and self-assessment tests in their courses, which led to poor performance in the assessment of students. The study concluded that online course assessment tools have a significant effect on the actual use of E-learning systems in Saudi universities.

The provision of training is one of the factors that contribute to the adoption of technologies. The literature review revealed that one of the main issues hindering the adoption and effective utilisation of E-learning seems in many educational institutions is the lack of faculty readiness (Al Mulhem, 2014a; Alharbi & Lally, 2017; Odunaike et al., 2013; Panda & Mishra, 2007). Thus, it not surprising that the importance of training is frequently mentioned in the literature. The success or failure of E-learning implementation is determined by the capabilities of the individuals who will use it. Odunaike et al. (2013) stated that the lack of adequate training of instructors is one of the reasons for the slow adoption of E-learning in educational institutions. They stressed that when training is lacking, instructors always become resistant to change, and avoid using E-learning in their teaching practice. Panda and Mishra (2007) pointed out that one significant factor preventing faulty members from adopting E-learning in higher education was the lack of training on how to use the technology. The main aim of training is to introduce academic staff and students to various suitable technologies that shift the traditional learning method to an effective learning method that will improve learning outcomes. The application of ICT in learning and teaching in university education in Saudi Arabia was investigated by Bingimlas (2009), who found that instructors are competent and confident when utilising technology in the classroom, but there is little if any practical training in the usage of available ICT.

Within the Saudi context, several research studies revealed that insufficient training is reflected in the reluctance to adopt E-learning for teaching purposes in many Saudi universities, although it plays a key role in the successful incorporation of E-learning in pedagogical practices. Al Gamdi and Samarji (2016, p. 26) examined faculty members' perceptions of the barriers influencing their adoption and implementation of E-learning in their daily teaching activities. They administrated a questionnaire to 214 faculty members. The study findings revealed that several factors can adversely influence the use of E-learning for teaching purposes. These factors included the lack of training on E-learning usage. The factor mean of 4.13 was the highest among all factors considered. Likewise, Quadri et al. (2017, p. 103) conducted a study in several Saudi higher education institutions. The study results revealed that lack of training in E-learning had the highest mean (3.62), thus

positioning it as the most significant factor hindering academic staffs' and students' acceptance and usage of E-learning. Furthermore, El Zawaidy (2014) examined barriers preventing faculty members from using the Blackboard system in Saudi universities. Their findings showed that inadequate training and poor infrastructure were influencing instructors' adoption of Blackboard when delivering E-courses. In a recent study, Almaiah et al. (2020) suggested that universities should provide training programs for instructors and students to enhance their ICT skills and become more likely to adopt E-learning. Finally, for the effective implementation of E-learning in teaching, proper in-service training is essential for both academic staff and students to acquire and improve teaching and learning skills respectively.

2.9.4 Learning Attributes

The implementation of E-learning technology in the learning environment must be aligned with the learning attributes. This section focuses on the students. Thus, learning-related factors such as interaction, peer learning and reflection (learning process) will influence the level of student engagement with E-learning. These factors are related to the capabilities and the attributes which students possess. The following subsections discuss learning attributes.

2.9.4.1 Interaction

According to Maor (2017), students' learning attributes determine their perception of the courses and their level of engagement/interaction. Through interaction, students share knowledge and engage with their peers and academic staff via discussion boards. The interaction between the lecturer and students enables the lecturer to pose questions to encourage students to engage in reflective thinking. Goh et al. (2017) conducted a study to investigate students' experiences, learning outcomes and level of satisfaction with E-learning. The study results showed that interactivity with peers and lecturers is an important consideration when planning E-learning courses. Also, Goh et al. (2017) recommended that interactive teaching styles should be adopted by lecturers in order to encourage student interaction and engagement in E-learning courses. Furthermore, Fedynich et al. (2015) and Pustika (2020) stated that interaction between students and lecturer is a challenge for all online teachers, and must be considered in E-learning implementation.

2.9.4.2 Peer learning

Peer learning refers to students reflecting on the comments made during peer conversations on and offline. In E-learning environments, the term 'interaction' could refer to learning activities, and includes the online communication between lecturers and students, the sharing

of information, and the exchange of learning experiences. There are various types of interactions such as learning content interaction, student-student communication, and student-lecturer communication (Liaw & Huang, 2013). In an E-learning setting, students engage in interpersonal interaction via computer networks and interfaces instead of face-to-face communication. The synchronous communication or interaction in E-learning environments may occur online between students and lecturers, and among students, and may involve questions, answers, and discussions (Islam, 2013). However, some of the disadvantages of E-learning include the lack of face-to-face interaction and the lack of social interaction. According to Rahmawati (2016), social interaction is essential in a learning environment. Because the instructor and students are not meeting face-to-face, students may feel isolated and miss the physical social interaction that takes place in the classroom.

2.9.4.3 Reflection (learning process)

Reflection practice means that students create reflective journals by using technology such as Blackboard to show their understanding and evolutionary thinking over time. Hsieh et al. (2011) indicated that reflection is the learning process that assists students to express their attitudes, feelings, experiences, actions, and beliefs. It provides students with opportunities to examine the knowledge they have absorbed. Studies done by Paechter et al. (2010) and Liaw and Huang (2013) found that interaction between students and lecturers requires lecturers to undertake a variety of tasks when teaching, such as providing an overview of the course contents, giving feedback on achievements, stimulating students' motivation to process and reflect on the content, and helping them to engage in learning activities, thereby supporting knowledge construction, and establishing the foundation for a social relationship. Students' peer interactions comprise communication with other students, whereby information is exchanged about the course contents and socio-emotional issues. Students benefit from working in small groups to construct understanding, provide socio-emotional support, and learn within a consistent and positive environment (Islam, 2013; Shee & Wang, 2008). According to Wong and Bakar (2009), the interactive learning environment is an important factor in promoting students' positive attitudes through perceived satisfaction, usefulness, and peer learning, and reflect students' skills required for problem-solving in the E-learning environment (Liaw & Huang, 2013).

2.9.5 Personal Factors

Personal factors such as culture, student motivation and personal management can influence the perception of and attitude towards the implementation of E-learning. Personal factors are discussed in the following subsections.

2.9.5.1 Culture

Al-Adwan and Smedley (2012) stated that any institution wanting to have a successful E-learning strategy should be prepared culturally as well as technologically. Cultural factors have a great influence on how students learn, as they determine the style of interaction and communication, establishing the core basis of E-learning. These factors have a strong impact on two key elements of online learning systems: 1) system development and design, and 2) system usability and usage (Rhema & Miliszewska, 2010). Therefore, the cultural characteristics of academics and students is an important motivational factor when designing an E-learning system, as they can accelerate the uptake of this technology (Vrazalic et al., 2010). However, the Kingdom of Saudi Arabia (KSA) has distinct religious and cultural influences on people's attitudes, practices, and behaviour (Alebaikan & Troudi, 2010a). Moreover, their social life and living standards are different and this may influence the success of E-learning in higher education (Quadri et al., 2017). Munro (2012) indicated that culture can affect learning and the mode of learning.

A study conducted by Onsman (2011) found that the cultural beliefs and the restrictions of religious and social practices in Saudi society do not support gender-desegregation. A similar point was expressed by Alturise and Alojaiman (2013) who pointed out that the rigorous application of Islamic law has led to its education system being segregated according to gender, which has far-reaching implications for the educational setting as it is conflicts with the open-access culture of many other nations. Baki (2004) notes that the Saudi system and methods of education differ from those of other countries around the world due to the different cultures and religious beliefs. Asiri (2012) confirmed that the KSA is one of the most conservative Muslim countries in the world, particularly regarding the status of women. In the KSA, male and female students in universities are completely segregated. Consequently, the male academics cannot teach female students face-to-face due to the Islamic restriction imposed by the Saudi government. The faculty members provide lectures to female students separately in buildings equipped with audio-visual materials. This places enormous substantial pressure on the available resources and facilities (Onsman, 2011). Therefore, Saudi universities are encouraged to introduce a variety of E-learning systems to

offer online courses for female students in different faculties (Al-Harbi, 2011; Quadri et al., 2017). Saudi Arabia's culture and religion not only shape individuals' attitudes, practices and behaviour, but also construct their lives. Therefore, the introduction of new technologies to the Saudi Arabia culture is an important challenge facing the development of learning systems. Since this study investigates the effective implementation of E-learning in Saudi universities, it would be beneficial to understand the Saudi culture.

2.9.5.2   Student motivation

Motivation can be defined in very different ways, and in terms of multiple characteristics. An early study by Schunk (1991) saw motivation as an important factor that could improve learning outcomes. According to Kawachi (2002), motivation is the degree of willingness of a person to take action to achieve an objective. Motivation plays an important role in the learning process; hence, its effects are frequently highlighted in different fields of education (Kahveci, 2010). The student is the most significant participant in E-learning (Aydin & Tasci, 2005). Since E-learning is a student-centred environment, self-confident and highly-motivated students are more likely to achieve better E-learning outcomes (Baeten et al., 2010). However, students should have adequate computer skills in order to use an E-learning system productively (Keramati et al., 2011).

There are several difficulties facing students who are required to learn via an E-learning system in Saudi universities. These include lack of motivation, delayed feedback or real-time assistance due to fact that students are away from their lecturers when they need assistance with tasks, and feelings of isolation because they are not physically attending the classes and interacting with other students (Yusuf & Al-Banawi, 2013). Furthermore, recent research by Quadri et al. (2017) found that lack of motivation is the most factor influencing students' utilisation of E-learning, with a mean of 3.63. In another study, Almaiah et al. (2020) found that awareness and understanding of E-learning can play a significant role in increasing students' motivation to use this system. The study concluded that universities should provide awareness sessions to increase students' confidence and motivation to use the E-learning system.

2.9.5.3   Personal management

Al-Yahya et al. (2015) indicated that personal management refers to the different needs and preferences of the learner, and involves the learning style and technical skills needed to solve the problems that occur when the learner accesses the E-learning system. For academic staff, personal management means that they become more adept at using E-learning technology in

the classroom. Academic staff must overcome personal confusion and uncertainty by being aware of and acknowledging the issues that they face such as time management of non-academic problems related to technology, thereby helping IT developers recognise the needs of academics, and catering for them (Chen & Jang, 2014).

On the other hand, Hussein (2011) suggests some weakness in the activation of E-learning management systems based on the participants' responses: the limited awareness regarding the basics of using the E-learning system; concerns of some faculty members and students' families regarding the E-learning; and the resistance of the community to the E-learning systems as they believe that technology is for entertainment, not for learning. Moreover, a lack of time was mentioned by Al Mulhem (2014a) as another main concern or factor that discourages the utilisation of E-learning. Alshammari (2015) emphasised that lack of time alongside other factors such as workload constraints and teaching experience, affects academics' willingness to incorporate learning management systems in their teaching practices.

Alharbi and Lally (2017) conducted a study to examine the factors influencing the adoption of E-learning in Saudi universities. The study results found that lack of time, lack of training and lack of institutional support were the main factors affecting academics' decision to use ICT for teaching purposes. However, to answer the second research question, factors such as ICT issues, Technological Pedagogical Content Knowledge (TPACK), Teaching Principles, Learning Attributes and Personal Factors will help to guide the effective implementation of E-learning in the Saudi higher education. Later, the researcher uses these factors to develop a survey instrument for the Saudi higher education in order to investigate E-learning implementation.

2.10 Research Gaps

As indicated in section 2.8, several models have been developed to implement E-learning in the education sector to improve students' learning outcomes. Most of these frameworks and models have been discussed in section 2.8. A range of common E-learning implementation factors for higher education is lacking. By filling this research gap, E-learning implementation in Saudi universities could be encouraged. Moreover, a comprehensive framework for the higher education sector, particularly in developing countries, has yet to be empirically tested or validated. A comprehensive literature review was carried out to identify the factors that must be included in the conceptual framework for E-learning in a tertiary education environment. After reviewing these studies and identifying various factors

(section 2.8), it was concluded that some of the factors were missing in some models as seen in Table 3. However, to the best of this researcher's knowledge, none of the reviewed articles examined the influence, on the effective implementation of E-learning, of factors such as ICT, Technological Pedagogical Content Knowledge (TPACK), teaching principles, learning attributes, and personal characteristics. Therefore, this study attempts to address the gap in the literature by designing a theoretical framework for the effective implementation of E-learning in teaching and learning process, particularly in Saudi Arabia's higher education sector.

Education is the most important sector in any country, especially in developing nations such as Saudi Arabia. Therefore, educational institutions need to use ICT extensively as an alternative means of course delivery to students, and they need to guarantee that these technologies are utilised efficiently in educational institutions (Alkhalaf et al., 2012). One of the modern common technologies is E-learning, which plays a significant role in developing learning environments. E-learning facilitates the use of information and communication technologies in various areas of education to strengthen and promote learning in the higher education institutions. Furthermore, E-learning offers the opportunity for interactions between students and academics during content delivery (Al-Adwan & Smedley, 2012; Wagner et al., 2008). However, the implementation of E-learning systems requires the adoption of various technologies and the environment to facilitate E-learning, which are not adequately developed in Saudi universities.

Academics and students are likely to face several problems when Saudi universities adopt E-learning, particularly since various lecturers' and students' teaching and learning requirements need to be met; furthermore, there seems to be a widespread lack of understanding of new technologies such as Web 2.0 (Quadri et al., 2017). Currently, Saudi universities are under great pressure due to an anticipated increase in students enrolments and the limited number of places available (Algahtani, 2017). Thus, with the opportunity of remote learning being facilitated through the successful incorporation of E-learning into teaching practice, this issue may be mitigated or even resolved. The duration of lectures and classes is short for certain subjects such as applied science, medical, and engineering programs offered in Saudi universities. Hence, the provision of E-learning by these faculties will enable various teaching methods to be applied involving computer-enabled blended learning practices which can help to address this issue (Al Zumor et al., 2013; Alqahtani, 2019).

The lack of knowledge in the use of technologies and the underdeveloped university websites need to improve. Information must be updated and presented in a user-friendly format to staff and students. Also, academics should be offered training programs that will assist them to design their course modules. ICT infrastructure is one of the most significant issues that must be addressed when implementing E-learning in the higher education sector due to interruptions to the Internet service. Furthermore, as aforementioned, religious law in Saudi Arabia forbids a male lecturer to teach female students face-to-face (Al-Harbi, 2011; Algahtani, 2017; Onsman, 2011).

Saudi Arabia is one of the most conservative Muslim countries in the world, particularly regarding the situation of women, and it has solid roots in religious and family histories unlike some other developing countries (Almutairy et al., 2014; Alzahrani & Ghinea, 2012; Asiri, 2012; Baki, 2004). Therefore, E-learning could help to solve this issue as male lecturers can teach female students through Blackboard or video-conference technology. Moreover, gender is a significant factor that influences academics' attitudes toward E-learning implementation (Al Gamdi & Samarji, 2016). Consequently, female faculty members have more positive attitudes toward E-learning integration in teaching and learning than do their male counterparts (Al-Dosari, 2011; Al Gamdi & Samarji, 2016; Alenezi, 2012). In this regard, this research will investigate the gender gap and may be useful for those males who have negative attitudes toward E-learning usage by providing some of the possible factors that could help to resolve this issue. Because there has been little research on the effective implementation of E-learning in Saudi universities, this study takes a different direction by proposing and developing a framework to investigate some of the factors that affect the successful utilisation of E-learning in Saudi universities.

Table 3: Research gap analysis table ('√' means this factor is addressed in this model or framework)

Authors & Year	ICT Factors					TPACK			Teaching Principles								Learning Attributes			Personal Factors		
	Internet connectivity	Technology support	Hardware and Software	Usability	HCI	TK	TPK	TCK	Course content	Course design	Learning theories	Digital technology	Teaching strategies	Skills and Knowledge	E-assessment	Training programs	Interaction	Peer learning	Reflection	Culture	Student motivation	Personal management
Selim (2007b)	√	√														√		√		√	√	
Goi and Ng (2008)				√					√	√							√		√			
Sun et al. (2008)	√			√										√	√		√					
Lee and Tsai (2010)						√	√															
Bhuasiri et al. (2012)	√		√							√						√		√	√		√	
Puri (2012)		√	√		√						√											
Altameem (2013)	√	√																				
Al Mulhem (2014a)		√														√						√
Alzahrani and Cheon (2015)						√		√														
Tarus et al. (2015)	√	√												√								

Authors & Year	ICT Factors					TPACK			Teaching Principles								Learning Attributes			Personal Factors		
	Internet connectivity	Technology support	Hardware and Software	Usability	HCI	TK	TPK	TCK	Course content	Course design	Learning theories	Digital technology	Teaching strategies	Skills and Knowledge	E-assessment	Training programs	Interaction	Peer learning	Reflection	Culture	Student motivation	Personal management
Aung and Khaing (2015)	√								√					√		√				√	√	
Mulhanga and Lima (2017)		√			√									√						√		
Quadri et al. (2017)	√	√			√								√	√		√					√	√
Alhabeeb and Rowley (2018)				√												√						
Almaiah and Almulhem (2018)	√								√	√		√									√	√
Alshehri et al. (2019)		√	√																			
Almaiah and Alyoussef (2019)									√	√				√	√							
Vu et al. (2019)	√										√	√			√							

2.11 The Initial E-learning Conceptual Framework

The proposed framework consists of five factors: ICT Factors, TPACK, Teaching Principles, Learning Attributes, and Personal Factors. After reviewing several studies mentioned in Table 1, these factors have been chosen as they are the most prominent in the E-learning literature. Until recently, none of the previous literature examined comprehensively all of these factors in a conceptual framework. Moreover, the proposed framework depicts all the key factors and its validity will make it suitable as a roadmap for further developments and policy-making. The study aims to take the best practices in regard to E-learning systems worldwide and examines their applicability in Saudi Arabia. Moreover, the study identifies those factors that might be appropriate to its unique cultural, social and technological needs. Therefore, a new model should be developed for Saudi Arabia since this country has a different culture and attitude towards the use of technology in tertiary education. Saudi Arabia is in its infancy in terms of the integration of web-based learning and teaching methodologies, and is working towards designing a modern curriculum in line with the objectives of the Saudi Vision 2030.

In order to achieve the objectives of Saudi's government for the development of education and enhancing technological programs at different levels, especially in Saudi universities by 2030, this research investigates the factors that might serve to successfully embed E-learning system in Saudi universities. Hence, the proposed framework is designed to include the influential sub-factors drawn from existing literature, and group these under five major factors that must be considered when addressing E-learning system in Saudi's higher education sector, as well as achieving the research aims. The outcome of this research will be a detailed framework that provides a structured roadmap facilitating the use of E-learning by academics and students at Saudi universities. By answering the research questions, the outcomes will be uniquely related to these universities. Figure 6 shows the initial E-learning conceptual framework that involves all factors, all of which are independent.
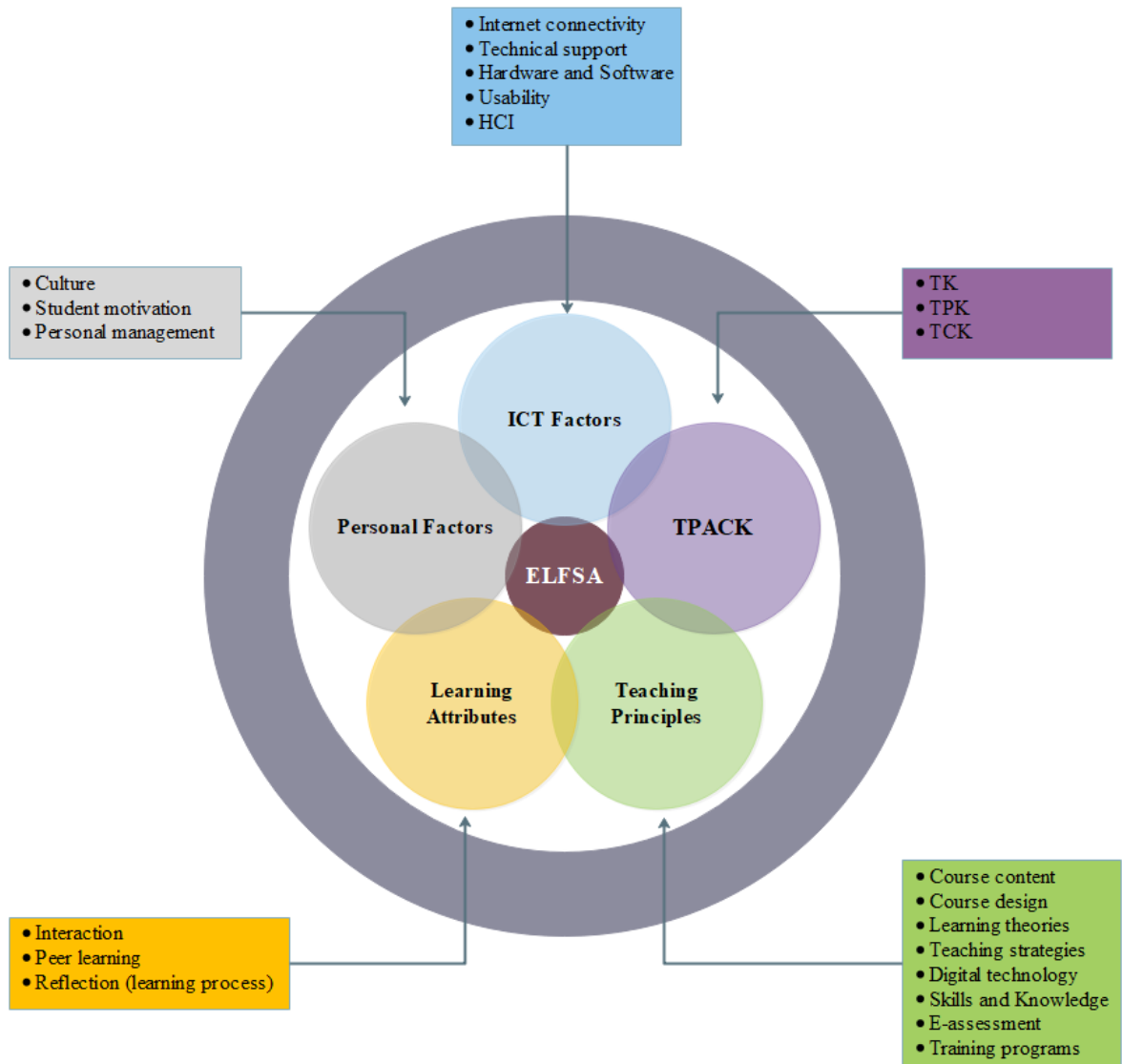
Figure 6: The initial framework of E-learning for Saudi universities (prepared by the author)

2.12 Chapter Summary

This chapter discussed the relevant literature on E-learning in the Saudi higher education context. It introduced E-learning in general, including its definition, types, advantages and disadvantages, and the challenges facing E-learning acceptance and implementation. The literature findings give a better understanding of the way that current E-learning systems are implemented in universities around the world. In this chapter, the gaps in existing literature have been identified and a critique of past studies has been presented, which leads to the development of an initial framework for Saudi Arabian universities. The next chapter will explain the research methodology and the research design adopted for this study.

Chapter 3: Research Methodology

3.1 Introduction

In the previous chapter, an extensive review was conducted of research studies related to the success or otherwise of E-learning systems. The scope of the literature and the criteria used in this research were presented. The E-learning definitions, challenges, and the advantages and disadvantages of using E-learning in different domains were introduced. The research gap was identified from previous E-learning models, and the initial framework for the effective implementation of E-learning was proposed.

The research significance and the value of this study to the Saudi higher education sector are explained in section 3.2 of this chapter. In section 3.3, the research objectives and questions are presented; these will guide the research in identifying the most important factors that influence the effective implementation of E-learning framework in Saudi universities. The purpose of this chapter is to investigate the most suitable research methods and procedures for data collection and analysis. In this study, a mixed-method approach was adopted to answer the primary research questions. The reasons for using this method are given in sections 3.4 to 3.7. A quantitative methodology was used as the main approach to investigate the factors identified in the initial research framework. The qualitative research phase obtained data to confirm and/or enrich the data obtained from the quantitative phase in order to develop the final model. This chapter looks at the intent behind the collection of data and the potential respondents targeted for questionnaires and interviews. Data analysis methods, essential ethical considerations, and the reliability and validity of the entire investigation are presented in sections 3.10 to 3.12. Finally, in section 3.13, the schematic view of the research methodology is summarised and depicted in Figure 12. The selection of the research approach and the data collection methods used for this study are discussed below.

3.2 Research Significance

For any type of research project, it is vital to clarify the significance of the research and the proposed contributions that the research will make which are anticipated to be both theoretical and practical. Theoretical significance is related to what the research can contribute to the existing knowledge on a topic. The practical significance concerns the application of the research findings to practice. The aim of this study is to address the research gap in the E-learning literature, and to extend what is already known about the

success of E-learning in the higher education sector in Saudi Arabia. It is anticipated that the research outcomes can offer concrete suggestions for future best practice.

3.2.1 Theoretical significance

This research will make a theoretical contribution to the current literature by investigating the main factors that influence the effective implementation of E-learning in the Saudi higher education sector. It examines what is already known about the success of E-learning, taking into consideration the unique attributes of Arab countries, particularly Saudi Arabia, and proposes a framework to improve the current pedagogical practices in Saudi universities. This research contributes to the literature on E-learning implementation by providing an instrument and that can be utilised to develop the awareness of academics and students regarding the use of E-learning technology. Moreover, the proposed conceptual framework can be used as a roadmap for further developments and policy-making regarding the effective implementation of E-learning in the Saudi tertiary education sector. The research results will be of use to stakeholders in Saudi universities such as faculty staff and management, Master and PhD students, academics, researchers who support E-learning in tertiary institutions, and those in the other developing countries, especially the Gulf countries in the Middle East, and possibly even more widely in other developing nations. This research is expected to enlighten stakeholders about the different uses of E-learning, and how these can be encouraged to develop learning and teaching practices at the university itself, and in the Saudi higher education sector in general.

3.2.2 Practical significance

This study is expected to have practical implications. To the best of the researcher's knowledge, none of the previous literature has examined the comprehensive range of factors included in the proposed framework (see Table 6). It is anticipated that E-learning will play a key role in the Saudi education system; hence, the factors included in the proposed framework should be carefully considered prior to implementing an E-learning system. Therefore, the outcomes of this study will help to develop an effective E-learning process and enable decision makers, especially in the Kingdom of Saudi Arabia, to make more informed decisions when developing E-learning system. Further, it is expected that all stakeholders will increase their involvement. The research outcomes will assist Saudi universities in to develop E-learning system and to offer new technologies as learning tools in order to improve students' learning outcomes, to keep pace with the government's Vision 2030 objectives for the higher education sector. Not all academics have the necessary level

of skills required to implement and utilise E-learning successfully (Al-Adwan & Smedley, 2012). Academics have to overcome the challenges that they encounter such as the amount of time needed to work within E-learning environments, and the increased workload.

3.3 Research Questions and Objectives

The main purpose of this research is to develop the awareness of academics and students regarding the use of E-learning technology in Saudi higher education. The research aims to acquire a better understanding of the implications of developing a model that improves the attitudes of academics and students towards the use of E-learning. To achieve this, the research questions and objectives have been established as shown in Table 4 below.

Table 4: Research questions and objectives

Question#	Research questions	Research objectives	Discussion
One	What are the factors that should be included in an E-learning framework for higher education in Saudi Arabia?	To identify the factors that must be included when developing an E-learning framework for higher education in Saudi Arabia.	This question aims to identify the required factors that must be included when developing an initial framework for E-learning in Saudi higher education.
Two	What are the factors that will ensure the effective implementation of E-learning framework in Saudi higher education sector?	To determine the main factors that influence the effective implementation of E-learning in Saudi higher education framework.	This question guides the development and evaluation of the refined E-learning model with student and academic staff in Saudi Arabian universities.
Three	What are the attitudes and opinions of academic staff towards the use of E-learning	To investigate the attitudes and opinions of academic staff regarding the use of E-learning for	This question is addressed by developing a conceptual E-learning

	for higher education in Saudi Arabia?	higher education in Saudi Arabia.	model for higher education in Saudi Arabia.

3.4   Research Philosophy

Researchers must explain the philosophical paradigm which justifies and guides the investigation process. Mingers (2001) has defined the research methodology as the activities and guidelines that assist a researcher in obtaining valid and reliable research findings. (Silverman, 2015) agreed with this and indicated that the research paradigm helps a researcher to choose the appropriate research strategy, and data collection techniques, etc. for the planning and execution of a research study. Hence, Information Systems (IS) researchers frequently encounter challenges when attempting to obtain satisfactory results and theories that offer fundamental insights into a phenomenon of interest (Venkatesh et al., 2013). To simplify the research design, the researcher followed the suggestion of (Saunders et al., 2016), who introduced the research onion layers as an appropriate guide to selecting the most appropriate data collection techniques and analysis procedures, as shown in Figure 7.
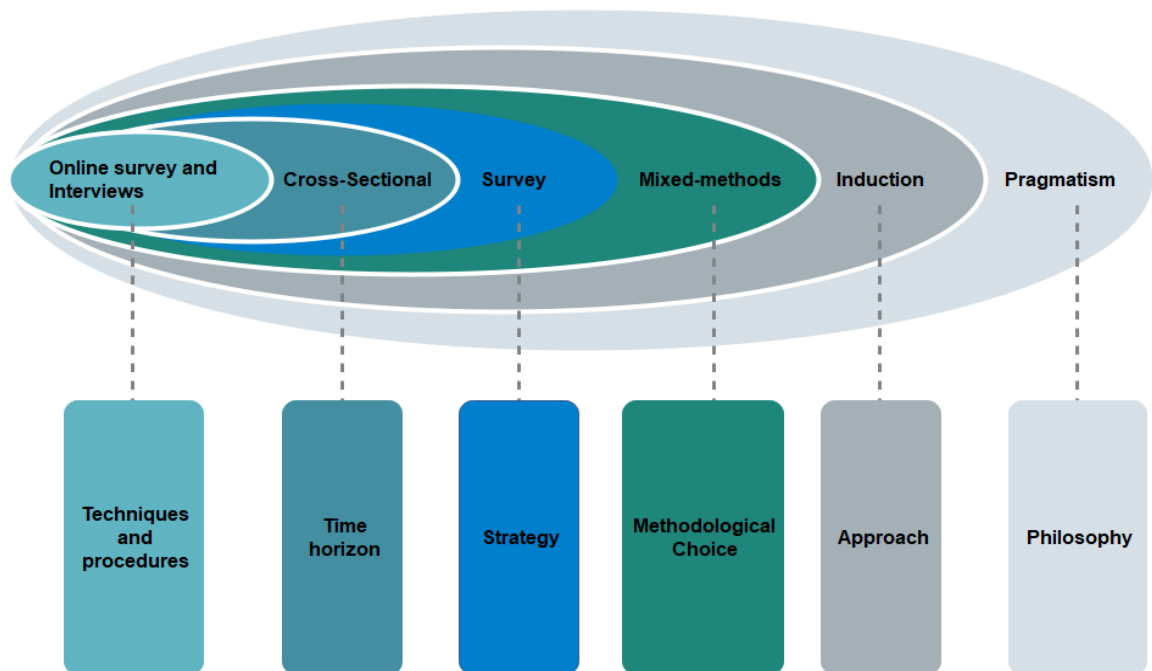
Figure 7: Study research approach process adapted from Saunders et al. (2016) (prepared by the author)

The first step (layer) in the research onion is the research philosophy or paradigm that forms the critical basis of research based on people's philosophies and their assumptions about the nature of knowledge (Collis & Hussey, 2013). For the choice of research paradigm, it was essential to compare all research philosophies with respect to their different research beliefs. As shown in Table 5, there are four research philosophies: positivism, critical realism, interpretivism, and pragmatism (Saunders et al., 2016). In section 3.4.1, the philosophy chosen for this research will be discussed.

Table 5: Summary of IS research paradigms adapted from Saunders et al. (2016)

IS research paradigms				
Assumption Type	**Positivism**	**Critical realism**	**Interpretivism**	**Pragmatism**
Ontology (Refers to the nature of reality)	• Reality is objective and quantifiable • Independent from the researcher	• Research is objective • Understanding of the social structures contributing to the phenomenon	• Research is subjective and changing multiple time by participants	• Research considers objective and subjective viewpoints
Epistemology (Refers to acceptable and valid knowledge)	• Making hypotheses, models, and testing theories. • Generalizing findings	• Knowledge is gained by including social actors in the research context	• Meaning is constructed through social interaction with participants	• Explores different views to derive knowledge
Axiology (Refers to the role of values and ethics)	• Value-free research • Research is objective, and the researcher is independent	• The researcher's view and cultural experience are biased (value-laden)	• Researcher is part of research • Research includes a value-laden data collection process	• Values are significant • Both subjective and objective viewpoints are considered
Methodology (Refers to the research process)	• Utilises quantitative data (well structured) • Can be a qualitative data	• Uses both quantitative and qualitative data • Tends to be longitudinal studies • Critiques reality	• Uses qualitative data mostly; nevertheless, quantitative data can be utilised in some cases	• Mixed-methods research • Addressing research problems and practices for solving research questions

3.4.1 The philosophy chosen for this research

In accordance with the research framework and aims, this study adopted the pragmatist research paradigm to explore the main factors that influence the effective implementation of E-learning in Saudi universities. Pragmatism philosophy has been chosen for this study to guide the research design because a single paradigm is not suitable for this research and may have limitations and weaknesses. This philosophy is based on the plurality of the paradigm and is suggested by mixed-methods advocates as one of the best paradigms when conducting mixed-methods research (Venkatesh et al., 2013). Pragmatism is used as a philosophical tool to address research problems and practices, and takes a value-oriented approach to research. The main benefit of pragmatism is that it helps the researcher to explore multiple views in order to acquire knowledge and obtain rich data. By combining methods from different paradigms to address the research questions, objective and subjective perspectives are considered in the search for answers. Collis and Hussey (2013) argued that pragmatism allows researchers to be 'free' to use a combination of methods from a variety of paradigms instead of being 'constrained' by a single paradigm, adopting them to address research issues. The pragmatist advocates pluralism since social interactions are required between the researcher and research participants at certain stages of the study, whereas other philosophies require greater objectivity (Teddlie & Tashakkori, 2009). Although this study does not include historical studies, its critical slant arises from a desire to ensure that E-learning is implemented effectively, and recommendations are made to improve education in tertiary institutions in Saudi universities.

3.5 Research Approach

Once the research paradigm has been selected, the next step is to choose the research approach. Three approaches were used in academic literature as a starting point for research. These approaches are inductive, deductive and abductive. The inductive approach is applied to the patterns and themes that emerge from the collected data, and is used to explore a phenomenon and generate or build a theory. Conversely, deductive research determines whether a theory is right or wrong by testing and measuring hypotheses related to an existing theory (Gray, 2013). The abductive approach is applied to the collected data in order to explore a phenomenon and identify themes and patterns in order to generate a new theory or modify an existing theory and test this through subsequent additional data collection (Saunders et al., 2016).

3.5.1 The chosen research approach

In this research, the strategy that is selected is determined by the research problems and questions. Although this research is intended to promote the use of E-learning systems in Saudi higher education, it is exploratory in nature and thus no hypotheses are required. The primary objective of this study is to derive meaning from common E-learning themes derived from the data. It needs to start on a broad basis which should progressively narrow as more light is shed on the research context until a precise picture of the situation emerges (Saunders et al., 2016). Therefore, the approach used for this research is inductive. Collis and Hussey (2013, p. 8) define the inductive approach as "a study in which theory is developed from the observation of empirical reality; thus, general inferences are induced from particular instances". Applying an inductive approach to this study to determine the reasons why the Saudi universities embrace or reject E-learning implementation would require obtaining data that are rich enough to allow this research to examine the phenomenon and identify and explain themes and patterns related to E-learning implementation. These explanations are then integrated into a comprehensive conceptual framework.

Put simply, this research begins with the gathering of data to explore a phenomenon and then generates or builds a theory (Saunders et al., 2016). A mixed-methods design is a strong mechanism that can assist the IS researcher to deal with all aspects of a phenomenon, and then make contributions to theory and practice. Hence, a mixed-methods, explanatory sequential design was adopted to achieve the research aims and answer the research questions. Quantitative data were gathered via an online survey, and the qualitative data were collected from semi-structured interviews that were used to understand the research problem and to improve on existing theory. Both sets of data were analysed separately and merged into one study (Creswell, 2014; Morse, 2016). In this research, the decision was made to commence with the quantitative data collection because the aim of this research is to identify the factors that influence the effective implementation of E-learning in Saudi universities. Using this approach, the researcher can start to explore a problem in order to identify the factors to be examined, or begin the research with a quantitative approach using a large sample, followed by a qualitative study of a specific group of participants who contribute their opinions on the topic. Morgan (1998) mentioned that a simple way to decide which approach should be utilised first is to build on the decision about which approach will be the main one. Additionally, Venkatesh et al. (2013) stated that if the IS researcher decides to conduct research for which a powerful theoretical basis

previously exists, but if the study context is novel or past results were unsatisfactory or indecisive, the researcher should consider using a quantitative approach first, followed by a qualitative approach that will offer further insights based upon the context-specified results. This research methodology was adopted based on the understanding of the study objectives that can be delivered by the quantitative approach and the subsequent data analysis.

For the qualitative phase, Creswell and Clark (2007) state that statistical findings regarding participants' views should be processed and clarified through interviews (Rossman & Wilson, 1985; Teddlie & Tashakkori, 2009). To fulfil the research aims, a sequential mixed-methods approach is used to obtain a comprehensive picture of a phenomenon by utilising the findings derived from the qualitative data and to obtain a rich clarification of quantitative data and then analyse them (Teddlie & Tashakkori, 2011). Based on the discussion above and on the research aims, the mixed-methods design was deemed suitable for exploring the issue of E-learning usage and its influence on the system's effectiveness in Saudi Arabian higher education. Figure 8 depicts the approach selected for this study.

Figure 8: Mixed-methods approach (prepared by the author)

3.6 Methodological Choice

This section discusses the selection of a methodology based on the research onion. The next step in the research onion requires choosing the research design -either a single method or combination of methods- before conducting the research (Saunders et al., 2016). As we can see in Figure 9, there are three methodological choices: mono method, multiple methods, and mixed methods.

- The mono method utilises a single data collection technique which may be either quantitative or qualitative.

- Multiple-methods are also known as multi-method or mixed-methods. Multi-method use more than one data collection technique such as a multi-method quantitative study or a multi-method qualitative study, but not a combination of the two.

- Mixed-methods is the branch of multiple-methods research that combines the use of quantitative and qualitative data collection techniques and analytical procedures. Due to the nature of the research questions, and the research context, the mono method and multi-method are not appropriate for this study. The next section describes in greater detail the methodology chosen for this study.
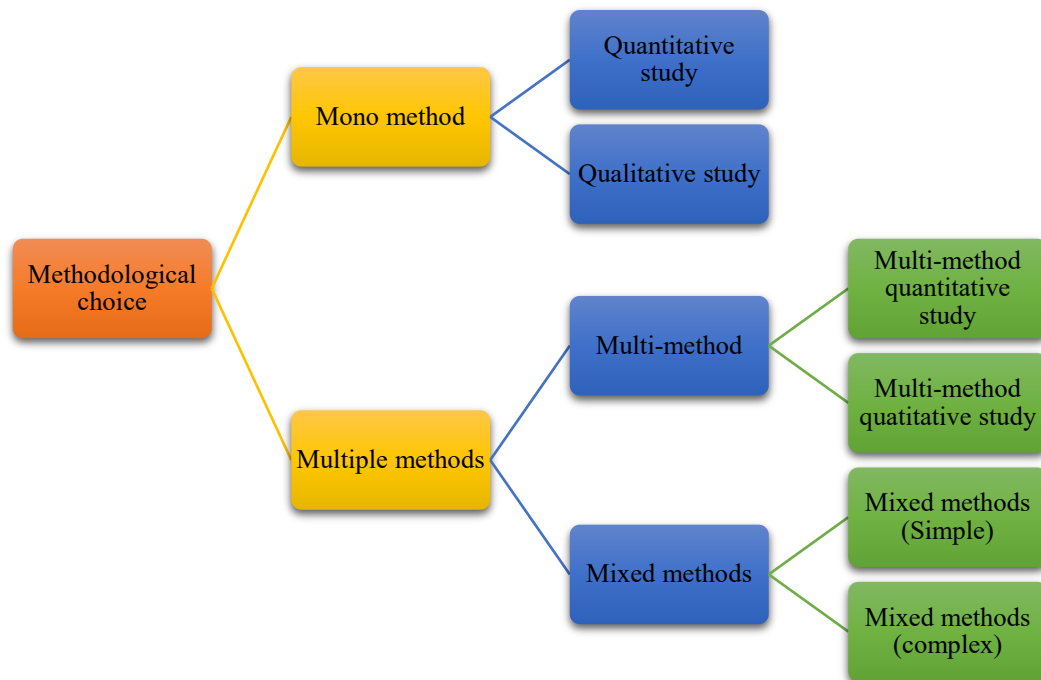
Figure 9: Methodological choice adapted from (Saunders et al., 2016, p. 167) (prepared by the author)

3.6.1 Research design - mixed methods

Researchers must determine the research design they will use in the study (Creswell & Clark, 2007). They need to identify the appropriate style of approaches for their research and determine whether it should be a quantitative, qualitative, or mixed-methods design. The difference between the quantitative and qualitative research methodologies are: the quantitative approach provides a numerical data of study variables that allows discussing the results in descriptive statistics; the qualitative approach provides non-numeric data as a nominal form and is often utilised for any data collection technique such as interview or data analysis procedure such as categorising data (Saunders et al., 2016). As discussed earlier, the philosophy underpinning this

research is pragmatism. An inductive approach is taken to determine the main factors that influence the successful implementation of E-learning in Saudi higher education, and to generate an initial framework.

The research design adopted for this study is a sequential explanatory mixed-methods approach (see Figure 10). The benefit of the mixed-methods approach is that quantitative data can be gathered and then a comprehensive explanation of the quantitative findings using in-depth qualitative data, is presented. By combining both quantitative and qualitative approaches, and aligning them with pragmatist philosophy (Teddlie & Tashakkori, 2009), richer data can be obtained which strengthens the validity of results (Mingers, 2001). With the mixed-methods approach, the shortcomings of one method are addressed by the other. However, the main disadvantages of the mixed-methods approach are that it is time consuming and imposes an extra workload on the researcher. However, since this was a four-year doctoral study, these disadvantages were negligible. In the first quantitative phase, data was collected from academic staff and students in Saudi higher education institutions to evaluate the initial research model that was derived from the literature review, and to obtain a range of new factors derived from the survey (Mertens, 2014). In the second phase, a qualitative approach was conducted involving semi-structured interviews to analyse the data in depth and to obtain an understanding of the phenomenon in its real-life context and through the meanings that people assign to it.

Briefly, the data collection method for this study involved administering the research tools to a large population sample so as to gather data required for the quantitative phase. After analysing the quantitative data, the qualitative data was collected. For the second phase of data collection, the researcher gathered qualitative data from several interviewees to confirm and enrich the quantitative findings.
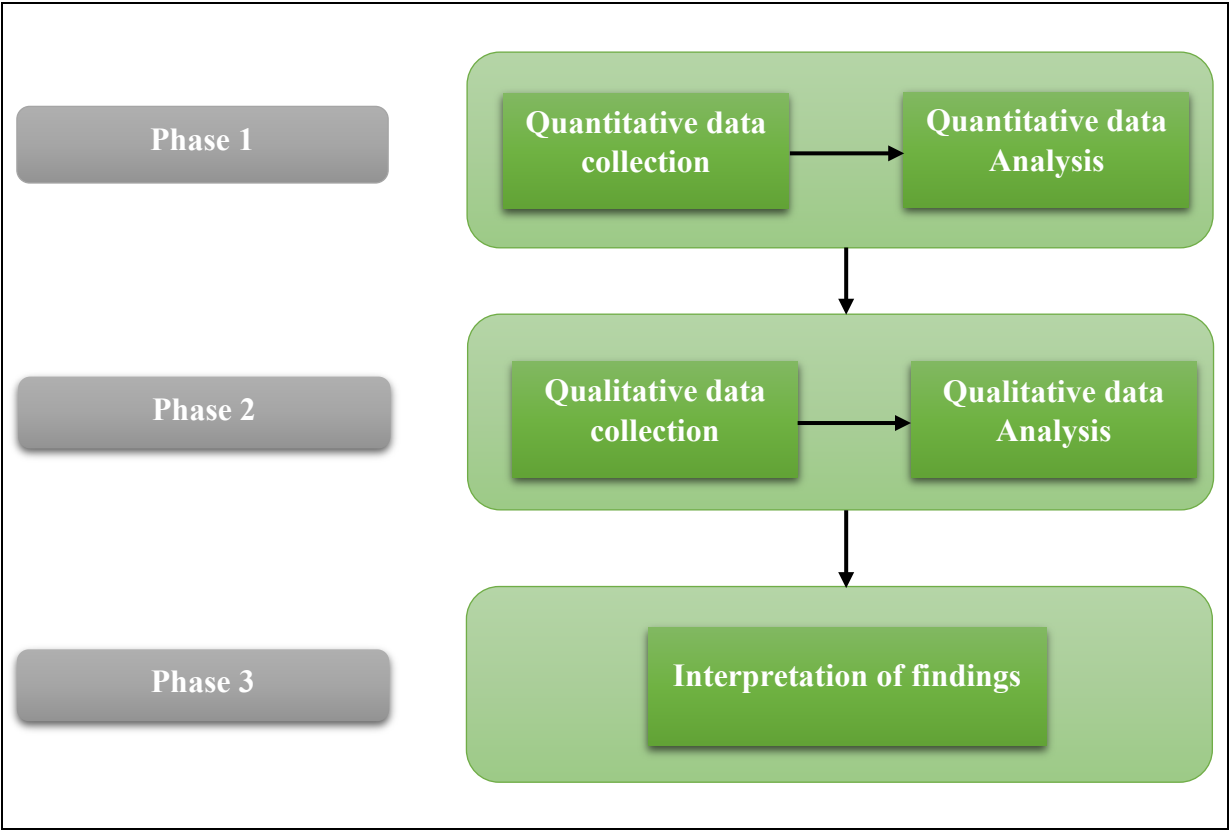
Figure 10: Explanatory research design in this research (prepared by the author)

3.7   Research Strategy

A research strategy is a plan of action applied to achieve a goal and to guide the researcher in answering his/her research question(s) (Saunders et al., 2016). The next step in the research onion is the selection of an appropriate research strategy. As shown in Figure 11, various possible IS research strategies are: experiment, survey, archival research, case study, ethnography, grounded theory and action research.

Figure 11: IS research strategies (prepared by the author)

From the IS research strategies above, three -experiment, archival research and case study- were ruled out as they were inappropriate for this research. Each research strategy has its own strengths, limitations and characteristics. The experimental study is appropriate for investigating the impact of independent variables on dependent ones. Archival research uses historical records and documents as the main source of research data (Saunders et al., 2016). The case study is used to explore a single phenomenon in a real-life setting, utilising a diversity of methods to acquire in-depth knowledge (Yin, 2013). Survey research is a popular and common strategy in IS research and is usually connected with the quantitative research approach whereby the data collected from a sample can be generalised to a wide population (Saunders et al., 2016). Other strategies, such as ethnography, grounded theory and action research could be suitable for this research because of their context-inclusive approach (Myers, 1999; Urquhart et al., 2010). However, they were not considered appropriate because of the main challenge: the lengthy or uncertain duration of the data collection process, which could have been problematic given the study's time constraints.

Due to these considerations, surveys and interviews were chosen as the best strategies as they are the most popular methods in IS research (Chen & Hirschheim, 2004). The survey approach is a quantitative method, and it involves the collection of information from one or more

individuals, and is a means of gathering data pertaining to personal attributes, behaviours, patterns or opinions (Creswell & Poth, 2016). The explanatory sequential mixed-methods design can be utilised for exploratory, descriptive, and explanatory research purposes. The purpose of using a survey is to analyse data obtained from a representative sample of the target population. The researcher uses survey research to determine the study's variables which are derived from participants' information such as demographic characteristics, behaviours, and information related to the perceptions, beliefs and attitudes that represent the views of participants. Briefly, this study is descriptive and explanatory. Its aim is to determine the factors that hinder or facilitate the successful implementation of E-learning in the Saudi higher education sector by means of a survey distributed to academic staff and students. Also, it examines the identified factors and the relevant variables proposed in the initial framework derived from the E-learning literature. Further, it is explanatory as it includes the quantitative data analysis, provides an in-depth explanation of the research inquiry, and allows the researcher to obtain deep insights from rich data. Therefore, the online survey was used to provide feedback on the initial framework, and then the refined framework was tested using the web-based interviews to help explain the quantitative findings and to develop the final framework.

3.8 Time Horizon

After the research strategy has been selected, the next step in the research onion is the time horizon, which consists of cross-sectional studies and longitudinal studies. This requires the researcher to decide whether the outcomes of the research would be relying on a "snapshot" of the phenomenon being studied at a particular time or via a set of observations over time (Saunders et al., 2016). The snapshot time horizon is referred to as cross-sectional, while the longer time horizon involves a longitudinal approach. Collis and Hussey (2013, p. 63) define a cross-sectional survey as "a methodology used to investigate variables or a group of subjects in different contexts over the same period of time". Moreover, it involves the collection of quantifiable data to determine the relationship between two or more variables, which may eventually lead to the emergence of patterns and associations. On the other hand, the longitudinal strategy offers the researcher more accurate outcomes as the phenomenon of interest may change over a long period of time (Chen & Hirschheim, 2004; Saunders et al., 2016). For this study, because of time constraints, a cross-sectional study design was employed for the collection of both online survey and interview data, a method that is often used in cross-sectional studies.

3.9 Data Collection Techniques and Procedures

As discussed in section 3.5.1, the data-gathering procedures of an explanatory mixed-methods design consist of two phases: the quantitative data collection phase followed by the qualitative data collection. In the first phase, the researcher commences with the collection of quantitative data to gather the information that is required before the qualitative data collection process commences. The research instrument is evaluated to ensure that it has good reliability and validity. In the second phase, the findings from the quantitative phase are known and contribute to the development of the techniques for the qualitative data collection process, which may involve semi-structured interviews and open-ended questions. Following the suggestion of Creswell and Poth (2017), in this study, the sample chosen for semi-structured interviews comprised several academic staff working in the Saudi higher education sector (sampling for the collection of qualitative data is detailed in section 5.3). The findings were analysed, and the outcomes utilised to complement the quantitative results.

For survey research, several data collection strategies can be utilised including questionnaires, structured or semi-structured interviews, and observations. In this study, there are two stages of data collection: a self-administrated questionnaire was utilised to collect primary data for the gathering of quantitative information, and interviews were conducted to gather data in the qualitative phase. This research used an online survey and semi-structured interviews to answer the research questions and to triangulate and extend the results for the development of the final framework, as well as to strengthen the reliability and maximise the validity of the research results by using several data sources.

3.9.1 Quantitative online survey

The questionnaire for this study was developed in two phases. First, to ensure content validity, the survey questionnaire was adapted from the literature review (Chapter 2) to examine the initial identified new factors that influence the effective implementation of E-learning in Saudi higher education. Second, the questionnaire was designed based on self-developed and pilot-tested instruments obtained from the relevant literature (see section 4.2.1). The literature guided the researcher in the development of the scale and measurements for the quantitative phase of the research.

The aim of the online survey was to collect information from a large sample of participants, namely students and academic staff, regarding the factors proposed in the research model. A

questionnaire is a method for gathering data in survey studies, and is a technique used when the knowledge about the topic being examined is appropriate for formulating sufficient methodically and technically valid questions (Flick, 2015). An online survey offers various essential benefits to the researcher: it saves time; it can easily and cheaply be distributed to participants; it overcomes the geographic challenges of regions and distance; the data can be downloaded in different formats; and the researcher can readily remind the respondents to submit their answers, and can thank them for their participation (Issa, 2013). It is easy for the researcher to control the survey design and analyse the results, particularly when these are downloaded either in Microsoft Excel files or IBM SPSS software.

The online survey was a suitable tool for this study as it enabled access to both male and female participants, which is an important consideration given the gender-segregated higher education system in Saudi Arabia. Prior to general distribution, the questionnaire was pre-tested by a group of individuals from the same environment to avoid any issues regarding wording, measurements, and ambiguities. According to Ghauri et al. (2020), a questionnaire pre-test is important because wording issues can affect accuracy significantly, and it is necessary to ensure that the questions are understandable and unambiguous. The survey questionnaire was distributed to respondents via the Qualtrics platform, which has both English and Arabic versions. This platform offers the facility of survey design; it is used as an interactive means of completing the online questionnaire; and it has proven value as a means of capturing data. Further, the data collection can be stored automatically in a database for data analysis and easy-to-conduct personal follow-ups with the respondents. Because the targeted participants are native Arabic speakers, the English version was translated into Arabic and revised by an expert in the Arabic language for clarity (see Appendix 3). The recruitment of participants is discussed in more detail in Chapter 4.

3.9.1.1 Pilot study

A pilot study was conducted before the online survey was launched. The pilot study offers many advantages. It identifies the factors for the proposed framework; checks that no errors have been made in or during the survey design; ensures that the questions are clear and easy for the participants to follow and understand; and ensures that the survey questions can be answered easily (Hair et al., 2012). A valid questionnaire will enable the data to measure accurately the concepts of interest to the researcher. Fink (2012) notes that the number of people selected should be sufficient and that ten participants is the minimum sample for a pilot test. Hence, in

this study, the researcher administered ten questionnaires for the pilot study to ensure the validity and reliability of the questionnaire and to detect any issues before beginning the primary data collection. Also, an equal number of participants from each target group of respondents was chosen. Pilot test participants made several suggestions regarding the revision of the wording and the order of several survey questions. Their suggestions were used to refine and finalise the survey for the quantitative phase (the pilot study is discussed extensively in section 4.2.1). For the sample size calculation, the total population numbers were gathered from academic staff and students based on the statistics centre of the Ministry of Education in Saudi Arabia. The academics comprised those who hold full-time positions as lecturers, assistant professors, associate professors, or full professors. Undergraduate students were included in the survey as they use the course materials face-to-face in the classroom, and they utilise the Internet daily to exploit the benefits of such technologies and improve their skills and learning ability. The sample size was determined to ensure a confidence level of 95% in the data with 0.5 standard deviations, and a margin error of 5% (Hutcheson & Sofroniou, 1999; Smith, 2013). According to Krejcie and Morgan (1970), the sample size formula for categorical data is frequently utilised and does not require previous knowledge of population variances, which is not always available. The sample size formula is:

$$n = \frac{x^2 NP(1-P)}{D^2(N-1)+x^2 P(1-P)} = \frac{(1.96)^2 \times 331001 \times 0.5(1-0.5)}{(0.05)^2(331001-1)+(1.96)^2 \times 0.5(1-0.5)} = 384$$

n= the determined sample size.

N= the limited population size is 331001 as reported by the Ministry of Education, 2017.

P= the maximum sample size proportion is 0.5.

X= t-value for an alpha level of .05 is 1.96 for sample size above 120 (Kotrlik & Higgins, 2001).

D= the acceptable margin of error for proportion being estimated is 0.05.

Therefore, the required sample size for the online survey in this study was 384. With the survey questionnaire finalised and target population identified, the online survey was ready to be administered.

3.9.1.2 Research instrument

The link to the online survey was sent via the Qualtrics platform to all potential participants, comprising students and academic staff in Saudi universities, via email and social networks. The

survey questionnaire used for this study consisted of two sections (see Appendix 2). The first section was intended to obtain participants' demographic data and background. It contained eight items pertaining to gender, age, job title, teaching experience, academic rank, administration role, academic field, and previous experience with E-learning. The second section required participants to record their responses on a five-point Likert scale anchored by 1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, and 5: Strongly agree. This scale was used to measure the initial research framework factors detailed in Table 6.

Table 6: Initial research framework factors

Initial research framework factors	
Total factors for academic staff and students	**Number of items**
22	95
Internet connectivity	4
Technical support	4
Hardware and Software	4
Usability	5
Human-computer interaction (HCI)	5
Technology Knowledge (TK)	5
Technological Content Knowledge (TCK)	5
Technological Pedagogical Knowledge (TPK)	4
Course content	4
Course design	5
E-assessment	6
Digital technology	4
Skills and Knowledge	3
Learning theories	4
Teaching strategies	4
Training programs	4
Interaction	4
Peer learning	4
Reflection	4
Culture	4
Student motivation	4
Personal management	5

After the quantitative data was collected, the reliability assessment was conducted using the IBM SPSS (version 25) statistics package. Exploratory factor analysis (EFA) was applied for

statistical testing of the gathered data to identify the factors for the proposed framework for the E-learning usage in Saudi higher education (Smith & Abouammoh, 2013). EFA is a technique used to reduce the number of latent variables and to determine the structural validity of the framework. EFA was used to examine the factors that need to be retained in the framework and condensed the amount of relatively large data into a more manageable number of variables. The research results obtained in this phase were used to develop and confirm the refined framework.

3.9.2 Justification for choice of qualitative method

The literature frequently uses mixed-methods approaches to understand the acceptance of technological innovations. Damanpour (1996) stated that technology acceptance is a complex process which cannot be generalised using a quantitative approach, and the adoption of technology is not an individual decision (Razmak & Bélanger, 2018). This indicates the importance of using mixed methods that enable the researcher to quantify and explain in different ways. The use of a quantitative approach for the first phase of the study facilitated the design of the research framework to investigate the effective implementation of E-learning in Saudi universities from the perspectives of academic staff and students. This approach was adjusted to answer the research questions related to the factors that influence the effective implementation of E-learning in Saudi higher education framework. A qualitative approach was suggested as a second source of data as it adds value to the collected data. The qualitative approach can often shed light on some unusual results from the quantitative analysis. This step was essential since E-learning usage is at an early stage in Saudi Arabia. Thus, the contribution of the adopters of E-learning enriched the research discussion and helped to address the issue raised earlier in this study regarding the development of an adaptable model for the effective implementation of E-learning in Saudi Arabia.

3.9.2.1   Qualitative interviewing

The purpose of qualitative interviews is to enhance the findings derived from quantitative data and to evaluate the refined research framework. The interview technique is one of the most popular research methods utilised in IS research (Schultze & Avital, 2011). Interviews can be unstructured, structured, or semi-structured. Based on the research approach, the researcher decides which type of interview is appropriate for eliciting information from the study sample. King and Horrocks (2010) explained that interview methods involve connecting elements, recording, interview venue, the introduction and conclusion of the interviews. In this study, the

researcher conducted semi-structured interviews to collect more in-depth information from the academic staff (E-learning experts) regarding their opinions and attitudes toward the use of E-learning systems in Saudi higher education. Before contacting the interviewees, many variables and factors had to be considered. Therefore, the interview questions were influenced by the results of the quantitative data analysis. A suitable strategy for gathering the data is to ask open-ended questions during face-to-face interviews or to use other technological applications that enable the researcher to explore the various opinions offered by individuals (Creswell & Poth, 2017). Open-ended interview questions allow participants to provide detailed and different perspectives. They enable the researcher to obtain specific answers and to make use of any further suggestions and modifications to the research framework that may be raised by the respondents.

In this research, open-ended interview questions were utilised and were divided into two sections. The first section elicited the required information about participants' demographics, and the next section enabled respondents to evaluate and confirm the refined E-learning framework resulting from the quantitative data analysis. The second section was intended to reveal any factors that had been excluded from the initial framework after quantitative data analysis had been conducted (see Appendix 6). That is because the researcher gave them a high level of importance from both the literature review and the quantitative online survey. The semi-structured interviews were carried out online via the Qualtrics platform, as will be discussed in Chapter 5 (Interviews Analysis and Findings). Interview questions were developed based on the factors identified in the refined framework, and interviewees were given the opportunity to add their comments before the interviews were concluded. The data derived from the interviews were used to establish the final framework.

In terms of determining the qualitative sample size, previous Information Systems studies pointed out that there is no recommended number of interviews. Recent studies suggest that the sample size should be between 5-10 interviewees so that the researcher ensures that theoretical saturation is reached (Creswell & Poth, 2017; Marshall et al., 2013; Yin, 2013). Others (Gubrium & Holstein, 2002; Guest et al., 2006) recommend that the average qualitative sample size should range from 15-30 interviews. However, past studies present no evidence regarding an ideal qualitative sample size (Creswell & Poth, 2017). Therefore, in this study, twenty-two interviewees were involved in the qualitative data collection. A thematic content analysis technique was applied for the analysis of interview data in order to identify emerging themes

and to group information according to identified patterns. Following this grouping of themes, the data was analysed using NVivo software (version 12) (Creswell & Poth, 2017; Maxwell, 2012).

3.9.2.2   Participants' recruitment

To obtain valuable results, the participants were selected from academics in Saudi universities based on their experiences with the E-learning systems, and those who have utilised and implemented E-learning to facilitate the actual use of technology in learning. It was anticipated that the opinions elicited from those with experience in E-learning would provide the researcher with rich information on the actual use of E-learning in Saudi higher education. A letter was sent via email to the potential participants inviting them to participate and to receive their consent. The letter contained an information sheet detailing the aims and purpose of the study, assuring confidentiality and anonymity, describing the data collection method, explaining the issue of informed consent, and providing the researcher's and supervisors' contact details should participants require further clarification and assistance (see Appendix 4 and Appendix 5). This ensured that the researcher followed ethical standards for conducting a study and is essential prior to data collection as it increases the validity and reliability of the results (Patton, 2014). The interviews were conducted online using social media tools such as E-mail, Twitter, LinkedIn and WhatsApp, since the interviewees were geographically dispersed and far distant from the researcher. This was a limitation in the sense that the time difference between Australia and Saudi Arabia made the contacting of participants more challenging. However, utilising an electronic form of communication enabled the researcher to interview the participants regardless of their location. The advantages of conducting interviews by email are that interviewees can choose when to respond to questions, and they can edit and review their response before they submit it (Gibson, 2010). Online interviews save time, costs and effort, thereby making it easier for the researcher to start analysing the data as soon as it arrives (Salmons, 2014).

Further, it offers more flexibility to participants who have busy schedules and are not able to participate in an interview. Interviews via email are a convenient means of collecting data from participants who are uncomfortable with face-to-face or telephone interviews (Bowden & Galindo-Gonzalez, 2015). Therefore, in this study, the online interviews were used as an alternative mode of interviewing. The Qualtrics platform enabled the researcher to distribute the questionnaire to participants and to evaluate the refined framework and obtain detailed feedback. Following the suggestion of Saunders et al. (2016), follow-up emails were sent one

week after the questionnaires had been distributed so as to increase the response rate and to keep track of all potential participants who may either have misplaced or not received the online questionnaire.

The online interview link was distributed in October 2019 after approval had been received from the Human Research Ethics Committee of Curtin University. During Coronavirus 19 (COVID-19) pandemic, the researcher expected to face several challenges when collecting the data since many people were panicked by the pandemic and its implications. Fortunately, the online interview enabled the researcher to gather sufficient data in a timely manner, possibly because people were forced to stay at home and could spend more time on social networking applications. After conducting three rounds of data collection, the researcher obtained twenty-two participants for this research, as discussed in section 5.3 (Participant demographics).

3.10 Data Analysis

Both the quantitative and qualitative data were critically analysed and interpreted. The purpose of data analysis is to compare the research findings with the previous results found in the literature in order to explain any similarities or differences if they exist. The analysis is discussed in detail in Chapter 4 (Online Survey Analysis and Findings) and in Chapter 5 (Interview Analysis and Findings).

Quantitative data collected from the online survey in the first phase was analysed using IBM SPSS (version 25) statistics. Raw data collected from the online survey were converted into meaningful figures for analysis. Exploratory factor analysis (EFA) was applied for statistical testing of the gathered data to investigate the predefined list of factors in the initial framework and to examine the structural validity and reliability of the framework. Also, the EFA technique was used to identify groups of inter-related factors that need to be retained in the framework, and helped to condense the relatively large amount of data into a more manageable set of variables (Courtney & Gordon, 2013). The findings from this analysis provide a basis for comparison with findings from previous studies and the opinions of other researchers on the topic under study. The factor analysis offered an improved list of factors for the refined framework, which is deemed to be a more consistent interpretation of the survey data than the original groupings (see section 4.7: Summary of Online Survey Findings). The findings of this phase were utilised to boost the framework and investigate it through qualitative data collection to ensure the effectiveness of the final framework.

For the qualitative data collected from the interviews, thematic analysis was conducted using NVivo 12 software. Thematic analysis is a technique used to identify themes based on the analysis of interview data, and also to group the information according to identified patterns of themes (Creswell & Poth, 2017). It is a method used for identifying, analysing, organising, recording and reporting themes found in a data set (Braun & Clarke, 2006). Therefore, thematic analysis is the most common type of analysis applied to qualitative research. Once the data was gathered, the researcher followed the steps of interview data analysis suggested by (Creswell & Poth, 2017): organising and preparing of data, thematic coding, visualization and analysis, and reporting data (see Figure 30: Steps of interviews analysis). Data preparation is an important step in the analysis process. The researcher reviews all data several times and makes sense of them, and then organises the data by preparing the interview transcripts to be imported into NVivo software. The themes that emerge are grouped under categories to prepare them for analysis. In this study, the raw data from all interview transcripts was reduced to a meaningful code. All transcripts were organised and stored in separate folders for each participant. The researcher examined each interview transcript thoroughly before labelling it with a code. Pre-identified themes and sub-themes were determined from the literature review and the refined research framework. As shown in Figure 31, the data was coded using inductive content analysis and resulted in six main categories: Technical learning management systems, TPTCK, E-learning management systems, E-assessment, Students' readiness, and Personal management issues. Further, some factors in the initial framework were excluded after the quantitative data analysis and were reserved for further investigation. The additional factors were Digital technology, Training programs, Learning theories, Teaching strategies, and Cultural factors. In the final step, the interview findings were presented in the form of direct quotations from the interviewees as an outcome of the process of data analysis described in section 5.4 (Findings from the Interviews Data). The results of the qualitative phase were summarised and linked to the previous phase, and to the research objectives and aims. The outcomes of the quantitative and qualitative data analyses led to the confirmation of the final research framework as presented in section 5.5.1 (The final framework (ELFSAU)).

3.11 Reliability and Validity

The validity and reliability of mixed-methods research are achieved by fundamentally measuring the quality of results or inductions from all of the quantitative and qualitative data in the research inquiry (Venkatesh et al., 2013). In regard to quantitative data, Tashakkori and

Creswell (2008) report that the surveys used for gathering quantitative data can bring breadth to a research by assisting researchers to collect from many participants information about various aspects of a phenomenon. Subsequently, the validity of the qualitative data collection is confirmed through interviews that provide depth to the research inquiry and allow the researcher to derive deep insights from rich data. For the purpose of this study, the researcher used the quantitative data to determine the factors that may influence the implementation of E-learning in Saudi higher education. This was followed by a qualitative approach so as to understand academic staff's attitudes toward the use of E-learning systems. Methodological triangulation is the usage of multiple methods for collecting data and confirming research findings. In this regard, collecting quantitative data from the online survey and qualitative data from semi-structured interviews employed in this study is considered triangulation utilising more than one method. The combination of the outcomes of both methods is intended to provide a more detailed picture of the research scenario and to confirm the validity and credibility of the research findings (Yin, 2013). In this way, the researcher analyses data obtained by using both techniques to assist with the development of the final research framework. In terms of the quantitative data, exploratory factor analysis (EFA) was applied to obtain a reliable set of factors for a successful E-learning framework within the context under examination. Hence, the factor analysis technique can be used to reduce data by grouping it into factors, and to validate and confirm the refined framework. According to Pallant (2013), EFA has been used as a compression methodology that manages a large set of factors by decreasing them based on correlations between variables, which can then be utilised in other tests. Reliability assessment was done using SPSS software (version 25) to determine the internal consistency of survey items for each factor and to explore the extent to which items within factors are related. The evaluation of items under each factor is measured using the Cronbach (1951) Alpha index and is considered when Cronbach Alpha value exceeds 0.70 (Mallery & George, 2003; Straub et al., 2004).

For the qualitative data, semi-structured interviews with open-ended questions were conducted with 22 academics in the Saudi Arabian higher education sector who were selected based on their teaching experience and the use of an E-learning systems. Careful attention was paid to the qualitative phase in terms of selecting a representative sample for participation in this study, and to maximise the coverage of the research and strengthen the credibility or replicability of the data, as well as the generalisability of the research findings in future related studies. Both the online survey and interview questions were reviewed by the supervisors and colleagues in the

IS domain to ensure content validity, which enabled the researcher to justify the final findings. The interview design comprised the following activities: preparation for the study, development of interview questions, sampling, data collection, data management and transcription, and data analysis (see section 5.2: Interview Design and Objectives). This strategy enabled the researcher to follow appropriate guidelines that inform the study and improve overall validity (Richards, 2014). Interview questions were asked in a way that allowed interviewees to comment on the identified factors of the refined framework (see Appendix 6). Interviews were conducted online using the Qualtrics platform, thereby preventing the researcher from judging or influencing the interviewees and reducing the potential for bias in the findings. The survey link was sent to potential respondents in Saudi universities who are likely to use email addresses to communicate with their students. In addition, the deans of E-learning and distance learning were asked to distribute the survey invitation letter. Moreover, all potential participants were given ample time to answer the survey questions in comfortable surroundings such as their home or office. The respondents provided rich information and detailed answers to each question, and some of them supported their responses with examples. Data saturation was reached when the themes became redundant and were reiterated by more than one participant. The qualitative data were carefully analysed using NVivo 12 software in order to categorise and classify the nodes identified and to produce the final interpretation of the findings. To ensure trustworthiness and rigour, (Whiteley, 2002) indicated that the investigator should record and utilise the exact words of the interviewee, and to draw the attention of the reader to the interviewees' words. Therefore, in this study, interviewees' comments are indented and presented in italics and enclosed in brackets to help the reader distinguish the researcher's words from those of the participants. The results from the qualitative analysis were used to develop the final research framework.

3.12 Ethical Considerations

Ethics approval was sought prior to the commencement of the primary survey (see Appendix 1). An ethical clearance certificate was obtained from the Curtin University Human Research Ethics Committee to guide the research requirements and to enable the data gathering phase of both the online survey and semi-structured interviews. The researcher submitted an "Application for recognition of ethics approval from another institution", which is intended to seek approval for low-risk research projects. Along with the online survey, all participants were sent letters explaining the requirements of the research, their particular roles, and the need to obtain their consent. Furthermore, the researcher explained that participation in this study was

voluntary, and participants could withdraw from the research at any time without the need to offer an explanation. The participants were informed that their privacy and confidentiality would be protected, and the research data would not be shared with any external party other than the researcher and his research supervisors. The online survey was written in English and then translated to the Arabic language by bilingual experts, in anticipation that Arabic would be the participants' preferred language for their responses. In addition, participants were given the option to switch from one language to another. For the interviews, all participants were provided with an informed consent form and information sheet outlining the objectives of the research, and issues related to anonymity and confidentiality, benefits and risks, privacy and security of data, and information about the researcher and his supervisors was provided to all participants in case clarification was needed. Participant contributions were acknowledged, and the participants received a letter of thanks for their participation.

3.13 Schematic View of the Research Methodology

The aim of this research project was to develop a framework for the effective implementation of E-learning in Saudi universities (ELFSAU). In order to answer the primary research questions and investigate the proposed framework, the researcher adopted the mixed-methods approach. A combination of both quantitative and qualitative approaches was utilised in this study to develop the final framework (ELFSAU). The research process workflow is summarised in Figure 12 and comprised the five main stages described below.

- In the first stage, (Chapter 2) the researcher undertook a comprehensive review of relevant E-learning literature and previous studies. The factors most relevant to the research context were identified to develop an initial research framework. The outcomes from this stage were used to answer research question one.
- In the second stage (Chapter 3), the research methodology and design were chosen, and data collection techniques were determined.
- The third stage (Chapter 4) included an online survey to collect quantitative data from academic staff and students in Saudi universities. A pilot study was conducted to check the validity and reliability of the research instrument, and to detect any issues before the primary data collection began. The aim of the online survey was to investigate the predefined list of factors in the initial research framework that had emerged from the existing E-learning literature. The collected data were analysed using IBM SPSS

Statistics (version 25). The results from the online survey were used to evaluate and confirm the refined research framework and aimed to answer research question two.

- The fourth stage (Chapter 5) involved conducting a semi-structured interview with open-ended questions to help explain the quantitative findings. The sample comprised academic staff who actively engaged in E-learning within Saudi universities. The purpose of the interviews was to obtain the most accurate information about the research topic and to understand academic staff's attitudes toward the use of E-learning systems. The collected data was analysed using NVivo 12 software. The findings from this stage were used to develop the final research framework and to answer research question three.

- The fifth stage (Chapter 6) concluded the study. It discussed the findings, and presented the limitations of the study, recommendations, and future research avenues.

Stage 1

Background literature study

- A comprehensive review of relevant E-learning literature and previous studies
- Identification of the research gap
- Building research questions and research objectives

Procedure and outcome

- Develop the initial framework
- Answer the research question one

Stage 2

Research approach

- Inductive approach
- Pragmatism
- Explanatory mixed-methods design
- Identification of data collection techniques
- Cross-sectional online survey and In-depth interviews

Stage 3

Pilot study

- Check the validity and reliability of the study data
- Quantitative online survey
- Initial framework tested

Quantitative data collection

- Online survey (586 students and 118 academics staff) valid responses
- Numeric data
- Preparation for analysis

Quantitative data analysis

- Descriptive statistics
- Factor analysis
- Refined the framework
- Answer the research question two

Stage 4

Qualitative data collection

- Open-ended questions and semi-structured interviews (22 academics staff completed the interview questions)
- Administered online
- Text data
- Preparation for analysis

Qualitative data analysis

- Coding and thematic analysis
- Development of the final framework
- Answer the research question three

Stage 5

Discussion and conclusion

- Discuss the study results
- Recommendations, limitations and future research avenues

Figure 12: Schematic view of the research methodology (prepared by the author)

3.14 Chapter Summary

This chapter discussed the research significance and the research objectives formulated as research questions. After that, the research methodology and design, based on the research onion, were explained. Pragmatism philosophy was chosen for this study because of its popularity among IS researchers and its suitability for the research objectives. An inductive strategy was selected as the research approach, being the most appropriate given the exploratory nature of the research. In terms of time horizon, a cross-sectional study was used for the collection of quantitative and qualitative data. A mixed-methods approach was chosen to achieve the research aims and answer the research questions using a sequential explanatory design. The data was gathered by means of a quantitative approach using an online survey, and a qualitative approach using semi-structured interviews to understand the research problem. Subsequently, the data from each approach was analysed separately and then merged into one study. The justification for conducting a qualitative study was discussed. Quantitative analysis was performed using exploratory factor analysis, facilitated by statistical analysis to check the validity and reliability of the study data, and to ensure that all factors utilised in the online survey measured all the proposed variables. For the qualitative study, NVivo software was used for the thematic content analysis of the interview data, and to organise the data according to themes. Research findings were combined to triangulate results for the development of the final research framework. At the end of this chapter, ethical considerations were discussed, and the research process workflow of this study was summarised. The quantitative data and findings from this research are discussed in the next chapter.

Chapter 4: Online Survey Analysis and Findings

4.1 Introduction

The previous chapter explained the research methodology adopted for this research. To achieve the research aims and answer the research questions, the decision was made to utilise a mixed-methods approach by using an explanatory sequential design, and the mode of data analysis was selected.

This chapter presents the findings from the quantitative data collection phase to identify the most significant factors that must be considered when developing a detailed, structured E-learning roadmap for Saudi universities. Furthermore, the findings of this quantitative analysis should provide a solid base for identifying the factors that will ensure the effective implementation of E-learning in the Saudi higher education. This chapter describes the survey development using a pilot study in section 4.2 and then presents data preparation and cleaning in section 4.3. The demographic data for academic staff is presented, followed by exploratory factor analysis (EFA) for academic staff in section 4.4 and 4.5.1 respectively. Similarity, the demographic data for students was presented and EFA was conducted in section 4.6 and 4.6.7. The summary of EFA findings is presented in section 4.7. Finally, the chapter presents the refined version of the E-learning framework in section 4.8. Table 7 below depicts the steps taken to achieve the aims of this chapter.

Table 7: Quantitative data analysis plan

Step	Action	Outcome
Survey development	Find the missing factors naming checks, data preparation.	Cleaned data set ready for the next stage of analysis.
Data preparation and cleaning	Pilot study	The online survey was piloted to ensure the validity, reliability and the survey instrument.
Descriptive data	Sorting cases according to the status of the participants (academic staff, students).	- Descriptive data analysis for the academic staff participants.

		- Descriptive data analysis for the students participated in this study.
EFA process	Building the model for EFA and preparing the data set.	One data set that will use the combined data (704 cases) for the EFA process. The explanation of each EFA step will be provided.
EFA model	Running EFA using SPSS software version 25	The final model based on the data from the academic staff and students. The outcome will be a refined model from which some of the factors or items have been removed.

4.2 Survey Development

This section presents the evaluation of the appropriateness of the survey items for the context of the study, and the process undertaken to detect any typographical or grammatical errors before the main online survey was launched.

4.2.1 Pilot study

In this phase, to determine the factors that are most likely to influence the effective implementation of E-learning in the Saudi higher education, an online survey was developed based on the current literature review and the study aims and objectives. To confirm the reliability and validity of the instrument, a pilot study was conducted before conducting the main online survey. This allowed the researcher to become familiar with potential respondents and to predict the response rate and survey completion time. The pilot study offers many advantages, such as identifying the factors for the proposed framework, checking that there are no errors have been made in or during the survey design, ensuring that the questions are clear and easy for the participants to follow and understand, and that the questions can be answered easily (Hair et al., 2012). A valid online survey enables the data to measure accurately the concepts of interest to the researcher. Fink (2012) notes that the number of people selected should be sufficient and the minimum sample for a pilot test is 10 participants.

Therefore, the researcher conducted the online survey for the pilot study to ensure the validity; the online survey was piloted utilising ten respondents in August 2018 who read and answered the survey on the Qualtrics platform to confirm that the whole survey design was free of faults and appropriate and valuable for the data collection. Thus, to refine and finalise the survey instruments, a number of academic staff in the Information Systems field relevant to this current research were chosen; they also participated in the main online survey, were working at different Saudi universities, and were highly appropriate given the aims of this research.

The link to the online survey was provided to the academic group through social media tools (Facebook, Twitter, LinkedIn and WhatsApp) and the pilot study participants were contacted via professional sources. The participants in the pilot study provided valuable feedback on the survey items' readability and validity, and the layout of the instrument. The feedback from the pilot study indicated the necessity of making all questions mandatory to prevent bias in the survey responses, since a respondent could accidentally miss some sub-questions. The pilot participants suggested organising all questions into parts so that each part was presented on a separate page. Further, the layout of the online survey was changed to ensure a balance between the data required and the length of the survey. The pilot study did not point out any other major issues with the survey.

The survey was then translated into Arabic by a professional translation organisation for those participants who are less conversant in English (see Appendix 3). Brislin (1986) and McGorry (2000) suggested that the research instrument can be translated to review the instrument in its original language and to ensure translation equivalence. The final version of the bilingual survey was then utilised for this study. Subsequently, the main online survey was conducted in Saudi universities from September to December 2018. The online survey was provided via the link to both groups: academic staff and students. A five-point Likert scale was used to measure each item. The scale ranged from 1 to 5 and consisted of the following values: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. The five-point Likert measures the research constructs, shows the differences between the responses, and improves the reliability of the findings (Cronbach, 1951). For instance, each factor consists of several items, and hence, the frequency of each chosen answer can be measured by a five-point Likert.

4.3 Data Preparation and Cleaning

The research instrument was administered to the participants via an online survey platform, Qualtrics, which is a website that offers the facility of survey design. The Qualtrics platform allowed the participants to express their opinions about the range of factors comprising the framework. The online survey consisted of twenty-three sections (participants' demographic information section and items specific to the subject of interest) in which subjects were required to complete all mandatory questions as described in the research methodology chapter. The link to the survey was sent to the academic staff and students in Saudi universities via email and social media tools (Facebook, Twitter, LinkedIn and WhatsApp) to increase the number of responses more than via emails (see Appendix 2). In addition, the sharing of the survey link in students' Blackboard by their lecturers facilitated gathering the data from targeted students. The returned responses provided the data that would be analysed. Details related to the first phase, the online survey to be completed by academic staff, are given below.

4.4 Descriptive Data for Academic Staff

This section presents the descriptive data obtained from the final datasheet used for the purpose of analysis. The presentation of the descriptive data is divided into sections representing each demographic category.

4.4.1 The total response for academic staff

A total of 283 responses were received from academic staff, of which 118 responses were valid and therefore suitable for analysis. Table 8 below shows the response rate for academic staff.

Table 8: Total response for academic staff

Subjects	Response*	Valid	Note
Academic staff	283	118	Only complete questionnaires were considered for the final data analysis. Incomplete questionnaires (started the survey but abandoned it before completion) were discarded from further analysis.

*Based on the number of possible participants in which the link to the online survey was distributed to the academic staff of Saudi universities.

4.4.2 Academic staff by gender

As shown in Figure 13, there was a fairly similar contribution of questionnaires from both male and female staff. Of the 118 participants, 64 (54.2%) were male staff and 54 (45.8%) were female staff.

Gender	Frequency	Percent
Male	64	54.2
Female	54	45.8
Total	118	100.0
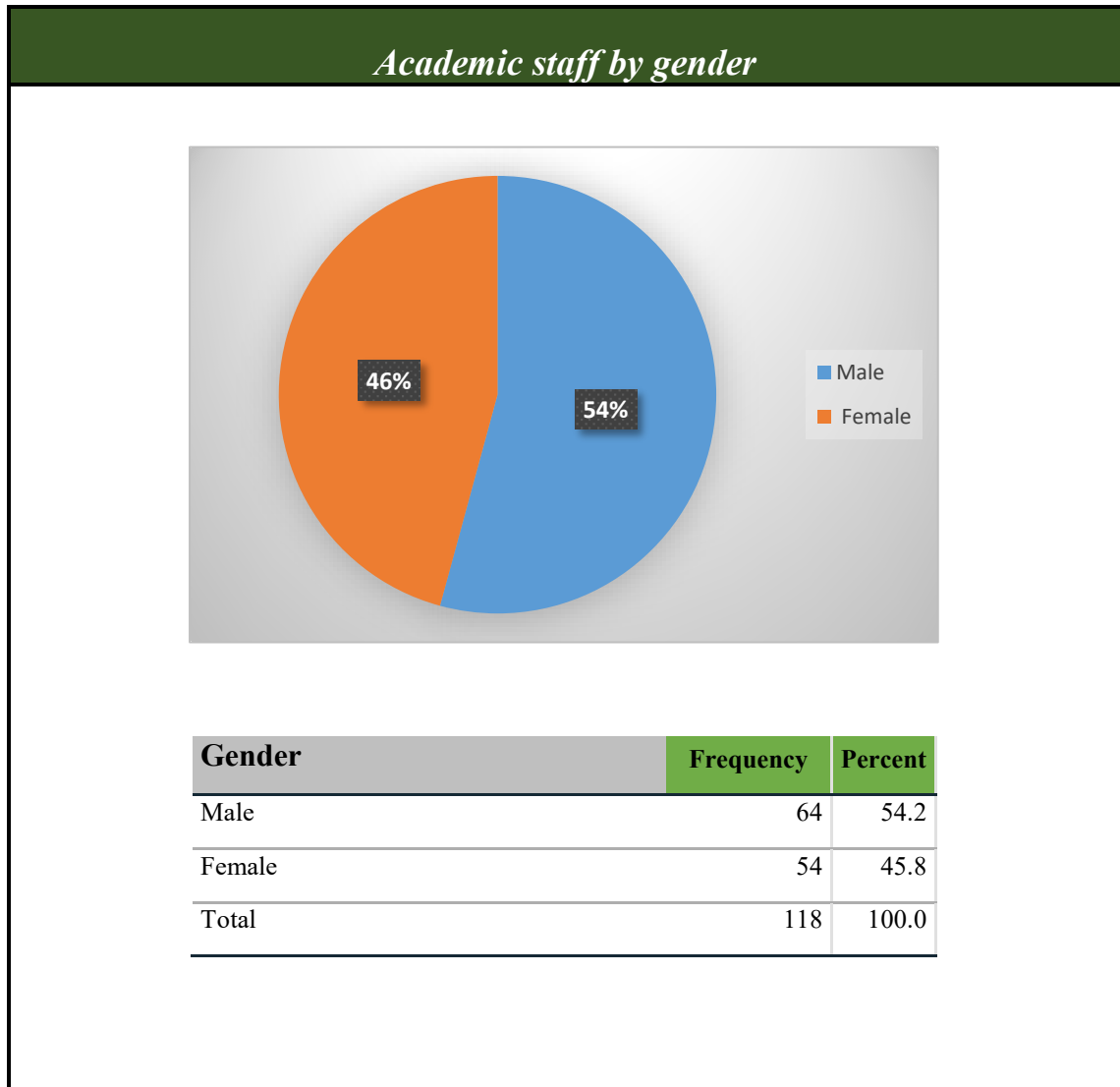
Figure 13: Academic staff by gender

4.4.3 Academic staff by age

Noticeably, more than half of the academic participants were between 31-40 years old (52.5%). Only one participant was younger than 25, while 14.4% of the participants were above the age of 50 or between 25-30 years old (see Figure 14).

Academic staff by age

Age	Frequency	Percent
Under 25	1	.8
25-30	17	14.4
31-40	62	52.5
41-50	21	17.8
Above 50 years old	17	14.4
Total	118	100.0

Figure 14: Academic staff by age

4.4.4 Academic staff by academic rank

Only a few professors completed the survey (6 participants: 5.1%) and more than half were either lecturers or assistant professors (43.2% and 26.3% respectively). Associate professors accounted for 11% of participants, while 14.4% were new academics (instructors) (see Figure 15).

Academic staff by academic rank

Academic Rank	Frequency	Percent
Professor	6	5.1
Associate Professor	13	11.0
Assistant Professor	31	26.3
Lecturer	51	43.2
Instructor	17	14.4
Total	118	100.0
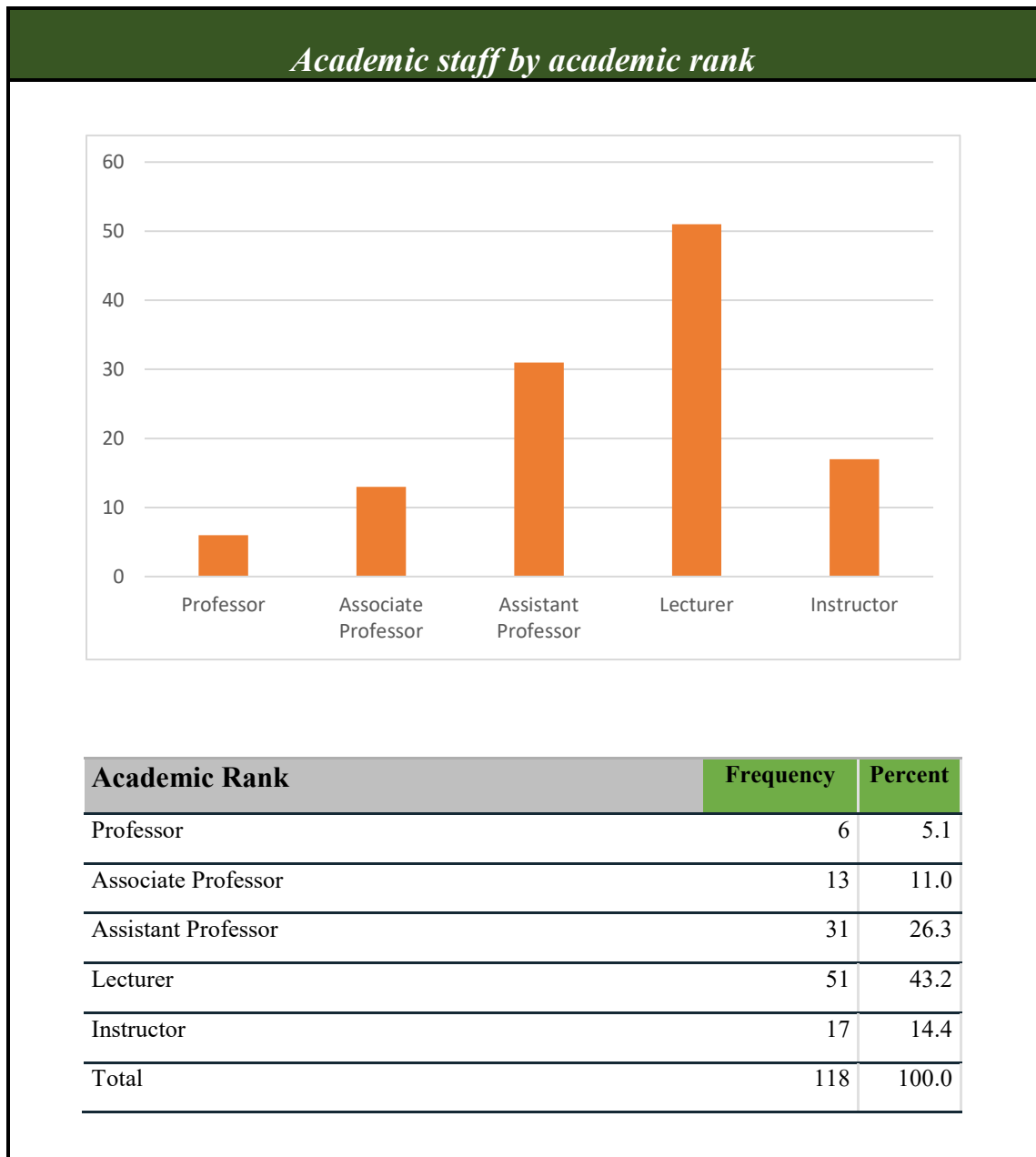
Figure 15: Academic staff by academic rank

4.4.5 Academic staff by administrative role

Most (91.5%) of the participants were faculty members. Only two Deans and four Department Chairpersons participated in the survey, while four others did not disclose their roles (see Figure 16).

Academic staff by administrative role

Administrative role	Frequency	Percent
Associate Dean	2	1.7
Department Chairperson	4	3.4
Faculty member	108	91.5
Other	4	3.4
Total	118	100.0
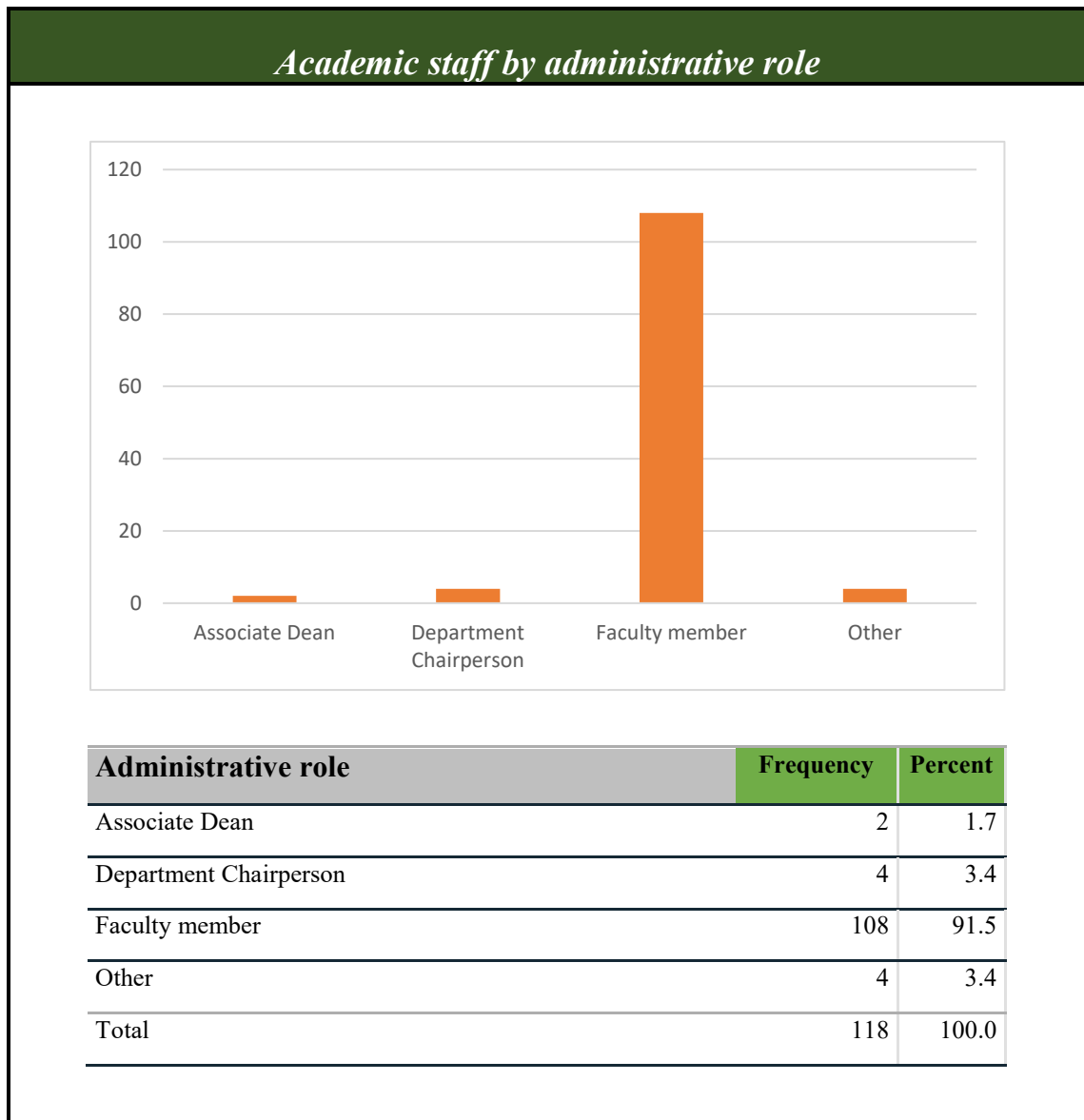
Figure 16: Academic staff by administrative role

4.4.6 Academic staff by academic field

As can be seen from Figure 17, 49 of the participants were from the Humanities & Social Sciences (41.5%) faculties, and 42 (35.6%) were from Applied Sciences (e.g., Engineering, Computing & IT). The third highest field was Medical and Health Science (11.9%). Only 4.2% were from the Natural Science domain, while the remaining participants (6.8%) did not specify their field.

Academic staff by academic field

Academic field	Frequency	Percent
Natural Sciences	5	4.2
Humanities & Social Sciences	49	41.5
Applied Sciences (e.g., Engineering, Computing & IT)	42	35.6
Medical & Health Sciences	14	11.9
Other	8	6.8
Total	118	100.0
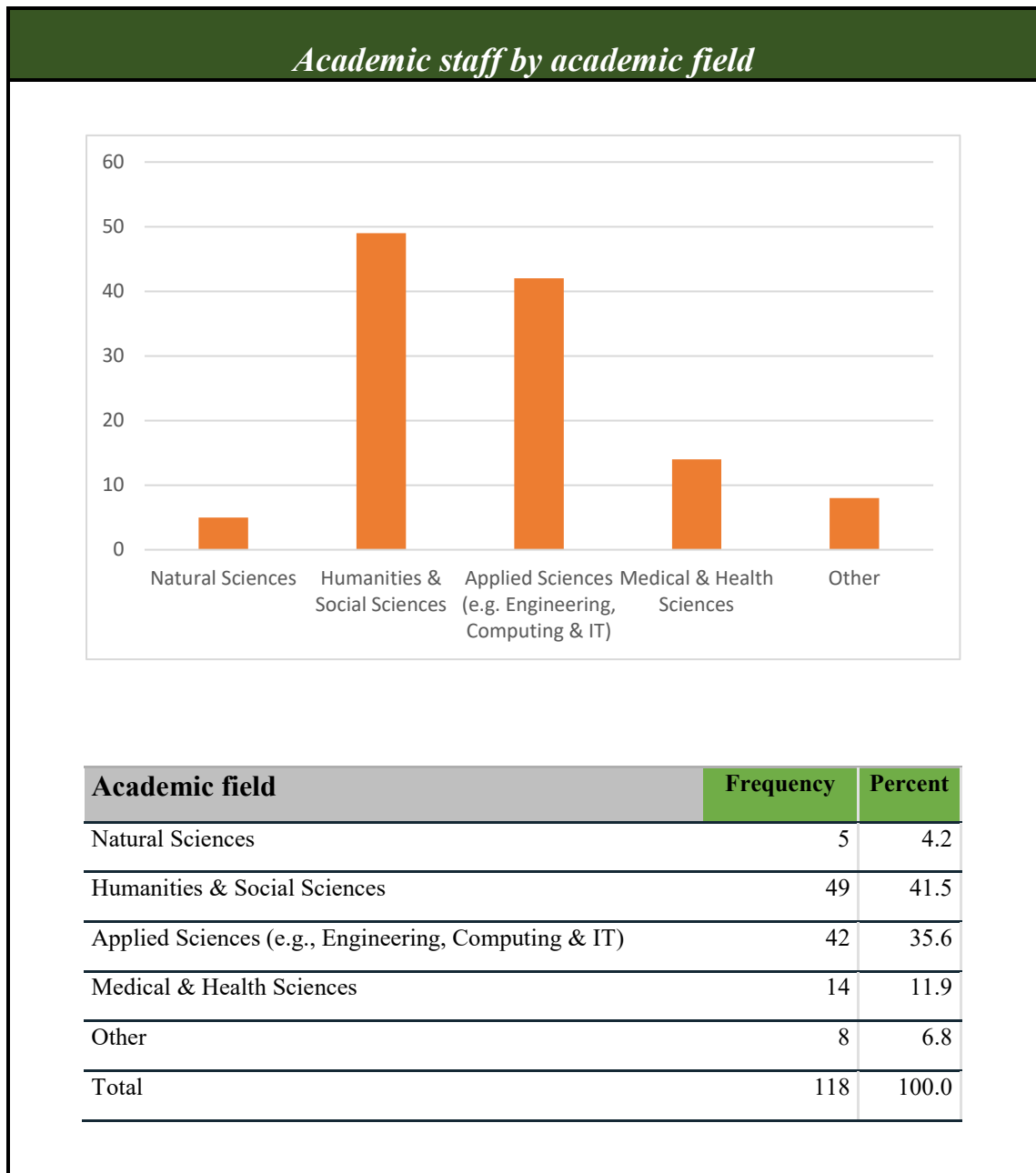
Figure 17: Academic staff by academic field

4.4.7 Academic staff by LMS experience

The demographic data shows that only 13.6% of the participants had never used a Learning Management System (LMS), and around 70% have more than a year of hands-on experience with LMSs. As shown in Figure 18 below, 19 participants (16.1 %) had less than a year's experience with LMS, while 28.8% (34 participants) had between 1-3 years of experience.

Academic staff by LMS experience

LMSs experience	Frequency	Percent
Have not used a Learning Management System (LMS)	16	13.6
Less than a year	19	16.1
1-3 years	34	28.8
3-5 years	22	18.6
More than 5 years	27	22.9
Total	118	100.0
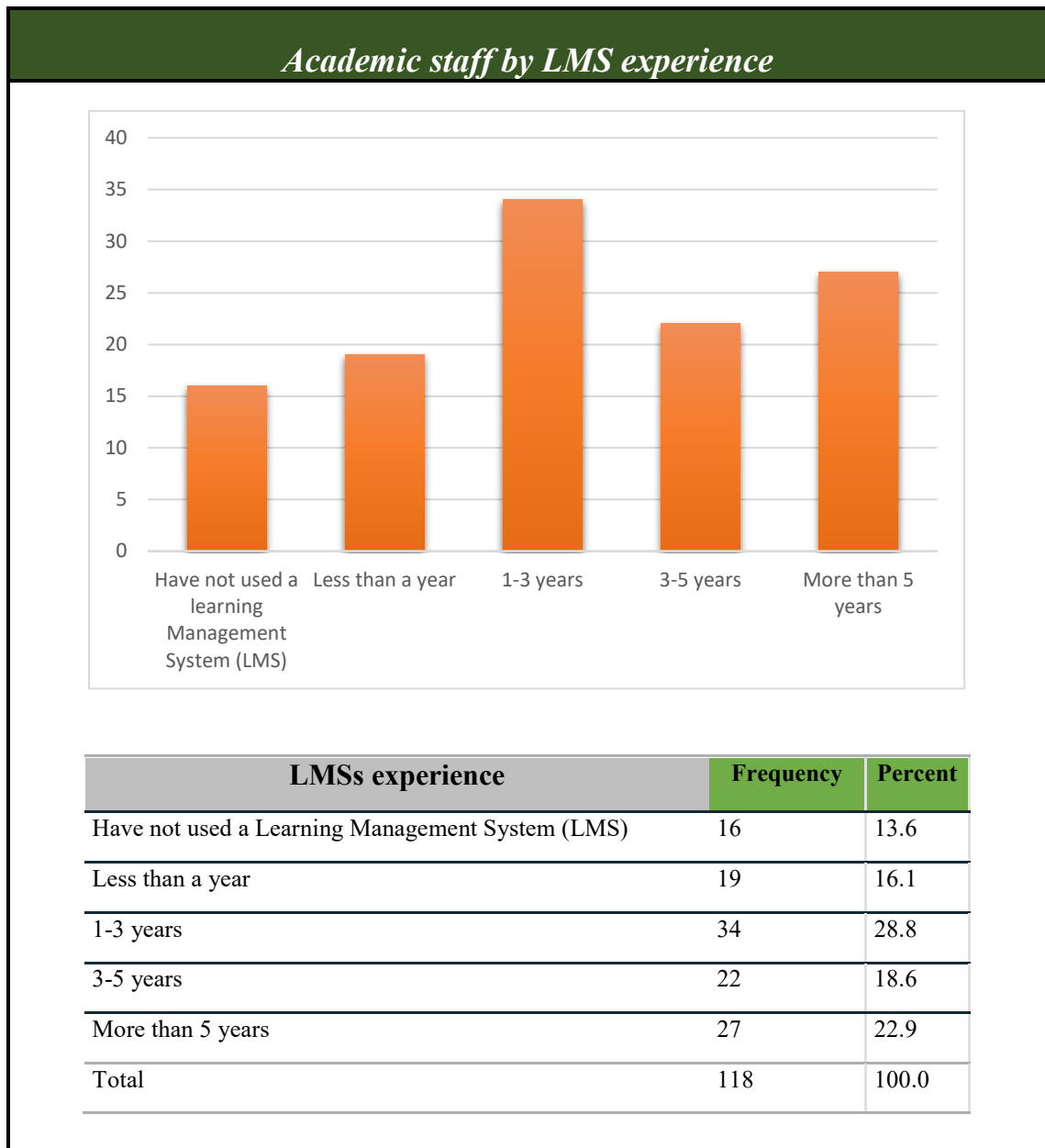
Figure 18: Academic staff by LMS experience

4.4.8 Further descriptive statistics for academic staff

This section presents the mean and standard deviation values for the academic staff survey and several factors were chosen after analysing the data using EFA in section 4.5.1.4. The highest mean and standard deviation of each item is highlighted in yellow; the lowest mean and standard deviation of each item is highlighted in orange (see Tables 9, 10, 11, 12, and 13).

4.4.8.1   Technical Learning Management Systems

Table 9 shows the mean and standard deviation of each item in the Technical Learning Management Systems of E-learning, staff mean scores for nineteen variables are all higher than the mean of 3, ranging from 3.21 to 3.77 on a 5-point Likert scale. The total average mean and standard deviation of all variables were (M = 3.48, SD = 1.06). The results demonstrate that the highest mean and standard deviation (M = 3.77, SD = 1.158) is for "The ICT resources assist me to use computers for work tasks" which is a most significant variable for the Technical Learning Management Systems of E-learning. Conversely, "Easy on-campus access to the Internet" had the lowest mean and standard deviation (M = 3.21, SD = 1.313), and is thus a less significant variable for the Technical Learning Management Systems of E-learning.

Table 9: The mean and standard deviation of the Technical Learning Management Systems

Descriptive Statistics

Variables	Mean	Std. Deviation
The university's E-learning support is good.	3.40	1.103
I can access the required resources for my daily tasks.	3.54	1.018
I can receive technical support from technicians.	3.29	1.110
Accessibility to learning material is provided.	3.50	1.044
Easy on-campus access to the Internet.	3.21	1.313
Information was well structured/presented.	3.63	0.894
E-learning systems are reliable.	3.61	1.074
I found the instructions for using the e-learning components to be sufficiently clear.	3.52	0.976
Easy to use.	3.54	0.949
E-learning systems are available all the time.	3.45	1.083
Browsing speed is satisfactory.	3.24	1.196
I found the course content to be adequate and relevant to the subject.	3.51	0.943
Lecture notes are supplemented with multimedia tools (flash animations, simulations, videos, audios, etc.).	3.44	0.986

I can use the PC and software applications before choosing E-learning-based courses.	3.50	1.204
ICT and practice are provided for E-learning.	3.48	1.145
I am able to interact with fellow students/colleagues via the Web.	3.39	0.970
The course materials were placed online in a timely manner.	3.41	0.948
The ICT resources assist me to use computers for work tasks.	3.77	1.158
It enables me to contact lecturers/students easily.	3.61	1.078
AVG	3.48	1.06

4.4.8.2 Technological Pedagogical Knowledge and Technological Content Knowledge (TPTCK)

Table 10 shows the mean and standard deviation of each item in the TPTCK. Staff mean scores for nine variables are all higher than the mean of 3, ranging from 3.88 to 4.19 on a five-point Likert scale. The total average mean and standard deviation of all variables were (M = 4.00, SD = 0.86). The highest mean and standard deviation (M = 4.19, SD = 0.765) was for "I am able to learn about E-learning technologies that I can apply to teach my subject and facilitate understanding" is a most significant variable for the TPTCK. Conversely, "I can evaluate the appropriateness of new technology for teaching and learning" had the lowest mean and standard deviation (M = 3.88, SD = 0.911), and is therefore a less significant variable for the TPTCK.

Table 10: The mean and standard deviation of the TPTCK

Descriptive Statistics

Variables	Mean	Std. Deviation
I am able to develop class activities and projects involving the use of instructional technologies.	3.97	0.942
I am able to learn about E-learning technologies that I can apply to teach my subject and facilitate understanding.	4.19	0.765
I can prepare a lesson plan requiring the use of instructional technologies.	3.97	0.901
I can use technologies to achieve course objectives.	4.10	0.834
I can choose technologies that enhance my teaching approaches.	3.93	0.884

I can choose technologies that enhance students' classroom learning.	4.00	0.896
I can evaluate the appropriateness of new technology for teaching and learning.	3.88	0.911
I can adapt to the use of the technologies that I am learning about different teaching activities.	3.97	0.857
Using area-specific applications.	4.03	0.768
AVG	4.00	0.86

4.4.8.3   E-learning Management Systems

Table 11 shows the mean and standard deviation of each item in the E-learning Management Systems. Staff mean scores for four variables are all higher than 3, ranging from 3.91 to 4.03 on a five-point Likert scale. The total average mean and standard deviation of all variables were (M = 3.97, SD = 0.82). The results show that the highest mean and standard deviation (M = 4.03, SD = 0.816) is found for "Easy-to-use platform" which is therefore a most significant variable for the E-learning Management Systems. Conversely, "I can interact with other course participants" had the lowest mean and standard deviation, and is thus a less significant variable for the E-learning Management Systems.

Table 11: The mean and standard deviation of the E-learning Management Systems

Descriptive Statistics

Variables	Mean	Std. Deviation
E-learning environment is clear and organised structure of the course and learning material.	3.98	0.806
E-learning environment offers e-mail, chat, newsgroups and/or other communication facilities.	3.97	0.784
Easy-to-use platform.	4.03	0.816
I can interact with other course participants.	3.91	0.877
AVG	3.97	0.82

4.4.8.4   Personal Management Issues

Table 12 shows the mean and standard deviation of each item in the Personal Management Issues, and staff mean scores for four variables ranging from 2.46 to 3.02 on a five-point Likert scale. The total average mean and standard deviation of all variables were (M = 2.85, SD = 1.12). The highest mean and standard deviation was for "Inability to manage all that technology requires" (M = 3.02, SD = 1.147), making it a most significant variable for the Personal Management Issues. Conversely, "Limited knowledge about the innovation" had the lowest mean and standard deviation (M = 2.46, SD = 1.160), and is therefore a less significant variable for the Personal Management Issues.

Table 12: The mean and standard deviation of the Personal Management Issues

Descriptive Statistics

Variables	Mean	Std. Deviation
I am not having enough time to organise myself each day.	2.92	1.059
Inability to manage all that technology requires.	3.02	1.147
The conflict between my interests and my responsibilities.	3.00	1.125
Limited knowledge about the innovation	2.46	1.160
AVG	2.85	1.12

4.4.8.5   E-assessment

Table 13 shows the mean and standard deviation of each item for the E-assessment. Staff mean scores for three variables are all higher than 3, ranging from 3.36 to 3.55 on a 5-point Likert scale. The total average mean and standard deviation of all variables were (M = 3.45, SD = 1.02). The highest mean and standard deviation was for "E-assessment is a practical alternative for paper-based exams" (M = 3.55, SD = 0.948) which makes it a most significant variable for the E-assessment. Conversely, "E-assessment is secure as paper-based assessment" had the lowest mean and standard deviation (M = 3.36, SD = 1.075), and is therefore less significant variable for the E-assessment.

Table 13: The mean and standard deviation of the E-assessment

Descriptive Statistics

Variables	Mean	Std. Deviation
E-assessment is secure as a paper-based assessment.	3.36	1.075
E-assessment is a reliable alternative to paper-based exams.	3.42	1.049
E-assessment is a practical alternative for paper-based exams.	3.55	0.948
AVG	3.45	1.02

4.5 Exploratory Factor Analysis (EFA)

The purpose of this section to analyse the data gathered from the surveys conducted in Saudi universities. This study aims to identify the factors that will ensure the effective implementation of E-learning in the Saudi higher education. This section presents the academic staff's online survey results using statistical methods, followed by the students' online survey results. EFA is then conducted to obtain a clear view of the data in order to determine the outcomes of this research. EFA provides another perspective of the survey outcomes; hence, the researcher used EFA technique for both academic staff and students. To address the issue of sample adequacy, the Statistical Package for the Social Sciences (SPSS) version 25 software was used to determine whether the data was appropriate for factor analysis. These measurements of adequacy include KMO and Bartlett's test, factor extraction, and principal component factor extraction (PCA) with varimax rotation and interpretation. Factor analysis is a data-reduction technique that is used to derive representative variables from a large set of variables and reduce them to a smaller set of new factors (Hair et al., 2010). Figure 19 illustrates how each EFA was conducted.
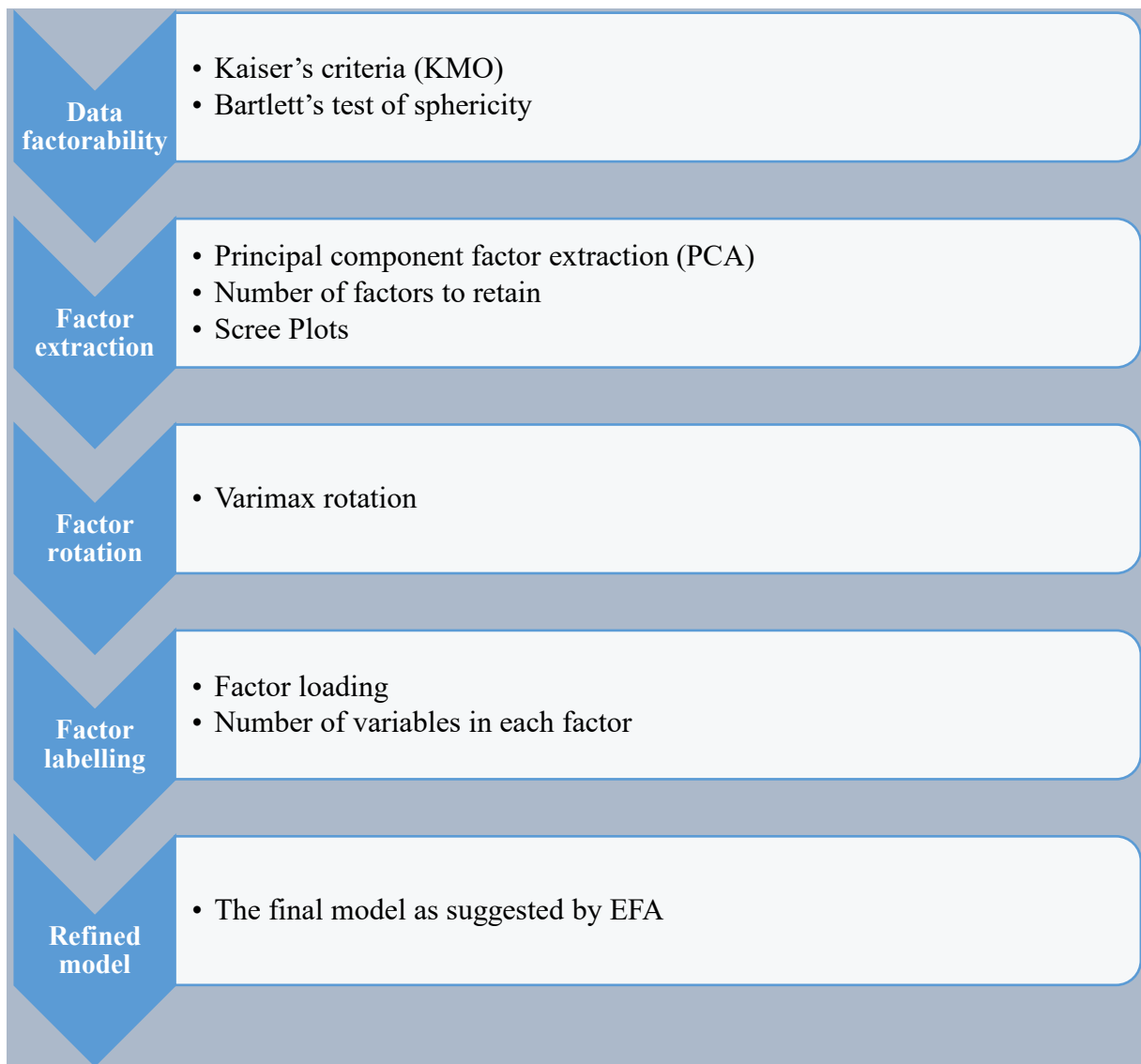
Figure 19: EFA steps for both groups' academic staff and students (prepared by the author)

4.5.1 Exploratory factor analysis of academic staff data

To cluster survey items under factors, Tabachnick and Fidell (2007) pointed out that factorability is further determined using statistical indices. SPSS provides two tests to identify whether factor analysis is appropriate for the data: the Kaiser-Meyer Olkin (KMO) and Bartlett's test of sphericity.

4.5.1.1   KMO and Bartlett's Test for academic staff

For the KMO test, a score of .70 is considered acceptable, while .80 or greater is excellent (Hair et al., 2010; Kaiser, 1974). The KMO result indicated that the academic staff data were factorable (see Table 14). The KMO measured the sampling adequacy value and it was above

.70 (KMO=.73), indicating that the dataset was suitable for factor analysis. Bartlett's test of sphericity was significant ($p < .001$), indicating that all survey data mechanisms and influencers satisfied the criteria for factorability, and were considered suitable for factor analysis (Pallant, 2013).

Table 14: KMO and Bartlett's Test for academic staff factors

KMO	Bartlett's test
.739	$\chi^2 = 7000.200$, df =2628, p < .000

4.5.1.2 Factor extraction for academic staff data

Pallant (2013) and Hair et al. (2010) indicated that there are several techniques such as, eigenvalue and scree plot, for determining the number of factors to retain. According to Pallant (2013, p. 184), factor extraction "involves determining the smallest number of factors that can be used to best represent the interrelationships among the set of variables". The eigenvalue of a factor represents the total variance that it demonstrates; only factors with an eigenvalue greater than 1.0 are retained based on the Kaiser criterion. The total variance explained was utilised to identify the number of components that meet this criterion. The first component explained most of the variance 25.92%, while all five factors together explained the variance of 50.12%. Beavers et al. (2013) pointed out that 50% of variance explained is acceptable for retaining the number of factors. Thus, for this research, the findings indicate that a five-factor solution may be the most suitable, and it was confirmed by an examination of individual factor loadings. The eigenvalues and the total variances explained are shown in Table 15 below.

Table 15: Total variance explained for academic staff factors

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.918	25.915	25.915	18.918	25.915	25.915	12.698	17.394	17.394
2	5.730	7.849	33.764	5.730	7.849	33.764	9.283	12.716	30.111
3	5.064	6.936	40.700	5.064	6.936	40.700	6.284	8.609	38.719
4	3.972	5.441	46.141	3.972	5.441	46.141	4.742	6.496	45.215

| 5 | 2.908 | 3.983 | 50.124 | 2.908 | 3.983 | 50.124 | 3.584 | 4.909 | 50.124 |

Extraction Method: Principal Component Analysis.

Figure 20 below shows the scree plot test that was used to identify only the factors occurring before the break that need to be retained. The scree plot test is based on the researcher's judgment and therefore tends to be subjective (Williams et al., 2010); however, this technique was used to help the researcher to find an accurate list of factors. The scree plot shows that the first component has the highest eigenvalue and the greatest amount of variance. Based on the scree plot and the total variance explained, the initial solution suggests that five factors should be extracted to categorise the academic staff data.
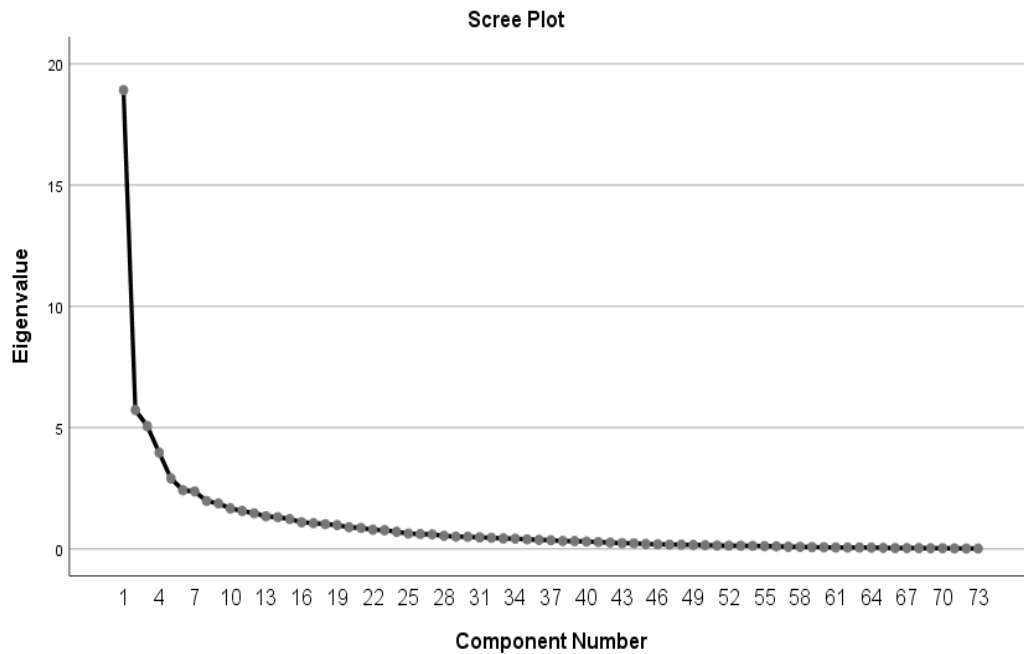
Figure 20: Scree Plot for academic staff factors

4.5.1.3   Factor rotation for academic staff data

To obtain factors, the principal component factor extraction (PCA) method with a varimax rotation was employed. Schmitt (2011) and Pett et al. (2003) pointed out that PCA is one of the most commonly-used component extraction methods for EFA, and is recommended for establishing preliminary EFA solutions. For this research, the varimax method was used as an orthogonal approach to minimise the number of variables by retaining the high loading variables of each factor (Osborne et al., 2008; Pallant, 2013).

The factor loadings presented in Table 16 indicate that all five factors had a number of items that loaded clearly onto them, and include the highest loading for that variable on any component. In addition, all factors were refined by removing non-loading or cross-loading items. For easier interpretation, the researcher set the minimum highest value at 0.6. Velicer and Fava (1998) categorise the loadings exceeding 0.8 as excellent, 0.6 as very good, and 0.4 as very poor, indicative of a loading condition.

Table 16: Factor loadings for academic staff factors

Rotated Component Matrix					
Variables	**Component**				
	1	2	3	4	5
The university's E-learning support is good.	.800				
I can access the required resources for my daily tasks.	.777				
I can receive technical support from technicians.	.766				
Accessibility to learning material is provided.	.717				
Easy on-campus access to the Internet.	.716				
Information was well structured/presented.	.711				
E-learning systems are reliable.	.682				
I found the instructions for using the e-learning components to be sufficiently clear.	.669				
Easy to use.	.663				
E-learning systems are available all the time.	.661				
Browsing speed is satisfactory.	.649				
I found the course content to be adequate and relevant to the subject.	.648				
Lecture notes are supplemented with multimedia tools (flash animations, simulations, videos, audios, etc.).	.632				
I can use the PC and software applications before choosing E-learning-based courses.	.629				
ICT and practice are provided for E-learning.	.628				
I am able to interact with fellow students/colleagues via the Web.	.623				
The course materials were placed online in a timely manner.	.622				
The ICT resources assist me to use computers for work tasks.	.617				
It enables me to contact lecturers/students easily.	.615				
I am able to develop class activities and projects involving the use of instructional technologies.		.815			
I am able to learn about E-learning technologies that I can apply to teach my subject and facilitate understanding.		.786			

I can prepare a lesson plan requiring the use of instructional technologies.		.775			
I can use technologies to achieve course objectives.		.772			
I can choose technologies that enhance my teaching approaches.		.771			
I can choose technologies that enhance students' classroom learning.		.764			
I can evaluate the appropriateness of new technology for teaching and learning.		.745			
I can adapt to the use of the technologies that I am learning about different teaching activities.		.719			
Using area-specific applications.		.659			
E-learning environment is a clear and organised structure of the course and learning material.			.768		
E-learning environment offers e-mail, chat, newsgroups and/or other communication facilities.			.758		
Easy-to-use platform.			.758		
I can interact with other course participants.			.742		
I am not having enough time to organise myself each day.				.798	
Inability to manage all that technology requires.				.759	
The conflict between my interests and my responsibilities.				.714	
Limited knowledge about the innovation				.601	
E-assessment is secure as a paper-based assessment.					.828
E-assessment is a reliable alternative to paper-based exams.					.799
E-assessment is a practical alternative for paper-based exams.					.696

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.5.1.4 Factor labelling of academic staff data

The purpose of the analysis is to generate new factors and label them based on the variables that were highly loaded on them. The EFA of the thirty-nine variables for E-learning academic staff effectiveness revealed five factors. The high loading on each component enables the researcher to label the variables loaded on that factor. Variables loaded on the first factor are strongly related to the technical learning management systems of E-learning in Saudi higher education. This was labelled "Technical Learning Management Systems". The first factor focused on the ways that academic staff interact with E-learning systems, including their responses to the overall design of the system. Following this, the second factor reflected "TPTCK" lecturer's knowledge by using a specific technology and understanding how certain technologies can

change teaching and learning practices. The third factor is "E-learning Management Systems" that provides communication tools and facilitates the interaction with other course participants. The fourth factor related to "Personal Management Issues" and its influence on the use of E-learning systems. Finally, the fifth factor, labelled "E-assessment", indicates the attitude of academic staff toward E-assessment.

Variables	Factor Loading	Factor label
The university's E-learning support is good.	.800	
I can access the required resources for my daily tasks.	.777	
I can receive technical support from technicians.	.766	
Accessibility to learning material is provided.	.717	
Easy on-campus access to the Internet.	.716	
Information was well structured/presented.	.711	
E-learning systems are reliable.	.682	
I found the instructions for using the e-learning components to be sufficiently clear.	.669	**Technical Learning Management Systems**
Easy to use.	.663	
E-learning systems are available all the time.	.661	
Browsing speed is satisfactory.	.649	
I found the course content to be adequate and relevant to the subject.	.648	
Lecture notes are supplemented with multimedia tools (flash animations, simulations, videos, audios, etc.).	.632	
I can use the PC and software applications before choosing E-learning-based courses.	.629	
ICT and practice are provided for E-learning.	.628	
I am able to interact with fellow students/colleagues via the Web.	.623	
The course materials were placed online in a timely manner.	.622	
The ICT resources assist me to use computers for work tasks.	.617	
It enables me to contact lecturers/students easily.	.615	

Variables	Factor Loading	Factor label
I am able to develop class activities and projects involving the use of instructional technologies.	.815	
I am able to learn about E-learning technologies that I can apply to teach my subject and facilitate understanding.	.786	
I can prepare a lesson plan requiring the use of instructional technologies.	.775	
I can use technologies to achieve course objectives.	.772	

I can choose technologies that enhance my teaching approaches.	.771	**TPTCK**
I can choose technologies that enhance students' classroom learning.	.764	
I can evaluate the appropriateness of new technology for teaching and learning.	.745	
I can adapt to the use of the technologies that I am learning about different teaching activities.	.719	
Using area-specific applications.	.659	

Variables	Factor Loading	Factor label
E-learning environment is a clear and organised structure of the course and learning material.	.768	**E-learning Management Systems**
E-learning environment offers e-mail, chat, newsgroups and/or other communication facilities.	.758	
Easy-to-use platform.	.758	
I can interact with other course participants.	.742	

Variables	Factor Loading	Factor label
I am not having enough time to organise myself each day.	.798	**Personal Management Issues**
Inability to manage all that technology requires.	.759	
The conflict between my interests and my responsibilities.	.714	
Limited knowledge about the innovation	.601	

Variables	Factor Loading	Factor label
E-assessment is secure as a paper-based assessment.	.828	**E-assessment**
E-assessment is a reliable alternative to paper-based exams.	.799	
E-assessment is a practical alternative for paper-based exams.	.696	

4.5.1.5   Reliability statistics for academic staff data

Cronbach (1951) proposed that to measure scale reliability, the coefficient alpha score is used to determine the reliability of a construct. The desired score for reliability is 0.70 or above to state that the scale items are considered reliable (Nunnally et al., 1967). The Cronbach alpha of the data for academic staff questions ranged from 0.942 to 0.842. The highest reliability was 0.942 for Technical Learning Management Systems, while the lowest internal consistency was

0.842 for E-assessment factors. Therefore, the overall reliability score for the survey in this study utilising the Cronbach's alpha was 0.923, indicating that the internal consistency of all the constructs confirms the measurement model. Similarity, Mallery and George (2003) and Straub et al. (2004) pointed out that the reliability test > 0.9 is excellent, > 0.8 is good, > 0.7 is acceptable, > 0.6 is questionable, > 0.5 is poor and < 0.5 is unacceptable. The reliability statistics of the survey for academic staff are presented in Table 17.

Table 17: Reliability statistics of the survey for academic staff

Factor labels	Number of items	Cronbach's Alpha α
Academic staff		
Technical Learning Management Systems	19	.942
TPTCK	9	.932
E-learning Management Systems	4	.921
Personal Management Issues	4	.850
E-assessment	3	.842
Overall reliability score	39	.923

The second stage in the collection of quantitative data involved an online survey of university students.

4.6 Descriptive Data for Students

This section presents the findings from the descriptive data analysis of the student survey data. The presentation of the descriptive data is divided into sections representing each demographic category.

4.6.1 Total number of student responses

Of the 1421 responses received from students, 586 were valid and therefore suitable for analysis. Table 18 below shows the response rate.

Table 18: Total number of student responses

Subjects	Response*	Valid	Note
Students	1421	586	Only complete questionnaires were accepted for the final data analysis. Incomplete ones (generally started the survey, but terminated before completion) were excluded.

*Based on the number of potential student participants in Saudi universities who received the link to the online survey.

4.6.2 Students by gender

Similar to the findings from the academic staff data, the students' data shows that there is almost equal distribution between male and female students. As shown below in Figure 21, the online survey was completed by 300 male students (51.19%) and 286 female students (48.81%).

Gender	Frequency	Percent
Male	300	51.19
Female	286	48.81
Total	586	100.0
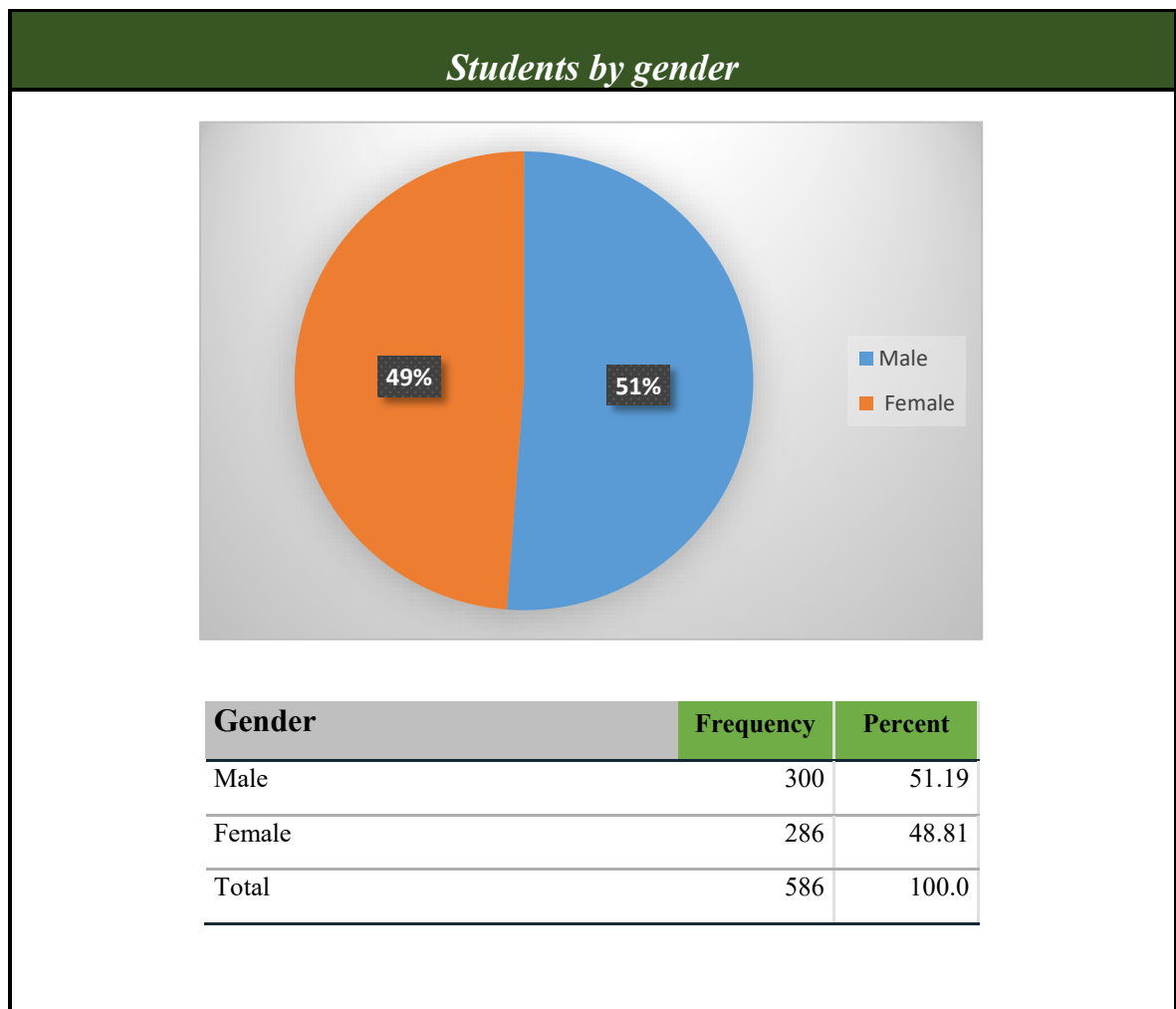
Figure 21: Students by gender

4.6.3 Students by age

Most of the participants were under 25 years old, which was expected as the survey was sent to mostly undergraduates. The second-largest percentage comprised students who were between 25-30 years old (11.1%). Only 1% were older than 40, and 3.1% were aged between 31 and 40 (see Figure 22).

Age	Frequency	Percent
Under 25	497	84.8
25-30	65	11.1
31-40	18	3.1
41-50	6	1.0
Total	586	100.0
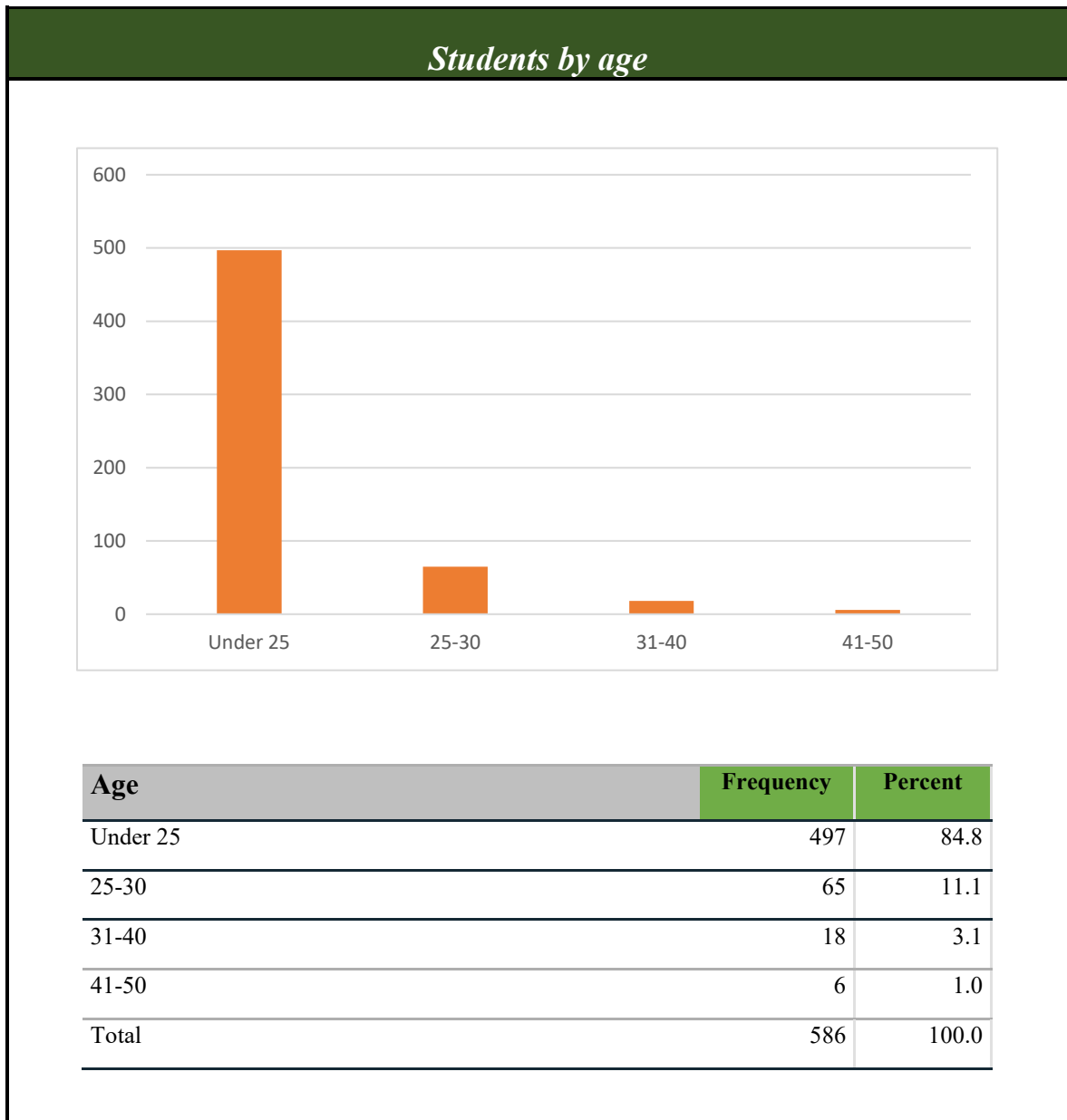
Figure 22: Students by age

4.6.4 Students by academic fields

Most of the academic fields were represented: 28.8% of the participants were from Humanities & Social Sciences and 16% were from Applied Sciences (e.g., Engineering, Computing & IT). Further, 8% of the students were doing Natural Science studies and 4.6% indicated that they were enrolled in Health and Medical courses. Of the participants, 42.5% did not indicate their academic fields (see Figure 23).

Academic field	Frequency	Percent
Natural Sciences	47	8.0
Humanities & Social Sciences	169	28.8
Applied Sciences (e.g., Engineering, Computing & IT)	94	16.0
Medical & Health Sciences	27	4.6
Other	249	42.5
Total	586	100.0
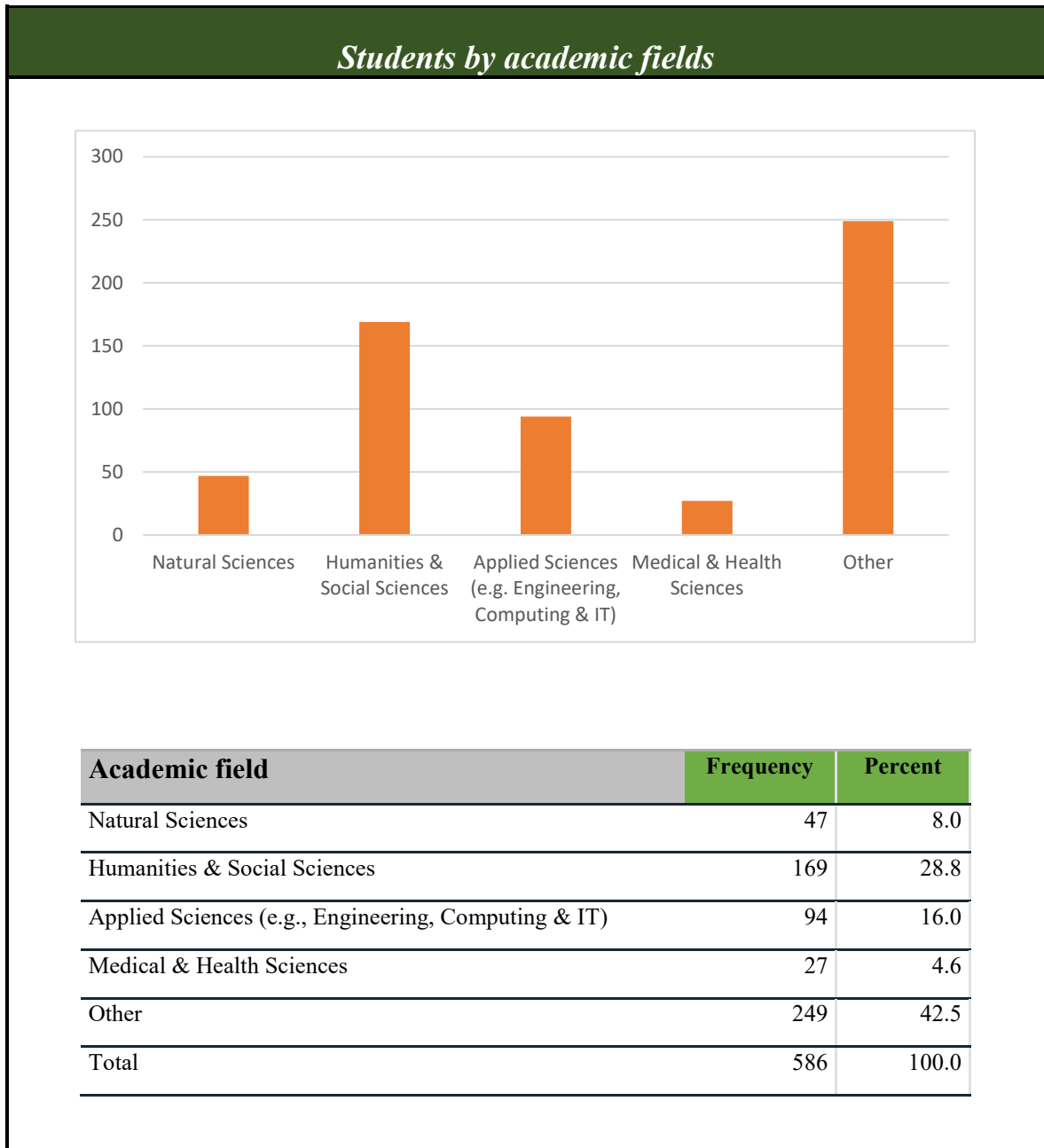
Figure 23: Students by academic field

4.6.5 Students by LMS experience

Almost a third of the student participants had never used an LMS (28.7%). Another third had less than a year of experience (33.1%), while 29.5% had used an LMS for 1 to 3 years. Only a few participants had between 3-5 years of experience and more than 5 years of experience with LMS (5.6% and 3.1% respectively) (See Figure 24).

LMS experience	Frequency	Percent
Have not used a Learning Management System (LMS)	168	28.7
Less than a year	194	33.1
1-3 years	173	29.5
3-5 years	33	5.6
More than 5 years	18	3.1
Total	586	100.0
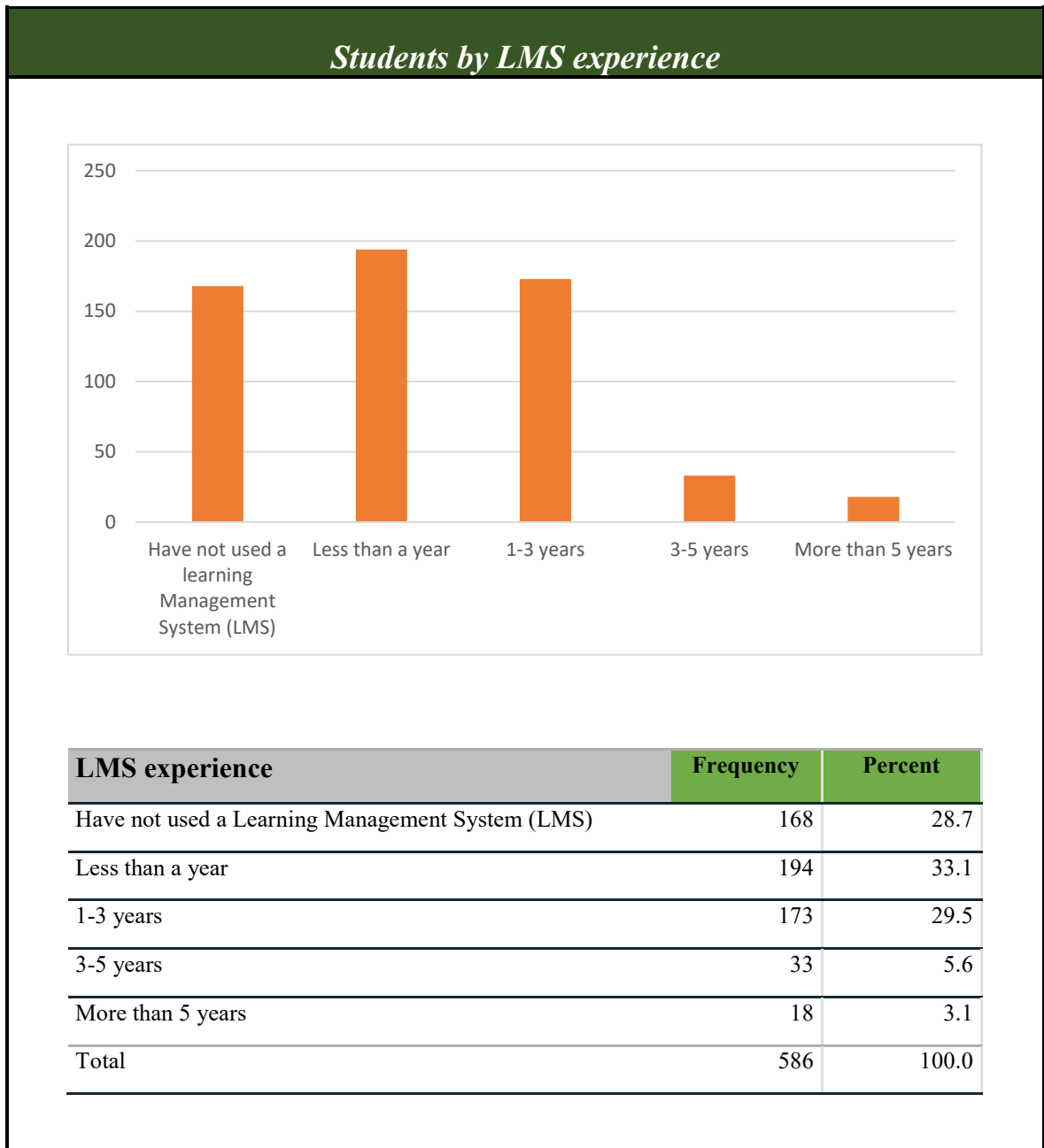
Figure 24: Students' LMS experience

4.6.6 Other statistics for student data

This section presents the means and standard deviations for student survey data. Several factors were chosen after analysing the data using EFA (section 4.6.7.4). The highest mean and standard deviation of each item are highlighted in yellow; the lowest mean and standard deviation of each item are highlighted in orange (see Tables 19, 20, and 21).

4.6.6.1   Technical Learning Management Systems

Table 19 shows the mean and standard deviation of each item pertaining to Technical Learning Management Systems. Students' mean scores for nineteen variables range from 2.82 to 3.73 on a five-point Likert scale. The total average mean and standard deviation of all variables were (M = 3.39, SD = 1.06). Similar mean scores emerged for "I found it simple to learn" (M = 3.73, SD = 0.987) and "E-learning systems are reliable" (M = 3.73, SD = 0.916) which is the most significant variable for the Technical Learning Management Systems. Conversely, "Browsing speed is satisfactory" had the lowest mean and standard deviation (M = 2.82, SD = 1.212), and is thus less significant variable for the Technical Learning Management Systems.

Table 19: The mean and standard deviation of the Technical Learning Management Systems – Student survey

Descriptive Statistics

Variables	Mean	Std. Deviation
I found it simple to learn.	3.73	0.987
Easy to use.	3.60	1.070
Information was well structured/presented.	3.56	0.949
I found the instructions for using the E-learning components to be sufficiently clear.	3.29	1.040
I perceive the E-learning design to be good.	3.48	1.084
I can access the required resources for my daily tasks.	3.53	0.977
Accessibility to learning material is provided.	3.72	0.983
ICT and practice are provided for E-learning.	3.55	1.003
I found the course content to be adequate and relevant to the subject.	3.49	0.998
The university's E-learning support is good.	3.28	1.105

I enjoy using E-learning related technologies.	3.30	1.068
I can contact the lecturers/students easily.	3.14	1.135
The screen design pleasant.	3.18	1.053
The course materials were placed online in a timely manner.	3.22	1.140
I can say that they are available all the time.	3.16	1.182
I am able to interact with fellow students/colleagues via the Web.	3.04	1.113
Browsing speed is satisfactory.	2.82	1.212
The ICT resources assist me to use computers for work tasks.	3.68	1.040
E-learning systems are reliable.	3.73	0.916
AVG	3.39	1.06

4.6.6.2   Students' Readiness

Table 20 shows the mean and standard deviation of each item for Students' Readiness. Students' mean scores for seventeen variables are higher than 3, ranging from 3.33 to 4.05 on a 5-point Likert scale. The total average mean and standard deviation of all variables were (M = 3.62, SD = 1.04). The highest mean and standard deviation (M = 4.05, SD = 0.918) is found for "I am able to learn at anytime and anywhere (e.g., at the university, at home)" is a most significant variable for Students' Readiness. Conversely, the lowest mean and standard deviation were for "I am able to complete my work even when there are distractions at home (e.g., television, children etc.)" (M = 3.33, SD = 1.164), and is thus a less significant variable for the Students' Readiness factor.

Table 20: The mean and standard deviation of the Students' Readiness

Descriptive Statistics

Variables	Mean	Std. Deviation
I learn at my pace and use learning strategies that work for me.	3.83	0.980
Support students' cooperative learning and group work.	3.58	1.063
E-learning increases my knowledge and to control my success (e.g., via tests).	3.82	1.006
E-learning improves my interaction with my lecturer.	3.56	1.084

Offering a variety of communication tools for exchanging information with peer students (e.g., e-mail, chat, newsgroups).	3.67	1.016
I can access immediate feedback.	3.69	1.024
Peer learning enables students to have personal contact with their peers.	3.61	1.091
Interaction increases my motivation to learn.	3.58	1.046
Peer learning enables an easy and fast exchange of information and knowledge with peer students.	3.61	0.996
I am able to schedule time to provide timely responses to other students and/or lecturer.	3.55	0.978
I am able to learn at anytime and anywhere (e.g., at the university, at home).	4.05	0.918
I am able to learn in a group situation and cooperate with other learners (e.g., through group activities, discussions, etc.).	3.48	1.104
I am able to take other courses delivered via e-learning.	3.60	1.088
I am able to complete my work even when there are online distractions (e.g., responding to friends' emails, surfing websites).	3.47	1.099
I am able to complete my work even when there are distractions at home (e.g., television, children, etc.).	3.33	1.164
I can express myself clearly through my writing (e.g., tone, emotions, and humour).	3.45	1.080
I can ask questions and make comments in writing that is clear and succinct.	3.64	0.961
AVG	3.62	1.04

4.6.6.3   Personal Management Issues

Table 21 shows the mean and standard deviation of each item for Personal Management Issues. Students' mean scores for four variables range from 3.19 to 3.51 on a five-point Likert scale. The total average mean and standard deviation of all variables are (M = 3.34, SD = 1.09). The highest mean and standard deviation (M = 3.51, SD = 1.116) was for "The conflict between my interests and my responsibilities", indicating that it is a most significant variable for the Personal Management Issues. On the other hand, "I spend time working with non-academic problems related to technology" had the lowest mean and standard deviation (M = 3.19, SD = 1.029), and is thus a less significant variable for the Personal Management Issues.

Table 21: The mean and standard deviation of the Personal Management Issues– Student survey

Descriptive Statistics

Variables	Mean	Std. Deviation
Inability to manage all that technology requires.	3.40	1.072
The conflict between my interests and my responsibilities.	3.51	1.116
I am not having enough time to organise myself each day.	3.28	1.140
I spend time working with non-academic problems related to technology.	3.19	1.029
AVG	3.34	1.09

4.6.7 Exploratory factor analysis of student data

To cluster survey items under factors, Tabachnick and Fidell (2007) pointed out that factorability is further determined by utilising statistical indicators. SPSS software provides two tests to identify whether factor analysis is appropriate for the data: the Kaiser-Meyer Olkin (KMO) and Bartlett's test of sphericity.

4.6.7.1 KMO and Bartlett's Test for student data

For the students' survey data, EFA confirmed factorability with a KMO test result of 0.924 which is above 0.7 (Hair et al., 2010; Kaiser, 1974), and Bartlett's test of sphericity was significant (p <.001), indicating that factor analysis can be applied to the data (see Table 22).

Table 22: KMO and Bartlett's Test for student data factors

KMO	Bartlett's test
.924	$\chi^2 = 17788.786$, df =2016, p < .000

4.6.7.2 Factor extraction for student data

Based on the eigenvalue rule and Kaiser criterion, only three factors with an eigenvalue greater than 1.0 were retained. As seen in Table 23, the total variance explained showed that the first component with the variance 24.37% had an eigenvalue over 15.59%, while all three factors

together explained 36.35% variance with an eigenvalue of 3.02%. For components analysis, some researchers have reported that 30% of the variance is acceptable with a high number of variables and a minimum sample size of 400 cases is required (Conway & Huffcutt, 2003; Lee & Comrey, 1979; Lloret-Segura et al., 2014). However, in this section, each factor includes more than three variables and the sample size is 586. Therefore, we conclude that the 36.35% of the total variance explained is acceptable.

Table 23: total variance explained for student data factors

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.597	24.371	24.371	15.597	24.371	24.371	10.157	15.870	15.870
2	4.643	7.255	31.625	4.643	7.255	31.625	9.812	15.331	31.201
3	3.023	4.724	36.349	3.023	4.724	36.349	3.295	5.149	36.349

Extraction Method: Principal Component Analysis.

Figure 25 below depicts the scree plot. As mentioned above regarding the EFA of academic staff data, the scree plot test was utilised to identify only the factors before the break and determine those that should be retained according to their eigenvalues (Williams et al., 2010). The scree plot showed an elbow after three factors; based on the eigenvalue and the total variance explained, three factors can be extracted. Hence, the student data items are categorised under three factors.
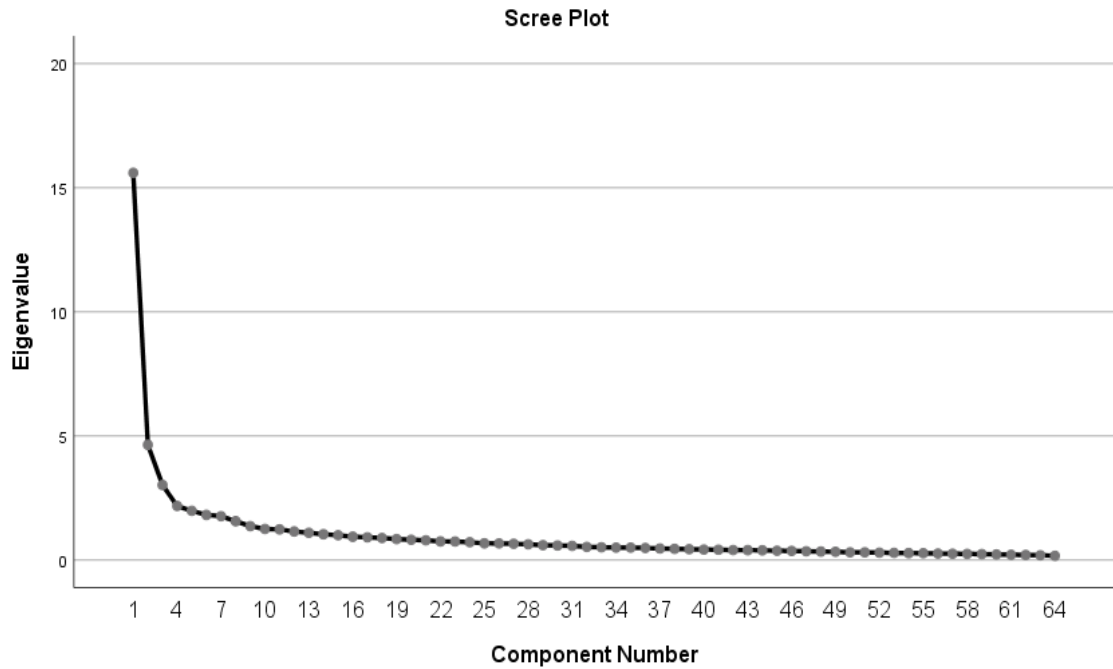
Figure 25: Scree plot for student data factors

4.6.7.3   Factor rotation for student data

As shown in Table 24, principal component factor extraction (PCA) with a varimax rotation was employed in this section. The factor loadings indicated that all three factors had a number of items that loaded onto them. Therefore, the researcher set the minimum highest value at .50 or higher according to (Osborne et al., 2008). The factor loadings listed below indicate acceptable convergent validity.

Table 24: Factor loadings for student data factors

Rotated Component Matrix			
Variables	**Component**		
	1	**2**	**3**
I found it simple to learn.	.680		
Easy to use.	.671		
Information was well structured/presented.	.649		
I found the instructions for using the E-learning components to be sufficiently clear.	.633		
I perceive the E-learning design to be good.	.625		
I can access the required resources for my daily tasks.	.619		
Accessibility to learning material is provided.	.617		
ICT and practice are provided for E-learning.	.609		

I found the course content to be adequate and relevant to the subject.	.608		
The university's E-learning support is good.	.602		
I enjoy using E-learning related technologies.	.591		
I can contact the lecturers/students easily.	.581		
The screen design pleasant.	.571		
The course materials were placed online in a timely manner.	.563		
I can say that they are available all the time.	.559		
I am able to interact with fellow students/colleagues via the Web.	.550		
Browsing speed is satisfactory.	.544		
The ICT resources assist me to use computers for work tasks.	.536		
E-learning systems are reliable.	.506		
I learn at my pace and use learning strategies that work for me.		.730	
Support students' cooperative learning and group work.		.724	
E-learning increases my knowledge and to control my success (e.g., via tests).		.702	
E-learning improves my interaction with my lecturer.		.699	
Offering a variety of communication tools for exchanging information with peer students (e.g., e-mail, chat, newsgroups).		.682	
I can access immediate feedback.		.678	
Peer learning enables students to have personal contact with their peers.		.673	
Interaction increases my motivation to learn.		.664	
Peer learning enables an easy and fast exchange of information and knowledge with peer students.		.662	
I am able to schedule time to provide timely responses to other students and/or lecturer.		.619	
I am able to learn at anytime and anywhere (e.g., at the university, at home).		.594	
I am able to learn in a group situation and cooperate with other learners (e.g., through group activities, discussions, etc.).		.586	
I am able to take other courses delivered via e-learning.		.567	
I am able to complete my work even when there are online distractions (e.g., responding to friends' emails, surfing websites).		.535	
I am able to complete my work even when there are distractions at home (e.g., television, children, etc.).		.534	
I can express myself clearly through my writing (e.g., tone, emotions, and humour).		.532	
I can ask questions and make comments in writing that is clear and succinct.		.523	
Inability to manage all that technology requires.			.751

The conflict between my interests and my responsibilities.			.730
I am not having enough time to organise myself each day.			.725
I spend time working with non-academic problems related to technology.			.690

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

4.6.7.4 Factor labelling of student data

In this section, the new factors are labelled based on the variables with high loadings. The general aim of the analysis is to generate new factors and label them based on the variables that were highly loaded onto them. The high loading on each component enables the researcher to label the variables loaded on that factor. The EFA of the forty variables under E-learning students' effectiveness revealed three factors. Hence, the three new factors have been labelled as follows.

Variables loaded on the first factor are strongly related to the "Technical Learning Management Systems" that are needed to provide high-quality E-learning systems and offer permanent technical support from technicians. The second factor pertained to "Students' Readiness" to ascertain the extent to which E-learning gives them opportunities to examine the knowledge they have absorbed and to indicate the learning process that assists students to express their attitudes, feelings, experiences, actions, beliefs, and the facilitation of collaborative learning. Finally, the third factor indicated "Personal Management Issues" to determine the various needs and preferences of the learner, including the learning style and technical skills needed to solve the problems that occur when the learner accesses an E-learning system.

Variables	Factor Loading	Factor label
I found it simple to learn.	.680	
Easy to use.	.671	
Information was well structured/presented.	.649	
I found the instructions for using the E-learning components to be sufficiently clear.	.633	
I perceive the E-learning design to be good.	.625	
I can access the required resources for my daily tasks.	.619	
Accessibility to learning material is provided.	.617	
ICT and practice are provided for E-learning.	.609	

I found the course content to be adequate and relevant to the subject.	.608	**Technical Learning Management Systems**
The university's E-learning support is good.	.602	
I enjoy using E-learning related technologies.	.591	
I can contact the lecturers/students easily.	.581	
The screen design pleasant.	.571	
The course materials were placed online in a timely manner.	.563	
I can say that they are available all the time.	.559	
I am able to interact with fellow students/colleagues via the Web.	.550	
Browsing speed is satisfactory.	.544	
The ICT resources assist me to use computers for work tasks.	.536	
E-learning systems are reliable.	.506	

Variables	**Factor Loading**	**Factor label**
I learn at my pace and use learning strategies that work for me.	.730	**Students' Readiness**
Support students' cooperative learning and group work.	.724	
E-learning increases my knowledge and to control my success (e.g., via tests).	.702	
E-learning improves my interaction with my lecturer.	.699	
Offering a variety of communication tools for exchanging information with peer students (e.g., e-mail, chat, newsgroups).	.682	
I can access immediate feedback.	.678	
Peer learning enables students to have personal contact with their peers.	.673	
Interaction increases my motivation to learn.	.664	
Peer learning enables an easy and fast exchange of information and knowledge with peer students.	.662	
I am able to schedule time to provide timely responses to other students and/or lecturer.	.619	
I am able to learn at anytime and anywhere (e.g., at the university, at home).	.594	
I am able to learn in a group situation and cooperate with other learners (e.g., through group activities, discussions, etc.).	.586	

I am able to take other courses delivered via e-learning.	.567	
I am able to complete my work even when there are online distractions (e.g., responding to friends' emails, surfing websites).	.535	
I am able to complete my work even when there are distractions at home (e.g., television, children, etc.).	.534	
I can express myself clearly through my writing (e.g., tone, emotions, and humour).	.532	
I can ask questions and make comments in writing that is clear and succinct.	.523	

Variables	Factor Loading	Factor label
Inability to manage all that technology requires.	.751	**Personal Management Issues**
The conflict between my interests and my responsibilities.	.730	
I am not having enough time to organise myself each day.	.725	
I spend time working with non-academic problems related to technology.	.690	

4.6.7.5 Reliability statistics for students data

In was any research, it is essential to ensure internal consistency between the research constructs in order to validate its reliability. According to Nunnally et al. (1967, p. 206), reliability is "the extent to which measurements are repeatable and that any random influence which tends to make measurements different from occasion to occasion is a source of measurement error". The Cronbach alpha α was measured for the three improved factors after factor analysis. The Cronbach alpha of the data for students' questions ranged from 0.913 to 0.805. The highest reliability result was 0.913 for the Technical Learning Management Systems, while the lowest internal consistency was 0.805 for Personal Management Issues.

The overall reliability score for the survey in this study utilising the Cronbach's alpha was 0.927, indicating that the internal consistency reliability for all the constructs is excellent, thereby validating the measurement model. Mallery and George (2003) pointed out that for the reliability test, > 0.9 is excellent, > 0.8 is good, > 0.7 is acceptable, > 0.6 is questionable, > 0.5 is poor and < 0.5 is unacceptable. The reliability statistics for the student survey are presented in Table 25.

Table 25: Reliability statistics for the student survey

Factor labels	Number of items	Cronbach's Alpha α
Students		
Technical Learning Management Systems	19	.913
Students' Readiness	17	.920
Personal Management Issues	4	.805
Overall reliability score	40	.927

4.7 Summary of Online Survey Findings

This section presents the findings from the data obtained by the EFA for both groups of participants: academic staff and students. There was no statistically significant difference between these groups in their responses to the factors influencing the effective implementation of E-learning. The online survey findings offer a descriptive summary of each of the research factors. The study findings provide an understanding of the initial trend in participants' views on the implementation of E-learning in Saudi universities. The quantitative study was undertaken to address the research question "What are the factors that will ensure the effective implementation of E-learning framework in Saudi higher education sector?" The survey findings showed that the majority of participants agreed that "Technical Learning Management Systems" and "Personal Management Issues" are the most significant factors influencing the uptake of E-learning in Saudi universities (see Figure 28 where the shared factors are highlighted in red). The following subsections summarise the findings from the data obtained from academics and students.

4.7.1 Findings from academic staff data

This chapter discussed the academic staff's online survey results using statistical methods. This was followed by a discussion of the students' online survey results. In the first phase, the factor analysis of academic staff data was conducted using the KMO and Bartlett's test, factor extraction, and principal component factor extraction (PCA) with varimax rotation and interpretation. Five factors were retained based on the highest loadings, and each factor had several variables that loaded clearly onto them.

Nineteen variables were grouped under "Technical Learning Management Systems"; the highest factor loading was for "The university's E-learning support is good" at (.800) while the lowest loading was (.615) for "E-learning enables me to contact lecturers/students easily".

Nine variables pertained to "TPTCK". The highest loading was for "The ability of academic staff to develop class activities and projects involving the use of instructional technologies" (.815); a lowest loading of (.659) was obtained for "academic staff enhances technology using area-specific applications".

In terms of "E-learning Management Systems", the highest factor was related to "E-learning environment is a clear and organised structure of the course and learning material" (.768). Similar loadings were for "The provision of communication tools and facilitate the interaction such as e-mail, chat, and newsgroups among the course participants" (.758) and "Easy-to-use platform" (.758). A lowest loading emerged for "The interaction with other course participants" (.742).

"Personal Management Issues" yielded the following results: "Not having enough time to organise myself each day" received the highest loading of (.798) while "Inability to manage all that technology requires" received a loading of (.759). "The conflict between my interests and my responsibilities" yielded a loading of (.714) while a lowest loading was obtained for "Limited knowledge about the innovation" at (.601).

In relation to "E-assessment", the highest loading of (.828) was for "E-assessment is secure as paper-based assessment" while "E-assessment is a reliable alternative to paper-based exams" received a loading of (.799). A lowest loading of (.696) was obtained for "Practical alternative to paper-based exams".

4.7.2 Findings from student data

The factor analysis of student data was conducted during the second phase. Three factors were retained based on the highest loadings, and each factor had a number of variables that loaded clearly onto them. In relation to "Technical Learning Management Systems", nineteen variables were grouped according to their high loading. The highest loading was for "E-learning is simple to learn" at (.680), while the lowest scored was for "E-learning systems are reliable" at (.504).

With respect to "Students' Readiness", seventeen variables were identified. The highest loading of (.730) was for "I learn at my pace and use learning strategies that work for me" whilst "I can

ask questions and make comments in writing that is clear and succinct" drew the lowest loading of (.523).

The "Personal Management Issues" yielded the following results: "Inability to manage all that technology requires" received the highest loading of (.751) while "The conflict between my interests and my responsibilities" received a loading of (.730). "I am not having enough time to organise myself each day" produced a loading of (.725) while "I spend time working with non-academic problems related to technology" yielded a lowest loading of (.690).

4.8 The Refined Version of E-learning Framework

As shown in Figure 26, following the factor analysis, five factors and thirty-nine variables were retained for the refined E-learning framework for academic staff. The five factors are: Technical Learning Management Systems, TPTCK, E-learning Management Systems, Personal Management Issues, and E-assessment. The Cronbach alpha for all factors was higher than 0.9, indicating that each factor had acceptable reliability. Similarity, as shown in Figure 27, following the factor analysis, three factors and forty variables were retained for the refined E-learning framework for students. The three factors are: Technical Learning Management Systems, Students' Readiness, and Personal Management Issues. The Cronbach alpha for all factors was higher than 0.9, indicating that each factor had acceptable reliability.

As can be seen from Table 26 on the following page, the original grouping of variables is strongly confirmed by the literature. In the original proposed framework, there were 95 variables grouped under 22 factors. After performing EFA, there were 79 variables grouped under 8 factors since several variables were excluded or did not load cleanly on any component. The findings from EFA analysis confirmed that all 79 variables for the 8 factors loaded strongly (Figure 26, Figure 27). The analysis results for the academic staff data EFA showed that two factors – Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) – were grouped under one factor (TPTCK). Further, several variables related to Internet connectivity, Technical support, Hardware and Software, Usability, Human-Computer Interaction (HCI) and Course content were grouped under one factor: Technical Learning Management Systems. Four variables were grouped under the E-learning Management Systems factor. The other two factors – E-assessment and Personal Management Issues – retained their original items.

Similarity, the results of the student data EFA showed three factors, and forty variables were retained for the refined E-learning framework. The three factors are: Technical Learning Management Systems, Students' Readiness, and Personal Management Issues. Following the factor analysis, six sub-factors from the original proposed framework were grouped under one factor: Technical Learning Management Systems. Additionally, five sub-factors related to Skills and Knowledge, Interaction, Peer learning, Reflection, and Motivation were combined under one factor: Students' Readiness. The other factor, Personal Management Issues, retained its original items. In short, several changes were made based on the survey responses. These changes included the removal of factors related to Digital technology, Learning theories, Teaching strategies, Training programs and Cultural factors from the subsequent factor analysis because each variable did not load cleanly onto a single factor (see Table 26).

Table 26: Changes to framework factors before and after EFA

Initial framework		Refined framework after EFA			
Total factors for academic staff and students	**Total variables**	**Total new factors for academic staff**	**Total variables**	**Total new factors for students**	**Total variables**
22	95	5	39	3	40
ICT Factors		Technical Learning Management Systems	19	Technical Learning Management Systems	19
• Internet connectivity	4				
• Technical support	4				
• Hardware and Software	4				
• Usability	5	TPTCK	9	Students Readiness	17
• HCI	5	Personal Management Issues	4	Personal Management Issues	4
TPACK		E-learning Management Systems	4		
• TK	5				
• TPK	5	E-assessment	3		
• TCK	4				
Teaching Principles					
• Course content	4				
• Course design	5				
• E-assessment	6				
• Skills and Knowledge	3				
• Digital technology	4				
• Learning theories	4				
• Teaching strategies	4				
• Training programs	4				
Learning Attributes					
• Interaction	4				
• Peer learning	4				
• Reflection	4				
Personal Factors					
• Culture	4				
• Student motivation	4				
• Personal management	5				

- The original framework (22 factors and 95 variables)
- The refined framework (4 factors and 33 variables), and (2 shared factors and 46 variables)
- The shared factors highlighted in red
- The factors removed from the survey highlighted in yellow.

Factor loading = .6

Factor loading = .7

Factor loading = .8

E-learning environment is clear and organized structure of the course and learning material

E-learning environment offers e-mail, chat, newsgroups and/or other communication facilities

Easy-to-use platform

I can interact with other course participants

E-learning Management Systems

Academic staff Factors

Technical Learning Management Systems

The university's E-learning support is good

I can access the required resources for my daily tasks

I can receive technical support from technicians

Accessibility to learning material is provided

Easy on-campus access to the internet

Information was well structured/ presented

E-learning systems are reliable

I found the instructions for using the e-learning components to be sufficiently clear

Easy to use

E-learning systems are available all the time

Browsing speed is satisfactory

I found the course content to be adequate and relevant to the subject

Lecture notes are supplemented with multimedia tools (flash animations, simulations, videos, audios, etc.)

I can use the PC and software applications before choosing E-learning-based courses

ICT and practice are provided for E-learning

I am able to interact with fellow students/ colleagues via the Web

The course materials were placed online in a timely manner

The ICT resources assist me to use computers for work tasks

It enables me to contact lecturers/ students easily

I am not having enough time to organize myself each day

Inability to manage all that technology requires

The conflict between my interests and my responsibilities

Limited knowledge about the innovation

Personal Management Issues

I am able to develop class activities and projects involving the use of instructional technologies

I am able to learn about E-learning technologies that I can apply to teach my subject and facilitate understanding

I can prepare a lesson plan requiring the use of instructional technologies

I can use technologies to achieve course objectives

I can choose technologies that enhance my teaching approaches

I can choose technologies that enhance students' classroom learning

I can evaluate the appropriateness of new technology for teaching and learning

I can adapt to the use of the technologies that I am learning about different teaching activities

Using area-specific applications

E-assessment is secure as paper-based assessment

E-assessment is a reliable alternative to paper-based exams

E-assessment is a practical alternative for paper-based exams

E-assessment

TPTCK

Figure 26: Concept map illustrating the new factors and variables for academic staff

Factor loading = .5
Factor loading = .6
Factor loading = .7

Student Factors

Students Readiness

I learn at my pace and use learning strategies that work for me

Support students' cooperative learning and group work

E-learning increases my knowledge and to control my success (e.g., via tests)

E-learning improves my interaction with my lecturer

Offering a variety of communication tools for exchanging information with peer students (e.g., e-mail, chat, newsgroups)

I can access immediate feedback

Peer learning enables students to have personal contact with their peers

Interaction increases my motivation to learn

Peer learning enables an easy and fast exchange of information and knowledge with peer students

I am able to schedule time to provide timely responses to other students and/or lecturer

I am able to learn at anytime and anywhere (e.g., at the university, at home)

I am able to learn in a group situation and cooperate with other learners (e.g., through group activities, discussions etc.)

I am able to take other courses delivered via e-learning

I am able to complete my work even when there are online distractions (e.g., responding to friends' emails, surfing websites)

I am able to complete my work even when there are distractions at home (e.g., television, children etc.)

I can express myself clearly through my writing (e.g., tone, emotions, and humour)

I can ask questions and make comments in writing that is clear and succinct

Technical Learning Management Systems

I found it simple to learn

Easy to use

Information was well structured/ presented

I found the instructions for using the E-learning components to be sufficiently clear

I perceive the E-learning design to be good

I can access the required resources for my daily tasks

Accessibility to learning material is provided

ICT and practice are provided for E-learning

I found the course content to be adequate and relevant to the subject

The university's E-learning support is good

I enjoy using E-learning related technologies

I can contact the lecturers/students easily

The screen design pleasant

The course materials were placed online in a timely manner

I can say that they are available all the time

I am able to interact with fellow students/ colleagues via the Web

Browsing speed is satisfactory

The ICT resources assist me to use computers for work tasks

E-learning systems are reliable

Personal Management Issues

Inability to manage all that technology requires

The conflict between my interests and my responsibilities

I am not having enough time to organize myself each day

I spend time working with non-academic problems related to technology

Figure 27: Concept map illustrating the new factors and variables for the students

Figure 28 illustrates the combination of factors derived from the data for academic staff and students. The factor analysis results for the data of both groups were compared and yielded two factors that were common to both surveys.

Figure 28: The combined factors in survey data of academic staff and students

The refined E-learning framework is shown in Figure 29 below. It will be utilised to formulate the semi-structured interviews discussed in the next chapter. The qualitative phase of the research will be conducted to validate the factors included in the improved E-learning framework. The aim of the qualitative phase is to seek explanation or clarification of any unusual findings that emerged from the quantitative data. The E-learning framework resulting from the interviews is the final version, and includes the factors identified as influencing the effective implementation of E-learning in Saudi universities. Therefore, the refined E-learning framework is the basis for the qualitative phase of this study.
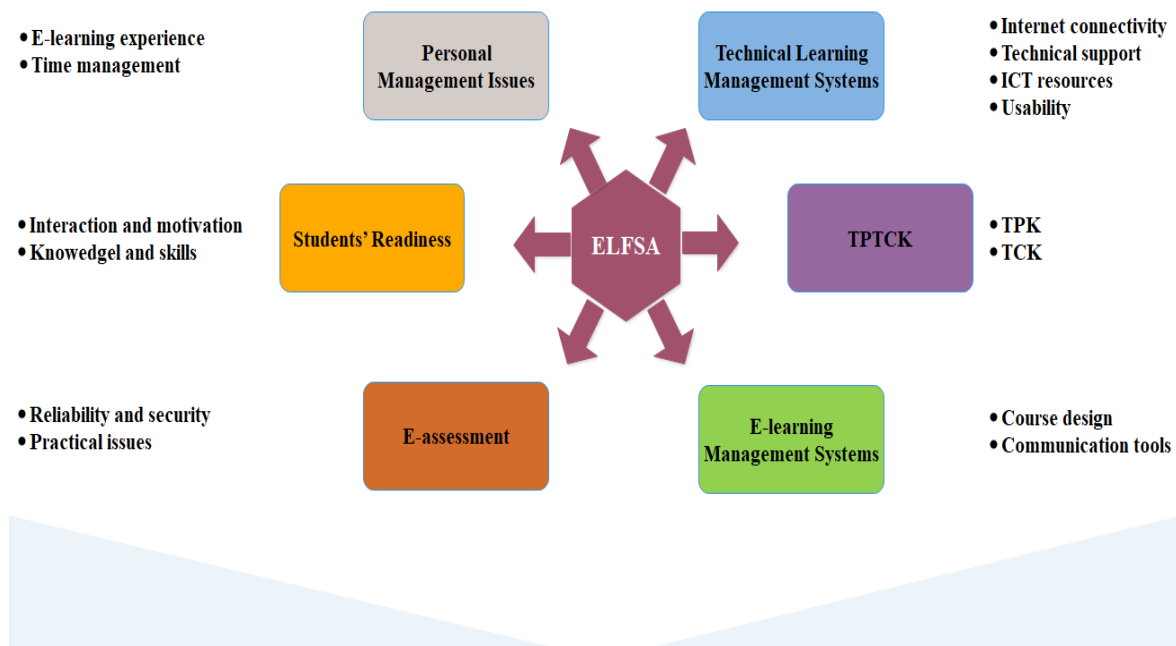
Figure 29: The refined version of E-learning framework for Saudi universities

4.9 Chapter Summary

This chapter presented the data collected from the online survey conducted to investigate the effective implementation of an E-learning framework in Saudi universities. The data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 25 software, and exploratory factor analysis technique was applied to the data for academic staff and students. The findings were greatly strengthened by an analysis of the opinions of both academic staff and students. The results of the first section of the online survey were presented, giving a profile of the academic staff sample. This was followed by the application of EFA to obtain a clear view of the data in order to determine the outcomes of this research. Thus, five factors were extracted from the results of the academic staff's online

survey and included in the refined framework. The same method was applied to the students' online survey data, which yielded three factors to be retained for the framework. The reliability statistics showed a high level of confidence. Finally, this chapter summarised the findings from EFA academic staff and students, and the refined version of the proposed framework was presented.

In the next chapter, the researcher presents the interview data analysis and findings used to identify the most important factors influencing the effective implementation of E-learning in the Saudi higher education. Open-ended questions were asked and the collected data informed the final framework for the effective implementation of E-learning in the Saudi higher education.

Chapter 5: Interview Data Analysis and Findings

5.1   Introduction

In the previous chapter, the online survey analysis and findings were discussed. It covered the main factors influencing the effective implementation of E-learning in Saudi higher education institutions, and explained how the quantitative findings led to an improved list of factors. Chapter 4 provided the groundwork for this phase of the study.

This chapter presents the analysis and findings of the interviews conducted in this research. First, it presents the demographics of participants. Second, the chapter gives a summary of the qualitative results obtained from open-ended interview questions (administrated online) to illustrate the main concepts obtained from the feedback regarding the effective implementation of E-learning framework in Saudi universities. The interviews were conducted to evaluate and confirm the refined E-learning framework resulting from the quantitative online survey. The findings from the analysis of the online survey data led to the retention and exclusion of several factors in the initial framework. The retained factors were used to validate the refined version of the framework through the interviews with academic staff to confirm the factors included in the final framework. Some of the excluded factors were retained for the final phase; these were: Digital technology, Training programs, Learning theories, Teaching strategies, and Cultural factors. The reason for this was that the researcher considered them of high importance following the quantitative online survey and the literature review. In the final framework, all factors were confirmed by the participants, except the Digital technology factor which was combined with E-learning Management Systems after the interviews data analysis, and Cultural factors were deleted.

The data from the structured online interviews were analysed using NVivo 12 software. The results of the interviews support and confirm the quantitative online survey results. The participants expressed their views on the identified factors and the effectiveness of the refined E-learning framework. At the end of this chapter, the final framework for this study is presented.

5.2   The Interview Design and Objectives

The purpose of this phase is to explain and strengthen the findings from the quantitative study by means of a qualitative inquiry. The qualitative study was undertaken to investigate the research question: "What are the attitudes and opinions of academic staff towards the use

of E-learning for higher education in Saudi Arabia?". The structure of the qualitative phase is based on the findings from the quantitative analysis. This is done to evaluate and confirm the validation of the refined version of E-learning framework and to arrive at a final version of an E-learning framework from the perspective of academic staff. As shown in Table 27, the interview questions were designed to address the research gaps evident in the online survey, literature review, research questions and objectives.

Table 27: The interview questions

Interview question	The interview question will answer and assess the research gap from the online survey	The interview question will answer and assess the research gap from the Literature review	The interview question will answer the research question	The interview question will answer the research objective
How important is the technical learning management systems for academic E-learning?	√	√	√	√
How important is the sufficiency of Internet connectivity in your university?	√	√	√	√
Do you think the current technical support is sufficient for the use of E-learning systems? Why?	√	√	√	√
Do you believe you have the appropriate ICT resources and knowledge to use E-learning systems? Why?	√	√	√	√
Do you think E-learning systems are easy to use?	√	√	√	√
To what extent do E-learning systems support you in designing course content?	√	√	√	√

How important is the TPTCK for academic E-learning? Why?	√	√	√	√
Do you think the academic staff has sufficient knowledge to integrate E-learning in their teaching and learning? If yes Why? if no Why not?	√	√	√	√
How important is TPK for academic staff to empower the use of E-learning in Saudi universities?	√	√	√	√
How important is TCK for academic staff to empower the use of E-learning in Saudi universities?	√	√	√	√
What kind of learning activities for the online course can be used in E-learning?	√	√	√	√
In your opinion, what are academic staff' willingness to use the E-learning system in their teaching in Saudi universities?	√	√	√	√
How important are the E-learning management systems for designing a course content in an E-learning environment?	√	√	√	√
How important using e-assessment for evaluating student learning outcomes?	√	√	√	√
Is e-assessment a practical, secure and reliable alternative to traditional paper-based assessment? If yes Why? Not Why?	√	√	√	√
How important are personal	√	√	√	√

management issues for the implementation of E-learning systems?				
Have you received any formal training (sponsor by the university) in using E-learning Systems? If yes Why, if no Why not?	√	√	√	√
From your experience, do you think students' training is an essential factor for the use of E-learning system? If yes Why, if no Why not?	√	√	√	√
What are the problems and challenges you face during your use of E-learning system? Do the limitations outweigh the benefits?	√	√	√	√
How would you evaluate the quality of E-learning system in your university in terms of (information quality)?	√	√	√	√
Do you think the current learning theories and practices in the Saudi universities support the integration of E-learning system? Why?	√	√	√	√
Do you think that the current teaching strategies in Saudi universities support the integration of E-learning system? Why?	√	√	√	√
Do you think the culture and gender segregation influence the effectiveness of	√	√	√	√

E-learning system usage in the Saudi universities?				

As discussed in the qualitative design section (see section 3.9.2.1), the open-ended interview questions were designed so that participants could comment on the identified factors of the refined framework. They were asked to explain their opinions regarding whether or not these factors influence the E-learning usage and the endorsement of its effectiveness. Table 28 presents the interview design and the procedure followed for this phase.

Table 28: The interview design and objectives

Process	Action
Preparation for the study	• To explain and enhance the findings of the main quantitative study and check whether there are any other factors that may influence the effective implementation of E-learning system. • Data was collected using semi-structured interviews carried out online via the Qualtrics platform.
Development of interview questions	The interview questions were developed according to the identified factors in the refined framework. The questions were checked by the supervisors and colleagues from the same field to ensure content validity.
Sampling	Academic staff who work at Saudi Arabian universities, who are appropriate the objectives and context of this study.
Interviews	• The interviews were conducted from October 2019 to March 2020. • The researcher distributed the invitation letter through social media tools such as E-mail, Twitter, LinkedIn and WhatsApp. • Twenty-two participants were included in this study.

	• There were three rounds for data collection: the first round collected twelve interviews, the second round collected eight interviews and the final round collected two interviews.
Data management and transcription	• Data was coded and checked. • Themes were identified to provide the explanatory base for the quantitative results.
Data Analysis	Thematic content analysis was conducted and the coding was done through NVivo 12 software.

The interview data were collected via the Qualtrics platform which allowed participants to express their thoughts about the set of factors comprising the refined framework. The researcher employed inductive content analysis, and coding was done using NVivo 12 software. NVivo is a categorising mechanism which identifies similarities and differences in the content and organises data from the transcripts into themes called 'nodes' that are encoded in the software (Creswell & Poth, 2017). The analysis of the collected data included identifying the general themes and sub-themes from participants' transcribed interviews, which made it easier to compare emerging themes and concepts. Figure 30 depicts the steps taken to analyse the interview analysis.

Figure 30: Steps of interview data analysis (prepared by the author)

The themes were established according to pre-defined categories (factors) from the literature and the findings of the online survey (quantitative phase). The researcher constantly reviewed the interview transcripts and the identified themes, highlighted them and eliminated any overlap if one part of text was coded under more than one theme. After all themes and sub-themes had been determined, they were coded to obtain a comprehensive view of the key findings. The six main factors were categorised under: Technical Learning Management Systems, TPTCK, E-learning Management Systems, E-assessment, Students' Readiness, and Personal Management Issues. Other factors were included after analysing the findings of the online survey; these were: Training programs, Learning theories, Teaching strategies and Cultural factors (see Figure 31).
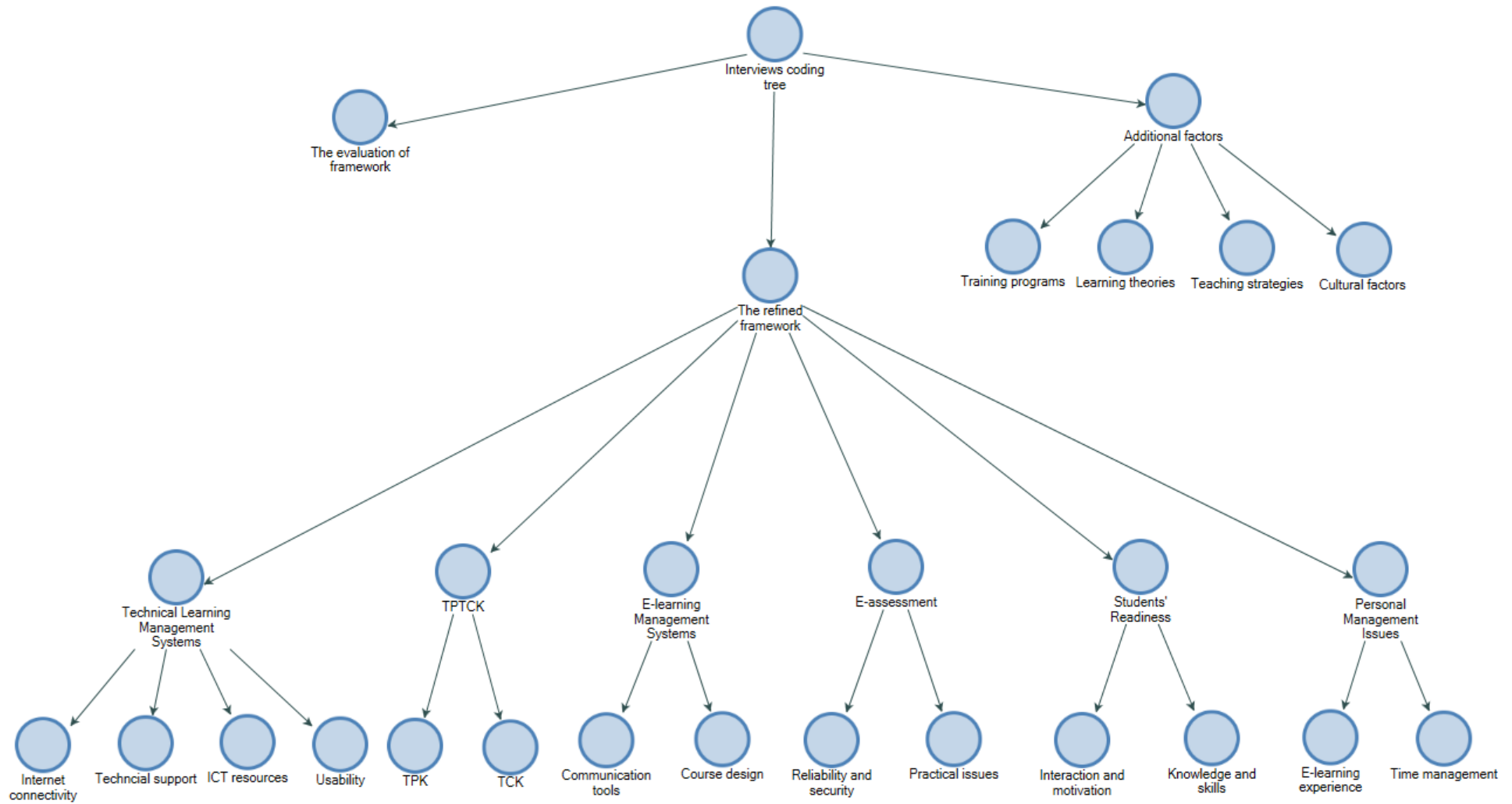
Figure 31: Interview data coding tree (prepared by the author)

5.3   Participant Demographics

Interviewing the right number of experts is important to obtain significant findings. Twenty-two academic staff who work at Saudi Arabian universities were included in the qualitative study based on their experience in teaching and with E-learning systems. The researcher began conducting the interviews in October 2019 and concluded in March 2020. An invitation letter was distributed through social media tools such as E-mail, Twitter, LinkedIn and WhatsApp to twenty-eight participants who indicated their willingness to be part of the study and agreed to be interviewed.

Participants were given a week to respond, and then a reminder was sent to non-respondents to encourage them to participate in this study.   Twenty-two   participants answered all interview questions and the data was included for analysis. The data collection process ended after the data had reached a saturation point and was confirmed by more than one participant. The online interviews comprised 49 questions which were divided into two sections: questions related to demographics and a combination of open-ended questions and multiple-choice items measured utilising a five-point Likert scale anchored by: '5 = extremely important', '4 = very important', '3 = moderately important', '2 = slightly important', and '1 = not at all important' (see Appendix 6). All responses were deemed suitable and utilised for the analysis as qualitative text extracted provided details on the identified factors being investigated, and failure to answer a question would not influence the analysis. Following the end of the qualitative data collection process, the researcher commenced the analysis.

5.3.1 Interviewee demographics

The selected interviewees represented all the different demographic categories. Out of 22 participants, 12 (54.5%) male staff and 10 (45.5%) female staff completed the survey. Notably, more than half of the participants were between 31-40 years old (54.5%) while six participants were in the range of 41-50 years of age. Table 29 summarises the demographic information.

Table 29: Participants' demographic information

Item	Demographics		Method of collection	
			Open-ended interviews	
			Frequency	**Percent**
Gender	Male		12	54.5
	Female		10	45.5
		Total	**22**	**100**
Age	Less than 30 years' old		1	4.5
	31-40 years' old		12	54.5
	41-50 years old		6	27.3
	51-60 years' old		1	4.5
	Above 60 years old		2	9.2
		Total	**22**	**100**

Of the participants, only one had less than two years' experience as an academic, and 12 participants (54.6%) had more than five years of experience in Saudi Arabian higher education. More than half of the participants (59.2%) had less than 5 years of experience with E-learning systems, while 7 participants (31.8%) had had prior interaction with E-learning systems (between 5-10 years). This diversity among participants improved the consistency of the collected data and offered different perspectives on the subject being investigated (see Table 30).

Table 30: Experience of employment and E-learning systems in year

Years of Employment (University)		Frequency	Percent
More than 1 year and less than 2 years		1	4.5
More than 2 years and less than 5 years		9	40.9
More than 5 years		12	54.6
	Total	**22**	**100**
Years of experience with E-learning systems		**Frequency**	**Percent**
Less than 5 years		13	59.2
5-10 years		7	31.8
11-15 years		1	4.5
16-20 years		1	4.5
	Total	**22**	**100**

As can be seen in Table 31, 40.9% of participants were assistant professors, and 18.2% were associate professors. Notably, 54.5% of participants described themselves as "somewhat competent" in the use of E-learning systems, while 27.3% of participants considered themselves to be "extremely competent".

Table 31: Academic status and Experience with the use of E-learning systems

Academic status		Frequency	Percent
Professor		1	4.5
Associate Professor		4	18.2
Assistant professor		9	40.9
Lecturer		8	36.4
	Total	**22**	**100**
Experience with the use of E-learning systems		**Frequency**	**Percent**
Extremely competent		6	27.3
Somewhat competent		12	54.5
Neither competent nor incompetent		4	18.2
	Total	**22**	**100**

The interviewees shared with the researcher their knowledge and experiences regarding the use of E-learning systems:

> *"Experience has been good and enriching most of the times. It has widened my scope and exposure and I have been able to learn new courses at my convenient times. E-learning is saving time and ease to use."* **[Participant 6 - Assistant Professor]**

> *"I have been teaching statistics using a virtual environment. It was actually hard at the beginning and a lot of students are complaining about the difficulty. Some students asked to schedule face-to-face classes every other week. Teaching mathematics or statistics online is different than other subjects. Student needs to interact directly with the teacher or to raise his hand whenever he has a misunderstanding. After one term, I explored some tools that I can apply to let students interact during the online lecture. There are actually many tools that make teaching mathematics online much easier."* **[Participant 5 - Lecturer]**

> *"My experience of using E-learning systems started with the establishment of the E-learning Deanship at [...] which was*

established in the year 2006, as part of the continuous University efforts to provide the latest scientific methodologies to improve the educational process. Since then, the E-learning Deanship has performed various activities and roles and had many experiences in deploying technology in education and developing skills and abilities of the academic staff and students." **[Participant 11 – Associate Professor]**

In summary, all the participants had acquired some knowledge and experience of the use of E-learning systems throughout their working life. Professors agreed that E-learning plays an effective role in the evolution of educational process by assisting students and/or the university to create new or improved learning experiences.

5.4 Findings from the Interview Data

In this study, the structure of the interviews enabled the participants to respond to open-ended questions to express their views related to factors influencing the usage of E-learning systems. The following sections will discuss the identified factors that influence the usage of E-learning systems that emerged from the online survey and were validated by the interviews.

5.4.1 Technical Learning Management Systems

This factor concerns the way that an E-learning system is designed from a technical and design perspective (see section 4.4.8.1). This section is intended to determine whether E-learning has given users better access to the Internet to obtain technical support, use ICT resources including teaching and learning materials, and plan the course content. The researcher noted that the majority of interviewees agreed that technical learning management systems are an important factor determining the effectiveness of E-learning use. Figure 32 below shows that 68.18% of participants agreed that this factor is extremely important for the success of E-learning implementation. The remaining participants also confirmed the importance of this factor and their responses ranged from 'slightly important' to 'very important'.
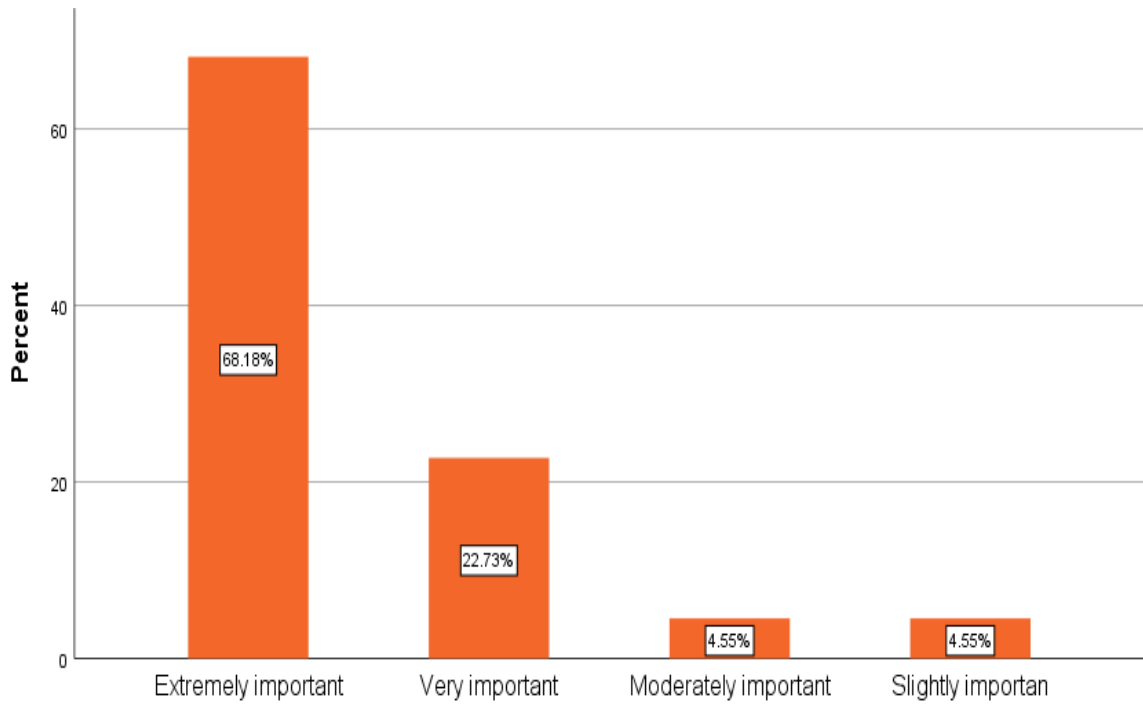
Figure 32: Participants' views on the importance of technical learning management systems

5.4.1.1   Internet connectivity

There was a common concern among academic staff in relation to Internet connectivity and its impact on their use of an E-learning system. This is borne out by these comments:

> *"The Internet connectivity is extremely important in our university because is purely an electronic university. We need good Internet connectivity for Online classes; uploading the course materials; creating assignments, discussions, and quizzes on the Blackboard; uploading the marks on the blackboard and on the Banner system; uploading the attendance on the system."* **[Participant 4 - Assistant Professor]**

> *"The adequacy of Internet connectivity is very important, especially during live lectures."* **[Participant 21 - Lecturer]**

Some respondents pointed out that the poor quality of Internet connection and networks will have an impact on their work, and it will influence their satisfaction and slow down the implementation of E-learning systems:

> *"In my university, the network is very bad and that leads to a big lowering of the performance of getting the work done. However, the university is working hard to solve this problem. As I know they made*

a new contract with a communication company to change the whole infrastructure." **[Participant 3 - Assistant Professor]**

"The Internet connection must be good quality, as we need to upload lots of teaching materials; students also need to submit the assignments required on time." **[Participant 7 - Professor]**

"No one can deny that technology quality and Internet quality significantly affect satisfaction in e-learning. A software tool with user-friendly characteristics, such as learning and memorizing few simple ideas and meaningful keywords, demands little effort from its users. Users will be willing to adopt such a tool with few barriers and satisfaction will be improved. Therefore, the higher the quality and reliability in IT, the higher the learning effects will be." **[Participant 11 - Associate Professor]**

Another participant emphasised that the Internet connectivity must be good, so that students are able to see all the steps involved in any topic the lecturer presents:

"During virtual lectures, Internet connectivity must be good otherwise virtual class will not be possible. Also, during virtual class, if I am using the SmartPad for writing or explaining any topic, then good Internet connection required otherwise students are not able to see all the steps immediately." **[Participant 17 - Associate Professor]**

5.4.1.2 Technical support

In regard to technical support, participants believed that this is a crucial factor to be considered as they have experienced technical problems when using E-learning systems. For instance, network failure, the delay in response from technical support when needed will limit the use of E-learning:

"Technical support is important for both lecturer and student. I faced some technical problems when I do the online lecture such as network failure or lack of access which causes difficulty in the communication process between me and my students." **[Participant 5 - Lecturer]**

"I was facing some problems during using the E-learning such as Blackboard. Thus, E-learning technical support is very important, especially if it is online support (instantly)." **[Participant 22 - Lecturer]**

"I believe teaching with technology like E-learning system requires good technical support and providing the maintenance of IT services at all times to solve problems as soon as possible whenever the end-user encountered with technical issues, and thus the delay in response from technical support will limit E-learning usage." **[Participant 10 - Assistant professor]**

Other participants agreed that adequate technical support is important for the success of E-learning usage. Regarding the influence of inadequate technical support, interviewees stressed that some students complained about several technical problems related to the use of the technology and the complexity of the system:

"Adequate technical support is necessary for successful implementation of E-learning. It is imperative that students should be equipped with technical skills to manage the E-learning environment. Not all students have prior experience of E-learning use, and some of them complained about technical problems related to how to deal with technology as well as learning their subject; downloading the content as well as managing and navigating the Blackboard." **[Participant 18 - Lecturer]**

"Technical support is one of the crucial components for the success of E-learning system. I noted that some students complained about a complication of logging into the E-learning system. For example, if a student lost a password, it is complex for him to get back the password." **[Participant 14 - Assistant Professor]**

5.4.1.3   ICT resources

The interviewees offered a variety of comments with regard to the appropriateness of ICT resources. Participants referred to existing of ICT resources in their universities such as information resources, collaboration resources and learning resources:

"Yes, we have appropriate ICT resources at my university. We have information resources (i.e., Webgraphy, virtual encyclopedias and online databases etc.), collaboration resources (i.e., mailing lists, groups, wikis and blogs etc.) and learning resources (i.e., interactive tutorials, online quizzes, e-Books and podcasts etc.)" **[Participant 4 - Assistant Professor]**

"There are many online tools in the Blackboard that can be used to support teaching online." **[Participant 5 - Lecturer]**

"Yes, my university has a department responsible to provide adequate ICT resources, knowledge and skills to use E-learning systems." **[Participant 21 - Lecturer]**

One of the participants suggested that the universities need to consider facilitating conditions, as their absence will discourage the use of an E-learning system:

"Regarding facilitating conditions, Saudi universities need to consider such as an efficient technological infrastructure, Internet, computer competency, and without it, the lecturer and students will be neglecting the use of E-learning." **[Participant 20 - Lecturer]**

5.4.1.4 Usability

As shown in Figure 33, the importance of usability was frequently emphasised during the interviews by the interviewees (90.9%). Most of the participants agree that E-learning systems are easy to use and useful to them:

"The system is very easy to use." **[Participant 16 - Assistant professor]**

"E-learning is very useful for learning and teaching purpose. I will never stop using it." **[Participant 17 - Associate professor]**

"The E-learning systems may be used to create professional structured course content. The teacher can add text, images, tables, links and text formatting, interactive tests, slideshows etc. It helps control which content a student can access, track studying progress

and engage student with contact tools." **[Participant 4 - Assistant professor]**

Furthermore, one of the participants commented that E-learning is easy, and it would increase the level of user satisfaction:

> *"E-learning systems is really easy. We built it to increase the student's satisfaction and fun from online learning and training."* **[Participant 9 - Associate professor]**
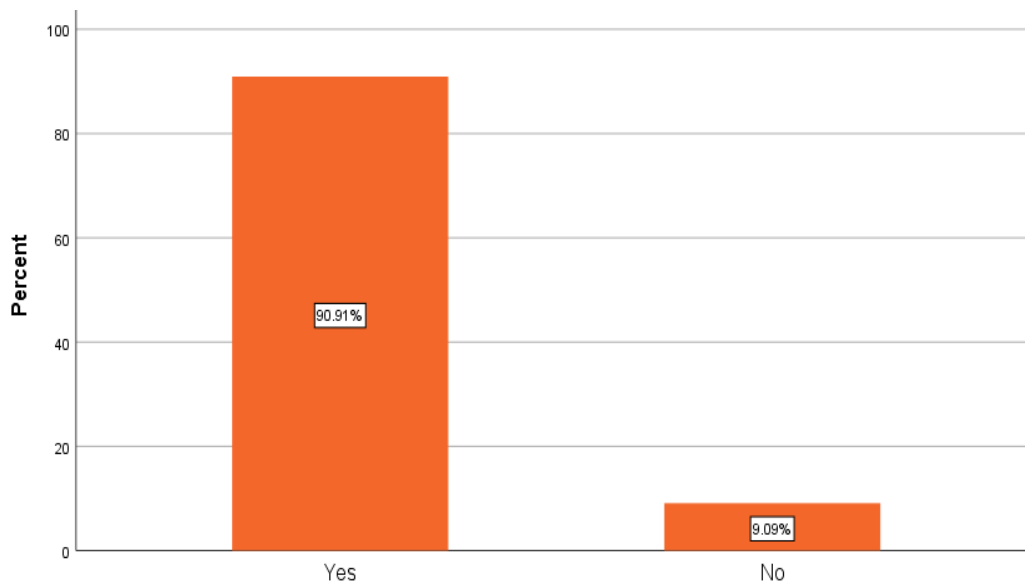
Figure 33: Participants' views on the importance of usability

However, two participants gave reasons for their negative attitude towards the use of E-learning systems. They pointed out that E-learning should be easy to use and encourage users to utilise the system:

> *"E-learning is not easy. Teaching online needs a lot of work to be effective. For example, using different online tools (Blackboard discussion, Wikis, etc.) to let students interact and engage as well as they do in the face-to-face class."* **[Participant 5 - Lecturer]**

> *"No. especially, for some lecturers and students who have no idea about technology. If the person does not have enough experience in dealing with the computer, he/she will find the E-learning is not easy. E-learning tools should be effective to use and attract users to utilise such system."* **[Participant 21 - Lecturer]**

In summary, the factor of technical learning management systems was considered important by the participants, and was therefore incorporated into the final research framework. Most of the interviewees agreed that technical learning management systems influence the effective implementation of E-learning.

5.4.2 Technological Pedagogical Knowledge and Technological Content Knowledge (TPTCK)

This factor is a combination of Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK), and it indicates the knowledge that academic staff have of technology-integrated teaching environments (see section 4.4.8.2). TPK refers to knowing how to use E-learning to implement different teaching methods, while TCK is the knowledge of how subject matter can be conveyed with E-learning. The focus is on how the academic staff integrates E-learning to facilitate teaching and improve the delivery of information (course content).

During the interviews, all participants agreed that TPTCK is necessary for the successful implementation of E-learning systems. They emphasised that academic staff need to know how to use technology for effective pedagogy and how to incorporate technological and pedagogical approaches that will help students to better understand course content and academic conventions:

> *"Pedagogy helps us to understand the best style of presenting the e-learning system whereas the technology part has to be implemented to support the pedagogical concept applied in the e-learning system."* **[Participant 7 - Professor]**

> *"The TPTCK allows us to incorporate resources among different types of knowledge involved in the design of digital educational resources: content, pedagogy and technology. Some exemplifications are presented integrating the TPTCK during the design process of resources to improve the presentation of content, such as graphic editors, publishers and multimedia. Tools to facilitate reflection on learning can be blogs or social forums. Resources for further knowledge of the subject area can be online databases and online encyclopedias (e.g., Wikipedia, WikiEducator)."* **[Participant 4 - Assistant professor]**

5.4.2.1   Technological Pedagogical Knowledge (TPK)

As shown in Figure 34 below, 59.09% of participants agreed that the technological pedagogical knowledge factor is extremely important for the success of E-learning implementation. The remaining participants also confirmed the importance of this factor, with responses ranging from 'moderately important' to 'very important'. When asked about the importance of TPK to facilitate the use of E-learning, interviewees stressed that academic staff must be aware of pedagogical aspects to successfully integrate E-learning system. The following comments indicate their opinions:

> *"It is very important; lecturers should be aware of the pedagogical side in order to successfully integrate e-learning. Therefore, e-learning needs to be aligned with theory and practices."*
> **[Participant 20 - Lecturer]**

> *"TPK awareness workshops should be conducted. It is essential for us [academic staff] to be aware of TPK and engage in more professional developments that concentrate on how to acquire key knowledge for effective incorporate E-learning in the teaching."*
> **[Participant 17 - Associate professor]**

> *"It is moderately important. Not all staff are well versed in pedagogical concepts."* **[Participant 7 - Professor]**
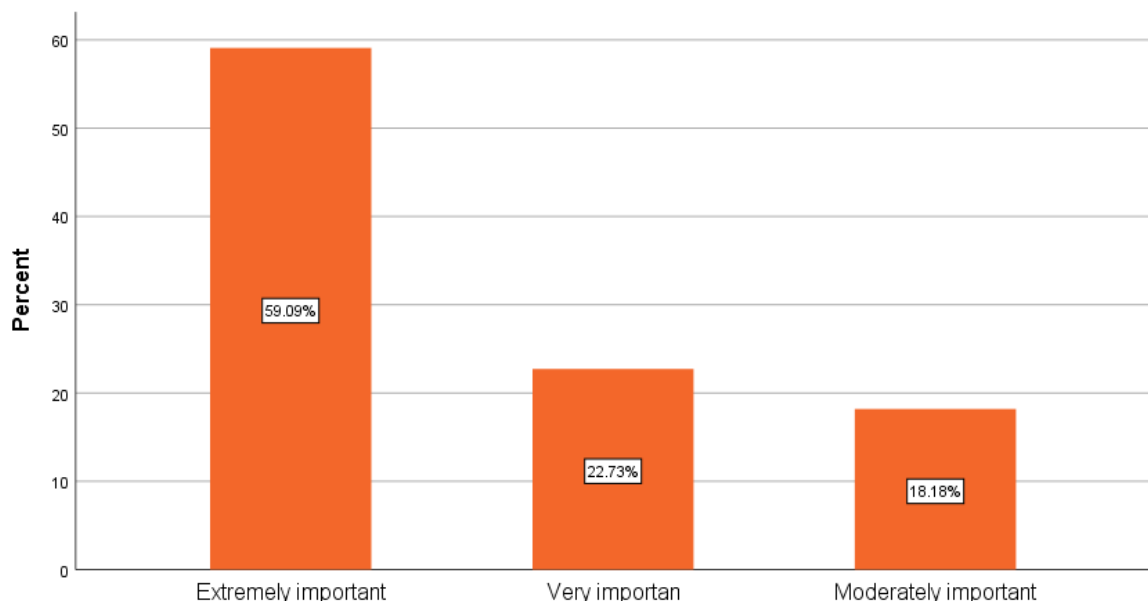
Figure 34: Participants' views on the importance of technological pedagogical knowledge (TPK) for the success of E-learning implementation.

Clearly, the interviewees agreed that a lecturer needs to be competent in the use of E-learning tools for online teaching to be effective:

> *"It is a very important factor. The lecturer needs to be updated about the new techniques that can help him to deliver knowledge. For example, there are many online tools that an academic lecturer can use, but not all the lecturers know how to apply them effectively through the teaching process. I think the department, or the university has to run training workshops for the online teachers to train them on how to use the online tools in the right way."* **[Participant 14 - Assistant professor]**

> *"The lecturer has to understand how ICT can provide the objectives of the learning and how to select the suitable kinds of tools that meet the purpose of student's learning. So, he needs knowledge about technology and pedagogy (TPK) to understand and increase the potential of technologies that provide the application of pedagogy and how to integrate them be used in an online environment in Saudi Arabia."* **[Participant 21 - Lecturer]**

> *"Of course, without knowing different tools for teaching, TPK cannot be made effective. So it is necessary to have complete knowledge about using various E-learning tools."* **[Participant 10 - Assistant professor]**

5.4.2.2   Technological Content Knowledge (TCK)

Fifty-four per cent of respondents asserted that technological content knowledge was extremely important for the effectiveness of E-learning usage (see Figure 35). Participants opined that academic staff need to have good knowledge of course content delivered in an online environment:

> *"Yes, it is important factor because without involving good content and employing it through various technical tools, technological content knowledge (TCK) cannot be made effective."* **[Participant 10 - Assistant professor]**

"Yes, it is very important. In my opinion, the academic staff need to have good knowledge on how to digitalise the contents of subjects, solve problems and communicate effectively utilising E-learning so that they can be able to address the learning needs of students. Also, they have to be more proactive especially those who are not in the area of IT." **[Participant 7 - Professor]**
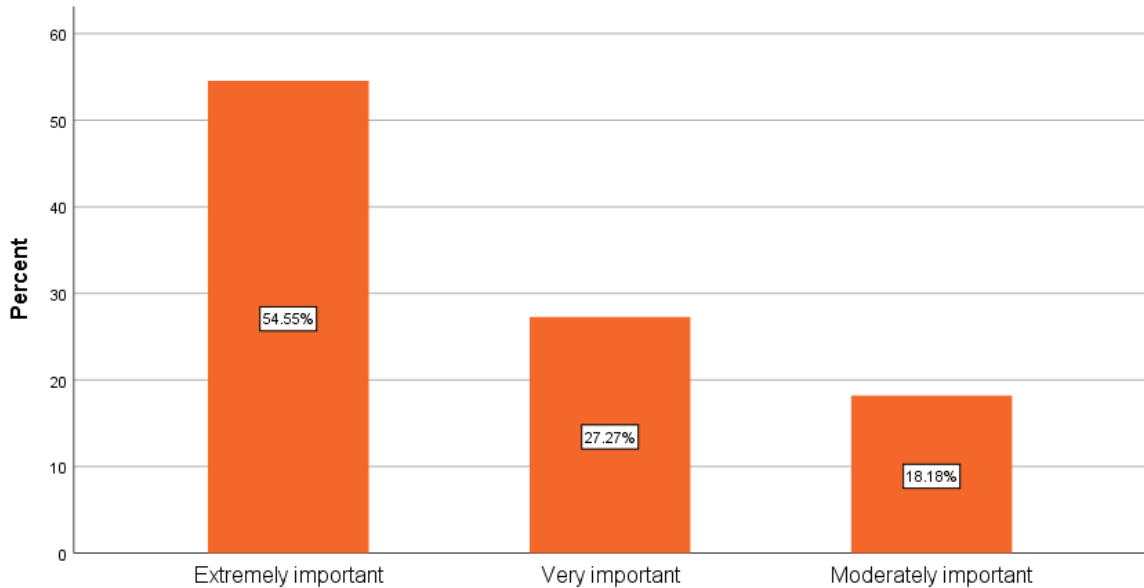
Figure 35: Participants' views on the importance of technological content knowledge (TCK)

One of the participants believes that the nature of some courses makes it impossible for them to be delivered through E-learning systems:

"Very important. Most of the Saudi universities now going forward to e-learning. So, the courses I teach may change to e-learning course so we have to know how to manage and deal with the course. In addition, it is important that E-learning be compatible with the type of course that academic staff teach it. At the same time, not any courses can be transferred that is really based on the content and the nature of course." **[Participant 3 - Assistant professor]**

However, only one interviewee felt that some lecturers do not know how to integrate E-learning tools into the curriculum:

"I don't think all of the academics have this knowledge, as an expert I encountered some lecturers in different fields have no idea about using these tools in their teaching." **[Participant 20 - Lecturer]**

To sum up, although some academic staff lacked adequate knowledge to integrate E-learning into their curriculum, all interviewees confirmed that technological pedagogical knowledge and technological content knowledge (TPTCK) is a key factor influencing the effective implementation of E-learning. Therefore, this factor was included in the final research framework.

5.4.3 E-learning Management Systems

All respondents stressed that E-learning management systems play a very important role in the effective teaching-learning process (see section 4.4.8.3). This factor is related to the way that academic staff present lectures to students and create effectively-designed online courses. These designs should include communication tools that allow students to engage in learning activities.

5.4.3.1   Course design

The majority of interviewees (68.18%) agreed that the design of the course content is important in the E-learning environment (see Figure 36).
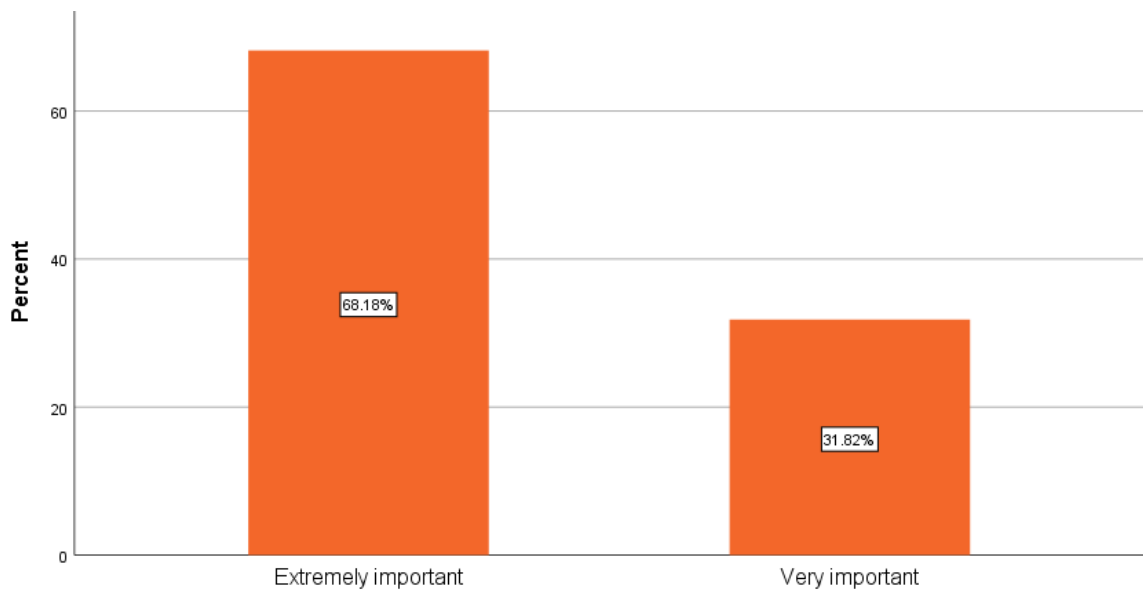
Figure 36: Participants' views on the importance of course design

Participants found that E-learning management systems are useful for their coursework and provide flexible access to course materials. This is expressed in the following comments:

> *"Yes, my university used the Blackboard in education, thus I can*
> *teach e-courses by using it. I can create a single source of e-courses*
> *and training materials for my students; I can manage the courses for*

my students and even improve their efficiency by using Blackboard."
[Participant 9 - Associate Professor]

"I as academic staff, I can manage my courses and modules in terms of adding text, images, tables, links and text formatting, interactive tests, slideshows etc. Therefore, E-learning management systems could be used to create professional structured course content."
[Participant 4 - Assistant Professor]

However, one participant stressed that course materials need to be designed for clear presentation and ease-of-use in order for students to benefit from E-learning management systems:

"It is important that the course materials need to be selected and designed in a clear presentation, so the students do not get lost. Also, the course design needs to be easy to use to expand the understanding of the students experience in E-learning and enhanced their satisfaction. **[Participant 6 - Assistant Professor]**

On the other hand, one participant believed that some academic staff do not have the technical know-how required for the development and delivery of online courses:

"I don't think all academics have sufficient skills to incorporate course materials in the E-learning environment. Academic staff must tackle system navigation issues and manage technical problems during the course. For example, they need to create course contents and revised it at regular intervals which make it a continuous process. Also, they need to explore all functions available to appreciate it." **[Participant 7 - Professor]**

5.4.3.2   Communication tools

This factor was frequently emphasised by the participants as it involved assessment tasks designed to determine the students' learning outcomes. The purpose of this factor is to obtain more clarification about the learning activities that are used when academic staff deliver a course online and communicate with students. Participants maintained that communication tools are important because they enable them to interact with students and evaluate their progress in the course delivered in an E-learning environment:

"I used to upload course materials and lecture notes in Blackboard, and I use some learning activities such as e-mail group, and announcement for the exams and group projects. Such activities allowed me to interact with my students. So, they can share their ideas on the topic delivered, given regular feedback which reflects students' progress." **[Participant 12 - Assistant Professor]**

One participant commented at length that the use of learning activities such as discussion groups encourages students' feedback and helps academic staff to improve their teaching practices:

"The E-learning systems can enable teachers to create customized tests for students, accessible and submitted online. Platforms allow different type of questions. Students' exchange of feedback both with teachers and their peers is possible through E-learning systems. Teachers may create discussion groups to allow students feedback and increase the interaction in course. Students' feedback is an important instrument which helps teachers to improve their work, identify what to add or remove from their courses, where students feel more comfortable, which makes them more included."
[Participant 4 - Assistant Professor]

Briefly, the online course design and communication tools influence the effectiveness of the E-learning environment. The use of E-learning management systems must be designed to meet students needs and improve their learning outcomes. Course design and communication tools were seen by academic staff as important factors for the success of E-learning management systems. Therefore, this factor was included in the final research framework.

5.4.4 E-assessment

This factor concerns academic staff perceptions about the use of E-assessment. Issues such as reliability, security, and practical application were associated with E-assessment (see section 4.4.8.5). Figure 37 shows that 50% of academic staff agreed that E-assessment is a very important factor for evaluating student learning outcomes in E-learning systems, while 40.91% of them considered it to be extremely important.
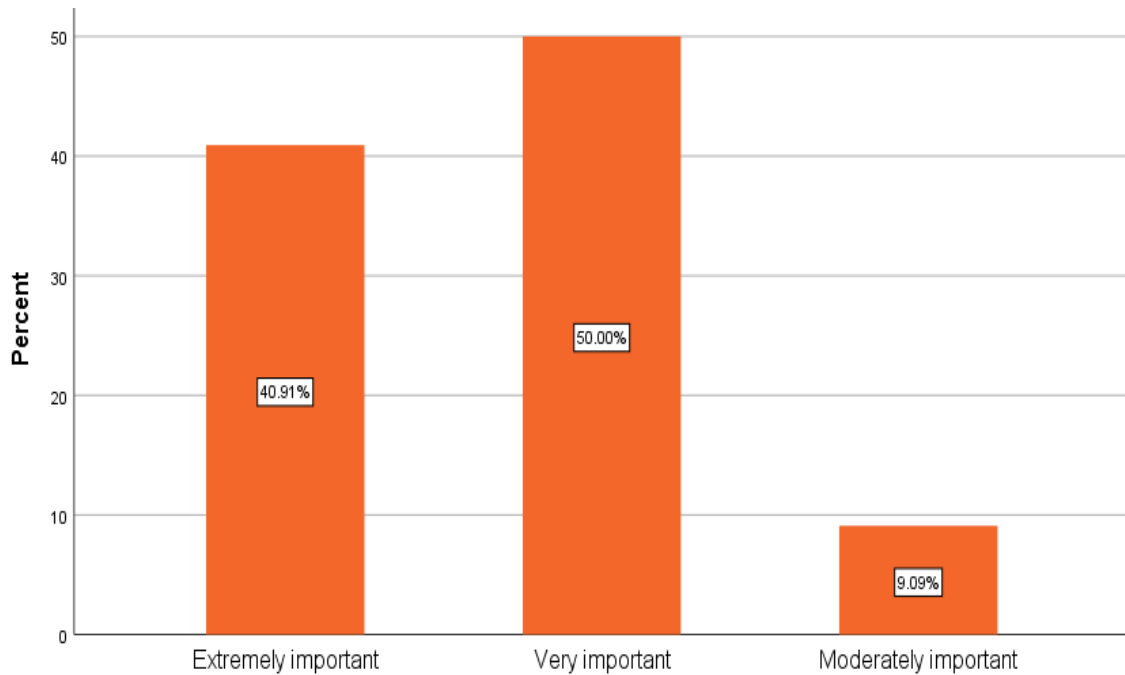
Figure 37: Participants' views on the importance of e-assessment

Participants expressed the following views about the importance of using E-assessment:

> *"Yes, it is very important. It can give students a different aspect of the same question."* **[Participant 12 - Assistant Professor]**

> *"Yes, it is extremely important. It is so easy to evaluate students with no paper assessment. It helps to manage your time and do the work anywhere. E-assessment approach makes students are involved in all stages of the assessment process."* **[Participant 1 - Assistant Professor]**

> *"Yes, it is extremely important. By doing E-assessment, the student can know about his/her progress in the course."* **[Participant 14 - Assistant Professor]**

5.4.4.1 Reliability and security

For this sub-factor, the participants were asked: Is E-assessment considered a practical, secure, and reliable alternative to traditional paper-based assessment? Almost all interviewees asserted that the use of E-assessment reduces time and effort for academic staff:

> *"Yes, the E-assessment is considered a practical and secure alternative to traditional paper-based assessment. The E-assessment*

saves time for the lecturers. For example, the use of E-assessment helps the lecturer to release the result of exam automatically." **[Participant 4 - Assistant Professor]**

"It is important for helping lecturer for saving time and energy better than using the traditional method." **[Participant 20 - Lecturer]**

"Yes, E-assessment is better than the traditional paper-based assessment. Here a student cannot complain of any favour to anyone nor an instructor can do partiality to anyone." **[Participant 10 - Assistant Professor]**

However, two participants believed that one obstacle to the use of E-assessment is the lack of monitoring and security which could make it easier for students to cheat on exams and other assessment tasks:

"Not always reliable and secure. The use of E-assessment in the final exams it will be easy for student cheating in the online classroom." **[Participant 14 - Assistant Professor]**

"No guarantee for security and reliability, if there is no strong security system to prevent cheating when the exam was done at home." **[Participant 13 - Assistant Professor]**

5.4.4.2   Practical issues

In the responses obtained for the practical issues sub-factor, some interviewees commented that the lack of prior E-assessment experience of academic staff influences the use of E-assessment and make them less confident, with one participant stating:

"Transforming from face-to-face assessment to E-assessment not easy for some academic staff. If they are unfamiliar with the use of E-assessment, they will be less confident for utilising it in their work." **[Participant 10 - Assistant Professor]**

Other participants mentioned that some academic staff do not use E-assessment because of technical issues and lack of awareness of using E-assessment:

"It is not working all the time because of the technical issues and

Internet connectivity and some of the lecturers prefer using the traditional way assessment because of their attitude still low toward these technologies." **[Participant 20 - Lecturer]**

"Regarding the practical, some technical problems make online exams and assessment impractical." **[Participant 21 - Lecturer]**

Another interviewee pointed out that the use of E-assessment was ineffective in some courses because it needs more technical assessment from the university:

"Ineffective for some courses, especially, if I need to design the exam questions such as open questions. Sometimes, I face some technical issues which need more support from the deanship of E-learning." **[Participant 6 - Assistant Professor]**

In summary, all participants confirmed that E-assessment is an important factor for the effective implementation of E-learning. Although there are some practical issues with using E-assessment, E-assessment helps academic staff to track students' progress and helps students to achieve the required level of learning outcomes. Therefore, this factor was included in the final framework.

5.4.5 Students' Readiness

This factor concerns students' awareness of E-learning systems, and their willingness to use such systems. The focus is on sub-factors that influence the students' readiness for E-learning systems adoption, in terms of the interaction and motivation, and knowledge and skills required to use the system (see section 4.6.6.2). Thus, interviewees were asked: Do you think the students' readiness factor is an important consideration when implementing E-learning in Saudi universities? Sixty-three per cent of the respondents agreed that students' readiness is an extremely important factor for the success of E-learning. The remaining respondents also confirmed the importance of this factor, with responses ranging from 'moderately important' to 'very important' (see Figure 38).

"Yes, it is an extremely important factor. If students are not ready then it will be difficult for us [academic staff] and them to have a fruitful discussion." **[Participant 12 – Assistant Professor]**

"Yes, it is extremely important. The readiness of students to use the new technology is significant to the success of implementing e-

learning in any university whether in Saudi Arabia or not."
[Participant 21 - Lecturer]
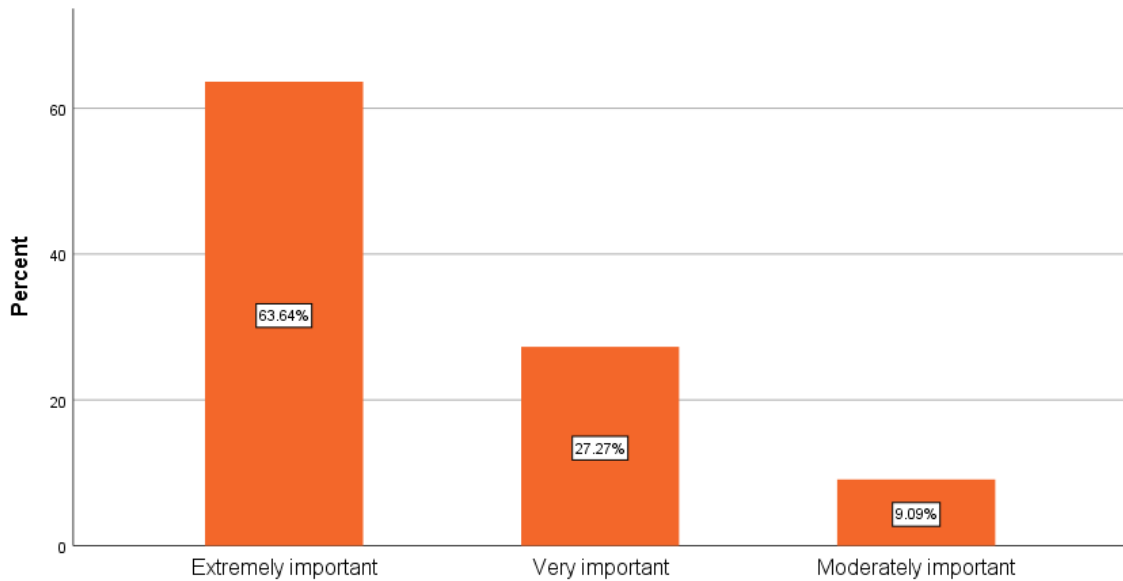
Figure 38: Participants' views on the importance of students' readiness

5.4.5.1   Interaction and motivation

In response to this sub-factor, some participants mentioned that students interact with them through E-learning systems:

> *"My students well interact with me when I asked them any homework by E-learning."* **[Participant 14 - Assistant Professor]**

Other participants commented that, despite the benefits of E-learning and the interactivity with students and with courses, students believed that their feeling of isolation decreases their motivation within the E-learning environment:

> *"I think students may not be motivated to take a course since they are in isolation. While e-learning can be quite interactive these days, through the use of video conferences, webinars, and face-to-face video chat, it still isn't the same as sitting across the room from a real person. Simply put, students believe that there is no substitute for interacting with, and learning from, a fellow human."* **[Participant 9 - Associate Professor]**

> *"It is transparent. E-learning as a method of education makes the learners undergo contemplation, remoteness, as well as lack of*

interaction or relation. It, therefore, requires a very strong inspiration as well as skills with the management of time in order to reduce such effects. It makes us dull and lazy by doing nothing with hands and feet. Since no face to face interaction, hence gives less moral education towards society." **[Participant 13 - Associate Professor]**

On the other hand, one participant raised that issue that not all courses lend themselves to the online mode of teaching. For instance, he said teaching statistics courses might not be feasible via E-learning as some students need to interact face-to-face with the teacher for further discussion:

"From my experience, I have been teaching statistics using a virtual environment. It was actually hard at the beginning and a lot of students are complaining about the difficulty. Some students asked to schedule face-to-face classes every other week. Teaching mathematics or statistics online is different than other subjects. Student needs to interact directly with the teacher or to raise his hand whenever he has a misunderstanding." **[Participant 5 - Lecturer]**

5.4.5.2   Knowledge and skills

Interviewees expressed their views that students are ready for E-learning and have the knowledge and skills necessary to accomplish their work online. One of the participants stated:

"In my opinion, I think students are ready for e-learning in terms of IT skills. Most of my student have easy, reliable and fast access to the Internet with even mobile. Students are comfortable with working with files, Internet browsing and searching, electronic mail, sending and reading attachments, word processing, and sometimes downloading and installing software." **[Participant 21 - Lecturer]**

Students should have adequate knowledge and skills enabling them to use an E-learning system. Thus, it is important to provide E-learning workshops and training programs for students to prepare them for E-learning systems. Some participants suggested that students need training programs to avoid the difficulties of using E-learning:

"Student's readiness is a crucial factor and it can be done via

conducting workshops class visiting and using posters everywhere to help to raise awareness." **[Participant 20 - Lecturer]**

In brief, students' readiness was confirmed by the participants as an important factor for the effective implementation of E-learning in the Saudi universities. Therefore, this factor was included in the final research framework.

5.4.6 Personal Management Issues

This factor refers to the effect on the academic staff of using E-learning systems in terms of E-learning experience and time management (see section 4.4.8.4). Seventy-two per cent of interviewees confirmed that personal management issues very much influence the implementation of E-learning systems; the responses of the remaining interviewees ranged from 'extremely' to 'moderately' influence (see Figure 39).
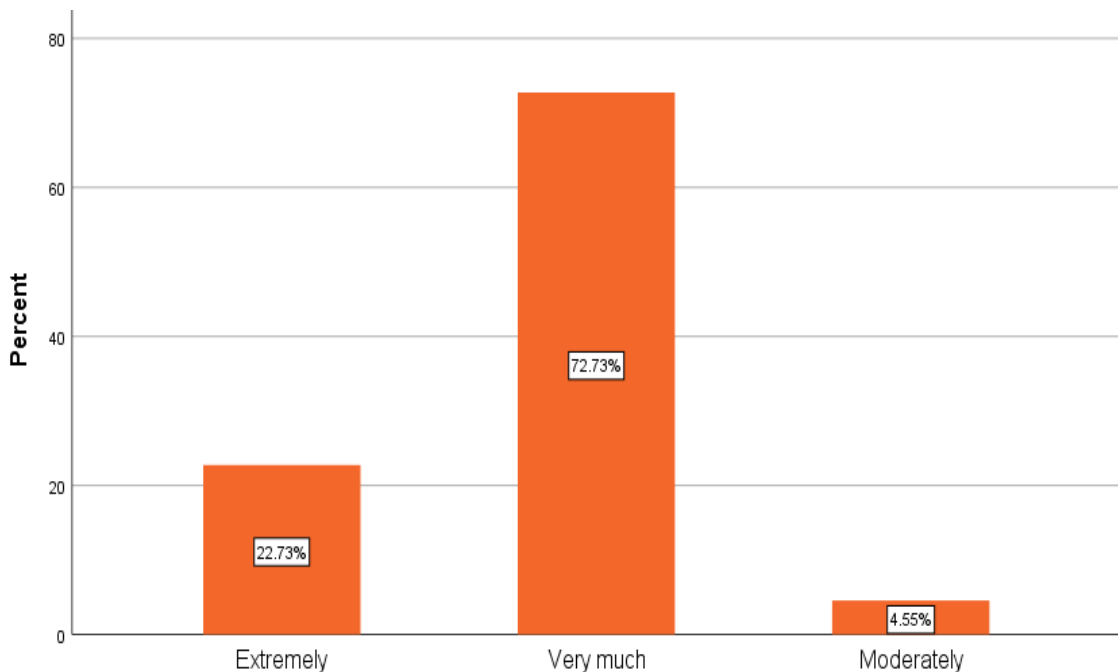
Figure 39: Participants' views on the influence of personal management issues in E-learning implementation

5.4.6.1   E-learning experience

Interviewees were asked to describe their experience and knowledge regarding the use of E-learning systems. They asserted that academic staff's experiences influence the implementation of E-learning. In addition, they acknowledged that E-learning experience is vital to appreciating the advantages of E-learning, and that it can enhance their teaching practices:

"It is very much influence. From my experience, I used to take many courses as E-learning to maximize my knowledge and enrich my experience. E-learning has lots of advantages such as, convenient with your own time schedule, flexibility of taking a course, less money, and providing international certificate without travelling."
[Participant 3 - Assistant professor]

"E-learning provides me with opportunities and different challenges for my course or program. Since it's delivered online, E-learning solutions can include tests, quizzes, activities, videos and images."
[Participant 4 - Assistant Professor]

One of the participants commented on the importance of E-learning experience, pointing out that lack of experience may result in some lecturers being reluctant to use E-learning systems. To overcome this issue, he suggested that academic staff need more support to set up their classes:

"As my background is in IT, I have some experience with the E-learning systems. However, some lecturers may hesitate to use due to lack of experience. This issue should be done by the technical support to help them set up their classes, and all course contents should be arranged on each academic portal." **[Participant 22 - Lecturer]**

5.4.6.2   Time management

For this sub-factor, some interviewees emphasised that time management is a very important factor in implementing E-learning effectively. They expressed these views:

"You have to be online as much as you can for interactivity and collaboration. So, time management is very important."
[Participant 12 - Assistant Professor]

"The lecturer has to be able to manage the time through the online lecture. How to use and move between the tools effectively. How to solve problems that might occur during the online lecture. Controlling all these factors will result in the influence of

implementing e-learning effectively." **[Participant 5 - Lecturer]**

On the other hand, two interviewees stated that the lack of time management will influence the use of E-learning tools. They suggested that the university should provide financial incentives for academic staff, and encourage students by giving them extra marks for actively contributing to the success of E-learning in their institutions:

> *"If you don't manage your time to utilise the advantages of e-learning it will be hard to use these tools effectively. Therefore, lecturers should be given incentives in order to encourage them to effectively participate in the success of E-learning. They can be encouraged by awarding them by prise like increase their salaries and encourage student by giving them extra marks."* **[Participant 20 - Lecturer]**

> *"Some staff reflects that they do not want to use E-learning as it is consuming time and they do not have enough experience. In addition, they highlighted that using technology is demanding so there should be an increase in their salary. In [....], we received many emails forcing us to use Blackboard tools. I think some staff do not like the way of forcing so encouraging using E-learning can be rewarded especially in the Saudi context as there are many factors affecting using it."* **[Participant 1 - Assistant Professor]**

To conclude, all participants confirmed that E-learning experience and time management skills are crucial factors affecting academic staff's attitudes towards the implementation of E-learning systems. Although there are some issues in using E-learning systems, participants suggested that the Saudi universities should give full support to the needs of academic staff and increase their efforts through clear incentives and providing training so that they can contribute to the success of E-learning. Therefore, the personal management factor was included in the final research framework.

5.4.7 The refined E-learning framework evaluation

The purpose of this section is to further explain and justify the inclusion of each factor in the final framework. This section provides an overview of interviewees' responses regarding the

effectiveness of the E-learning framework. Generally, positive responses were given by the participants. As shown in Figure 40, seventy-seven percent of interviewees confirmed that the E-learning framework comprises the factors necessary for the effective implementation of E-learning in the Saudi Arabian higher education. Two interviewees stated:

"The framework included most of the factors that need to be considered for the implementation of E-learning in Saudi universities. So, it seems to be very good." **[Participant 12 - Assistant Professor]**

"Useful framework and would definitely help in bringing out important reforms and additions to improve E-learning systems. Good luck!" **[Participant 6 - Assistant Professor]**
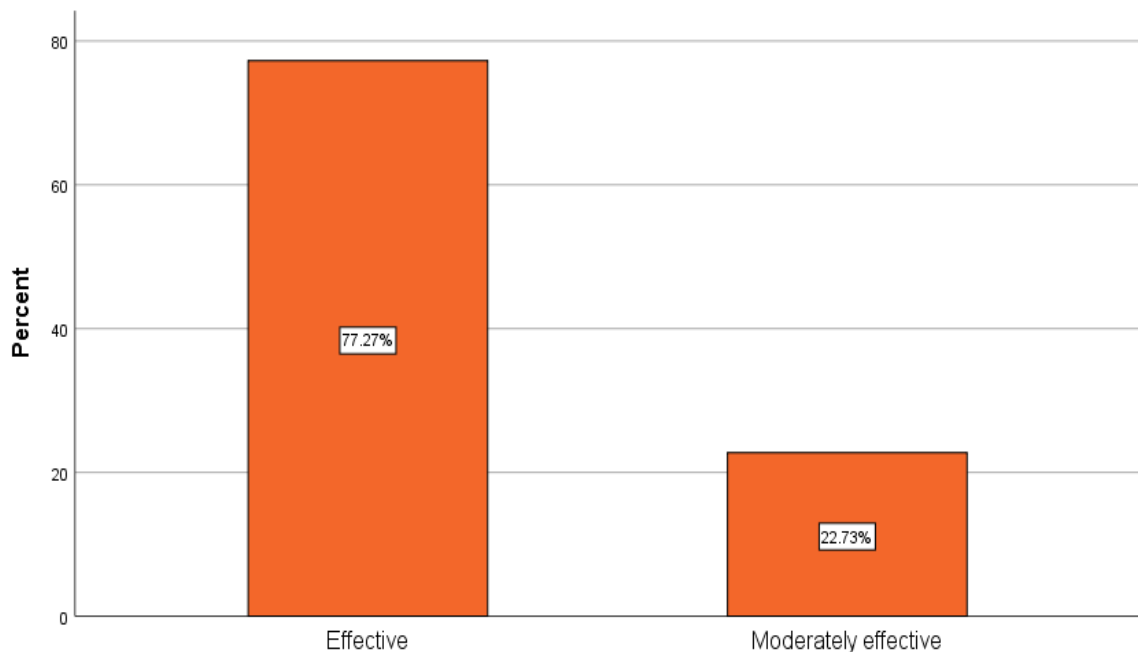
Figure 40: Participants' evaluation of the refined E-learning framework

"All of these factors are important in the effectiveness of E-learning use in Saudi higher education. I don't think I would add or delete any factor from the framework or its definitions." **[Participant 11 - Associate professor]**

"Your framework accommodates most of the important factors to use

E-learning systems in Saudi universities. It is effective in this context." **[Participant 20 - Lecturer]**

"This framework combines different elements of E-learning, which is good to be considered them all." **[Participant 22 - Lecturer]**

Most of the interviewees agreed with all identified factors in the refined framework and they did not wish to add or remove any factor.

5.4.8 Training programs

During the interviews, the participants confirmed the importance of training in influencing the academic staff and student attitudes towards using E-learning systems. The interviewees were asked to what extent it is important to offer training to academics and students on the use of E-learning systems. Figure 41 shows that 54.55% of participants agreed that this factor is extremely important for the success of E-learning. The rest of the participants also confirmed the importance of this factor, with responses ranging from 'moderately important' to 'very important'.
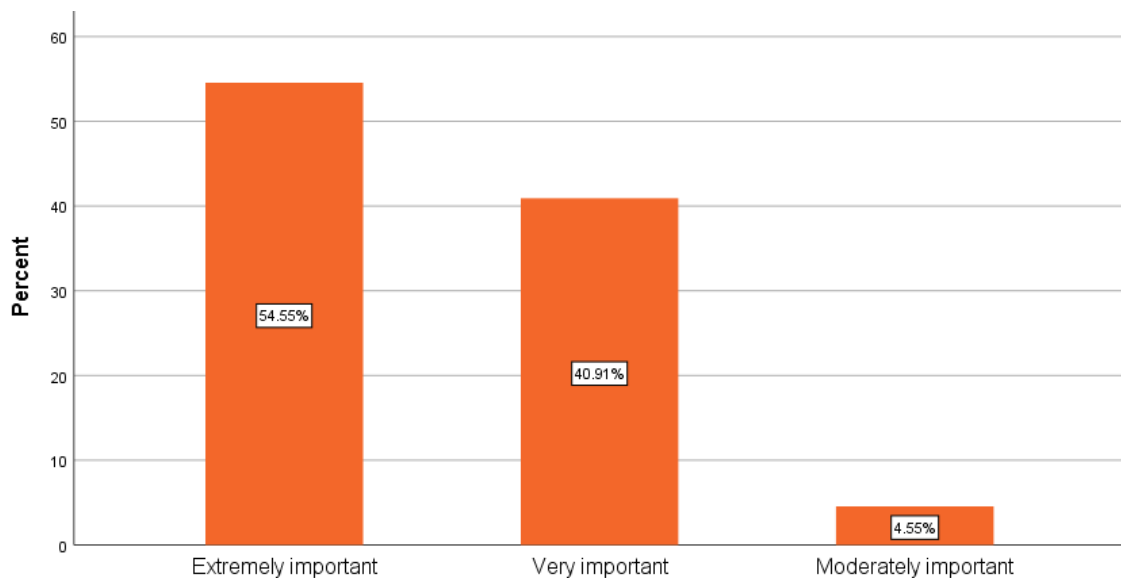
Figure 41: Participants' views of the importance of training for academics and students

5.4.8.1   Academics staff training

The majority of participants stated that they had received formal training by the university in the use of E-learning systems. They clarified this by explaining that the university provided them with training sessions to provide online courses:

"Yes, my university does many online courses and workshops about

Blackboard which make it easier to attend since I live far from the university." **[Participant 2 - Lecturer]**

"Yes, the department of IT in my university always try to conduct a training session or sometimes they upload a tutorial on how to use any kind of IT such as Blackboard." **[Participant 11 - Associate Professor]**

"Yes. I have a good technical background and I took many online courses. I took a course on how to provide online courses." **[Participant 3 - Assistant Professor]**

However, other participants stated that the university needs to run training courses for those academics who have insufficient knowledge and skills to integrate E-learning in their learning and teaching practices in order to show them how to use E-learning tools correctly:

"I think academic staff do not feel sufficiently prepared to use ICT in their classrooms. I think the integration of technology in the educational field is a complex innovation for academic staff in Saudi Arabia. They need more training, especially for the newly joined faculty." **[Participant 21 - Lecturer]**

"Yes, it is very important. The lecturer needs to be updated about the new techniques that can help them to deliver knowledge. For example, there are many online tools that an instructor can use, but not all the teachers know how to apply them effectively through the teaching process. I think the department or the university has to run training workshops for online instructors to train them on how to use the online tools in the right way. Training workshops for academic staff are necessary to cover the gaps." **[Participant 5 - Lecturer]**

"Yes, it is extremely important. I think they just need to know the exact benefits of using the E-learning method." **[Participant 1 - Assistant Professor]**

"Yes, I do think the academic staff have the knowledge and required skills to integrate E-learning in their learning and teaching practices, but they need more of it as it is not sufficient." **[Participant 17 - Associate Professor]**

"Despite the fact that we are using technology in our daily life, sometimes it is difficult to apply it in pedagogical way. However, I do believe that individual can keep improving their skills by attending training for personal development or the institutions should provide workshops for their academic staff to improve their skills." **[Participant 16 - Assistant Professor]**

5.4.8.2 Student training

All participants emphasised the importance of involving students in the training courses to improve their knowledge and skills, thereby enabling them to effectively use E-learning systems. They pointed out that students need to be ready by attending E-learning workshops, whilst lack of training will make them hesitant to use E-learning:

"Yes. Students need to attend E-learning workshops as well, to prepare themselves on using it." **[Participant 22 - Lecturer]**

"Yes sure, it is very important to make them ready to work effectively with E-learning. Many students have no skills and ideas on how to use E-learning system." **[Participant 21 - Lecturer]**

"Yes, I strongly believe that students should be given training about such learning modes. As lack of training will make students hesitant to utilise such systems." **[Participant 14 - Assistant Professor]**

"Yes, absolutely. We are not working alone in blended or E-learning. Students are important in the learning process. How do we want them to be active if some of them lack the skills in using online materials?!" **[Participant 16 - Assistant Professor]**

"Yes, students must be ready there should be online training programs and videos available on the website because some of them

don't have the knowledge on how to use the Blackboard."
[Participant 19 - Lecturer]

Briefly, the training of academics and students was seen by all participants as an important factor in the success of E-learning systems. Although Saudi universities do provide training and development programs for both academic staff and students, all participants confirmed that there is still a need for more training programs for recently-employed academic staff as well as students who have insufficient skills to use E-learning and benefit from its features. Therefore, this factor was included in the final research framework.

5.4.9 Learning theories

Learning theories refer to the practices that can be used to ensure that course content is conveyed effectively online. Respondents confirmed the importance of learning theories in supporting the integration of E-learning systems in Saudi universities. About 45% of interviewees answered that this factor is 'very important', while the rest of the interviewees selected 'extremely important' and 'moderately important' (see Figure 42).

Interviewees stressed that academic staff need to consider cognitive theory and its impact on student engagement in the E-learning process, suggesting that the use of a variety of E-learning tools will strengthen students' motivation and help them to understand the course content. One of the interviewees stated:

> *"Yes, it is extremely important. Learning theories still need a lot of development in Saudi higher education. The cognitive load theory and expertise reversal effects need to be considered more often. For example, mathematics lecturer needs to develop teaching and learning mathematics using diverse tools to encourage students to be active in the online class; lecturer needs to build students thinking skills and help them how to solve problems that they face over learning mathematics."* **[Participant 17 - Associate Professor]**
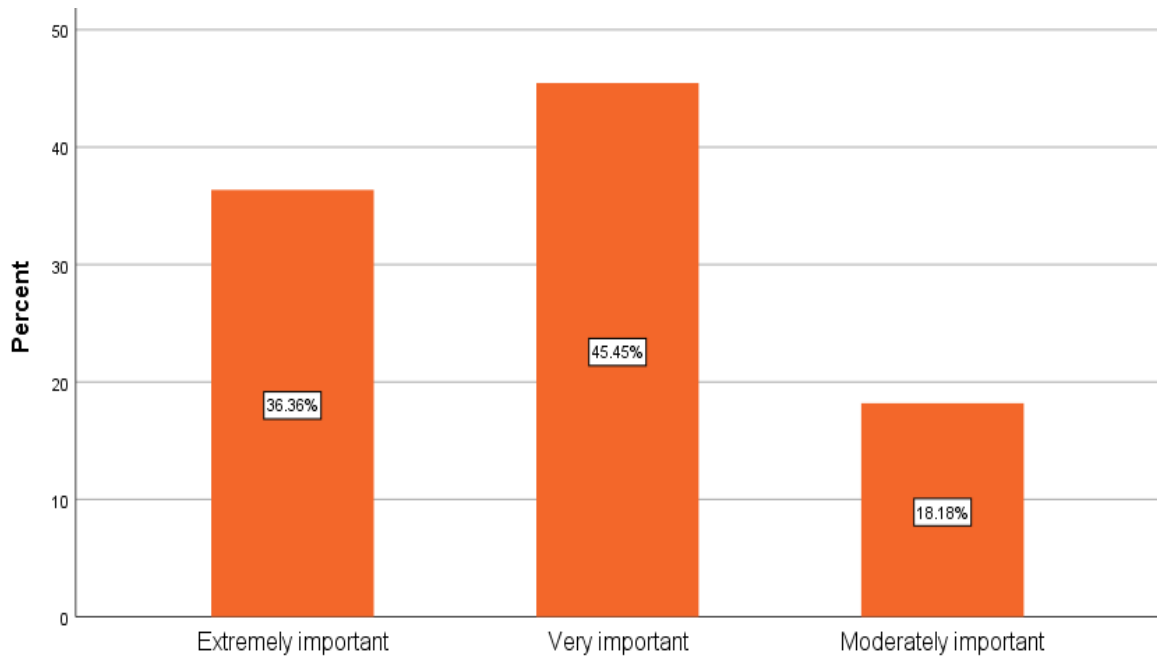
Figure 42: Participants' views on the importance of learning theories

Two respondents emphasised that there is a need to align learning theories and learning activities for the effective integration of E-learning:

> *"I think it is very important as it helps teachers or practitioners to design the activity taking into account the pedagogical goals. That is to say, sometimes the teacher wants to design an activity using technology, however, the lack of knowledge in using technology hinder any innovation or creativity."* **[Participant 16 - Assistant Professor]**

> *"It is very important; lecturers should be aware of the pedagogical side in order to successfully integrate E-learning. Therefore, E-learning needs to be aligned with theory and practices."* **[Participant 20 - Lecturer]**

Overall, learning theories were seen by the interviewees as an important factor for the effective implementation of E-learning. However, this factor was deleted from the quantitative analysis as it did not load on any factor, although the qualitative results confirmed the importance of learning theories in improving teaching and learning in the E-learning environment. Therefore, this factor was included in the final framework.

5.4.10 Teaching strategies

Half of the interviewees (50%) agreed that teaching strategies are an extremely important factor in supporting the implementation of E-learning in their teaching, while the rest of the participants selected 'very important' and 'moderately important' for this item (see Figure 43). Interviewees agreed that they integrate different E-learning tools in their teaching strategies to interact with their students as shown by the following comments:

> *"Yes, I used to upload course materials and lecture notes in Blackboard, and I use some learning activities such as e-mail group, and announcement for the exams and group projects. Such activities allowed me to interact with my students. So, they can share their ideas on the topic delivered, given regular feedback which reflects students' progress."* **[Participant 12 - Assistant Professor]**

> *"Yes, it is extremely important. E-learning tools are very useful for learning and teaching purpose. We can give quizzes, assignments having different category of questions".* **[Participant 17 - Associate Professor]**
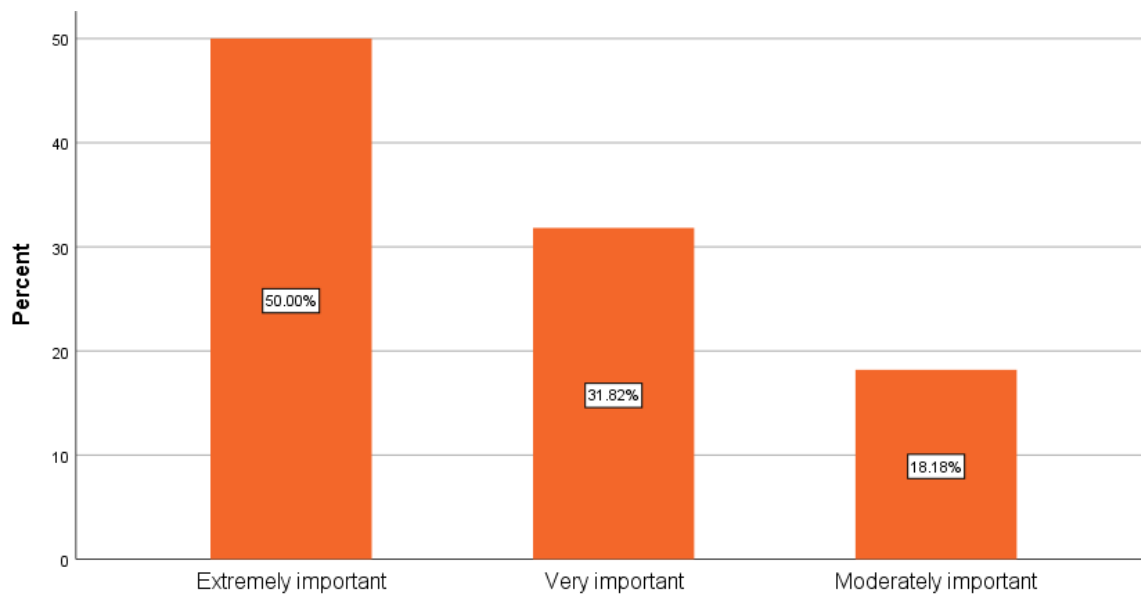
Figure 43: Participants' views on the importance of teaching strategies

However, other participants believed that some Saudi universities need to change their current traditional teaching practices which appear to discourage students' creativity. The following comments are indicative of their opinion:

"I think still some Saudi universities use regular education method (face to face) or blended learning. E-learning is promising but to be effective it needs collaboration of many institutional, social-cultural factors. Saudi universities need to evaluate the effectiveness of current teaching strategies and improving teaching method. As in view of Saudi Vision 2030, we must have an advanced educated pool of youths which can give their best in the progress of the nation."
[Participant 16 - Assistant Professor]

"It is very important to change the traditional way of delivery in Saudi Arabia that hinder noticing students' creativity. Also, it will enable the teacher to vary in delivering the materials using a variety of E-learning tools and make the learning process more vivid."
[Participant 18 - Lecturer]

In summary, all participants confirmed the importance of considering different teaching strategies when implementing E-learning in Saudi universities. Although this factor was deleted from the quantitative analysis as it did not load on any factor, the qualitative results confirmed that teaching strategies are important for the effective implementation of E-learning. Therefore, this factor was retained for the final research framework.

5.4.11 Cultural factors

The purpose of this section is to determine the influence of the elements of culture difference, gender segregation and attitudes toward the effective implementation of E-learning in Saudi universities. Cultural factors were validated using quantitative analysis but were deleted as they did not load on any factor. The statistical results showed that cultural factors do not influence the implementation of E-learning in Saudi universities.

During the interviews, the participants were asked whether the cultural factors are important, and whether they could affect the implementation of E-learning in Saudi universities. More than half of the participants (54.55%) believed that cultural factors do not influence the implementation of E-learning in Saudi universities, and the remaining participants believed that this factor has some influence (see Figure 44).
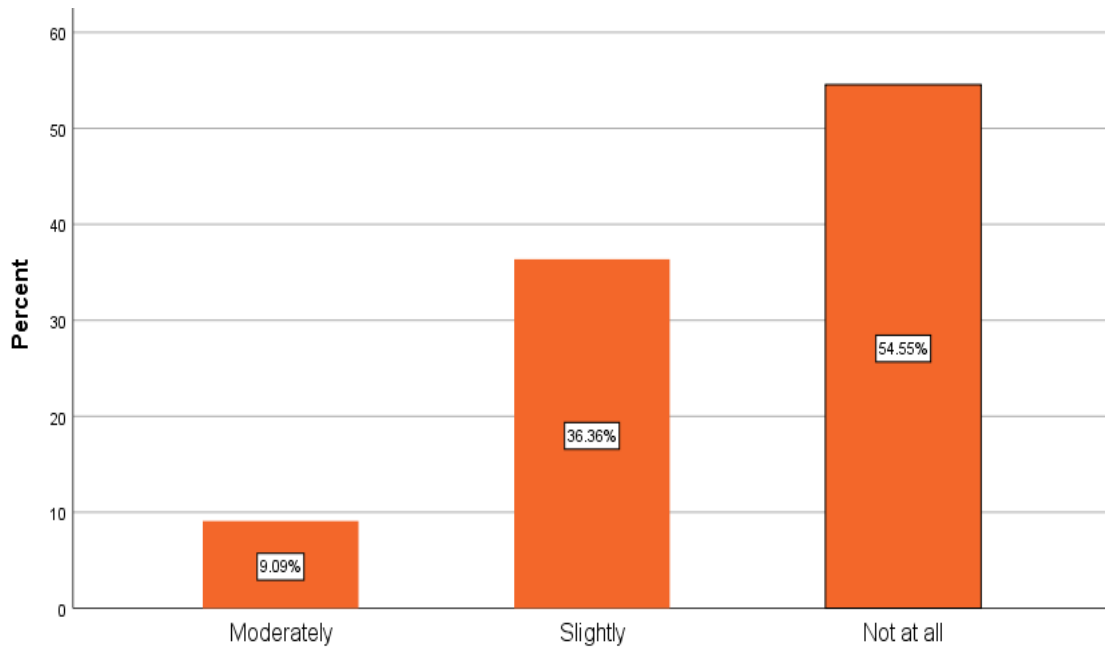
Figure 44: Participants' views on the importance of cultural factors

Fifty-four percent of the participants who answered 'No' gave reasons. They confirmed that cultural factors do not influence the implementation of E-learning in Saudi universities, stating that E-learning is a smart solution for gender segregation and they benefited from this technology by introducing the online classes for both genders:

> *"No, it will not influence."* **[Participant 10 - Assistant Professor]**

> *"No. I don't think so."* **[Participant 12 - Assistant Professor]**

> *"No. Because we have mixed (boys and girls) virtual classes and the learning outcomes have been all accomplished."* **[Participant 19 - Lecturer]**

> *"E-learning is a very smart solution for gender segregation. E-learning is for everyone."* **[Participant 20 - Lecturer]**

However, other participants believed that cultural factors do have some influence:

> *"Yes. It could influence to an extent in many places."* **[Participant 6 - Assistant Professor]**

> *"Well, the culture might play a role in personality despite the changes and initiatives we notice these days in some Saudi universities."* **[Participant 16 - Assistant Professor]**

One respondent was uncertain about the influence of cultural factors on the use of E-learning systems; he said:

> *"It could have an influence, but not that really important. In Saudi Arabia I think females are passive compared to males in the use of new technology and males are more confident than females."*
>
> **[Participant 21 - Lecturer]**

Although few participants believed that cultural factors do have an influence to some extent, 54.55% of participants believed that cultural factors do not influence the implementation of E-learning in Saudi universities. They indicated that E-learning is a smart solution for gender segregation issues because teaching and learning can take place in virtual classes (Participants 21,19). Moreover, both quantitative and qualitative results confirmed that cultural factors do not influence the effective implementation of E-learning. Therefore, this factor was removed from the final framework, since there is no difference between males and females in terms of using E-learning systems and culture does not influence E-learning. Besides, both genders can interact through the Internet and exchange information and knowledge via this technology. This is one of the Saudi government initiatives in "Saudi Arabia's Vision 2030" for the improvement of education in Saudi universities.

5.4.12 Digital technology

The quantitative results showed that digital technology did not load on any factor. Therefore, this factor was omitted from the final E-learning framework. For the design of the interview questions, several IS academics recommended that the digital technology factor be combined with the E-learning management systems factor in the final framework. The reason is that they considered this factor is common to any technology, and it could create misunderstanding or confusion for the interviewees. Hence, the researcher combined the digital technology factor with E-learning management systems in the final framework based on the experts' opinions.

5.5 Summary of Interview Findings

This section presents the qualitative results yielded by the academic staff data. The interview data confirmed the importance of all identified factors in the refined E-learning framework. The factors were validated by means of qualitative data analysis and consolidated to form the final framework (see Table 32). The interviewee data confirmed that technical learning management systems and other subfactors such as Internet connectivity, technical support,

ICT resources, and usability are extremely important factors for the effective implementation of E-learning. Interviewees indicated that adequate Internet access and technical support are crucial for online classes. Other interviewees believed that the existing technical issues such as network failure, and the delay in response from IT support will influence the actual use of E-learning systems. Moreover, two respondents pointed out that E-learning is not easy, stating that teaching online requires lecturers to undertake a lot of work in order for E-learning to be effective, especially for those academic staff who have less experience in using E-learning for their course delivery.

The technological pedagogical knowledge and technological content knowledge (TPTCK) factor has two sub-factors: technological pedagogical knowledge (TPK) and technological content knowledge (TCK). The qualitative results indicate that the participants agreed that this factor is crucial to the effective implementation of E-learning system. They indicated that academic staff need to have a sound knowledge of E-learning tools to facilitate teaching and improve the delivery of course content. The E-learning management systems factor has two sub-factors: course design and communication tools. The qualitative results showed that the participants confirmed the importance of E-learning management systems for the effective implementation of E-learning. They indicated that the system must be designed so that information is presented clearly to meet students' needs and improve their learning outcomes.

Further, the findings of this research confirmed that E-assessment and other sub-factors such as (reliability and security), and (practical issues) were very important for the evaluation of students' learning outcomes in E-learning systems. Although the surveyed academic staff revealed that E-assessment is better than traditional assessment, and that it helps them to evaluate students' progress and saves time and effort, the qualitative data suggest that one obstacle to using E-assessment is that the security system needs to be strong to prevent students from cheating in the online exams. One participant indicated that E-assessment cannot be used for some courses, and the technical issues need more support in his university.

In terms of the students' readiness factor, the qualitative results revealed that this factor is extremely important for the success of E-learning. Students' readiness to use E-learning consists of two sub-factors: (interaction and motivation), and (knowledge and skills). The study results indicate that academic staff interact with students using various E-learning tools. However, some participants believed that the lack of interaction and the sense of isolation led to students becoming less motivated and less engaged during online lectures.

Moreover, the results showed that there is a need for training programs and workshops, especially for those students who have insufficient knowledge and skills to avoid the difficulties of using E-learning systems.

For personal management issues and its sub-factors comprising E-learning experience and time management, the findings revealed that this factor strongly influences the success or otherwise of E-learning systems. Although E-learning experience is vital to realising the benefits of E-learning, and can improve teaching practices, one participant believed that some lecturers may be reluctant to use E-learning due to lack of experience. He suggested that academic staff need more support from technical personnel to set up their online classes. On the other hand, two participants indicated that lack of time management influences the use of E-learning. They suggested that Saudi universities should offer incentives to academic staff to encourage them to contribute to the success of E-learning.

Although some factors - digital technology, training programs, learning theories, teaching strategies and cultural factors - were deleted from the quantitative phase as they did not load on any factor, the researcher retained those factors for further consideration to establish the final factors that influence the effective implementation of E-learning. The digital technology factor was combined with the E-learning management systems factor in the refined framework, since digital technology is considered common to any technology and it could cause misunderstanding or confusion for the participants during the interviews. In terms of the training factor, the qualitative results showed the importance of training for both the academic staff and students to facilitate the use of E-learning. The participants confirmed that there is a need to provide training programs for those academic staff who have insufficient skills or for new faculty members as well as students.

The qualitative results confirmed the importance of learning theories for the implementation of E-learning systems in Saudi universities. The participants indicated that E-learning needs to be aligned with theories and practices to ensure students' engagement in the learning process and help them to understand course content. In terms of teaching strategies, the interview data confirmed that this factor is extremely important for the implementation of E-learning systems. From the results, it is evident that Saudi universities still use traditional teaching strategies or, at best, a blended learning mode when delivering course materials; hence, there is a need to change current strategies and improve teaching methods so that they align with the objectives of Saudi Arabia's Vision 2030. In regard to cultural factors, the results from the interviews indicated that E-learning is a smart solution for gender

segregation issues because learning can take place in virtual classes conducted for both genders. This finding confirms the quantitative results in the previous phase which suggest that cultural factors do not influence the effective implementation of E-learning. Consequently, this factor was removed from the final framework. Table 32 summarises the research findings.

Table 32: Summary of the research findings

Initial framework	Refined framework after EFA		
Total factors for academic staff and students	**The factors after the online survey**	**The factors after the interviews**	**The factors in the final framework**
ICT Factors • Internet connectivity • Technical support • Hardware and Software • Usability • HCI	**Technical learning management systems** • Internet connectivity • Technical support • ICT resources • Usability	**Technical learning management systems** • Internet connectivity • Technical support • ICT resources • Usability	**Technical learning management systems** • Internet connectivity • Technical support • ICT resources • Usability
TPTCK • TK • TPK • TCK	**TPTCK** • TPK • TCK	**TPTCK** • TPK • TCK	**TPTCK** • TPK • TCK
	E-learning management systems • Course design • Communication tools	**E-learning management systems** • Course design • Communication tools	**E-learning management systems** • Course design • Communication tools • Learning theories • Teaching strategies
Teaching Principles • Course content • Course design • E-assessment • Knowledge and skills • Digital technology • Training programs • Learning theories • Teaching strategies	**E-assessment** • Reliability and security • Practical issue	**E-assessment** • Reliability and security • Practical issue	**E-assessment** • Reliability and security • Practical issues
	Students' readiness • Interaction and motivation • Knowledge and skills	**Students' readiness** • Interaction and motivation • Knowledge and skills	**Students' readiness** • Interaction and motivation • Knowledge and skills
	Personal management issues • E-learning experience • Time management	**Personal management issues** • E-learning experience • Time management	**Personal management issues** • E-learning experience • Time management • Training programs
Learning Attributes • Interaction • Peer learning • Reflection		Digital Technology	
		Training programs	
		Learning theories	
Personal Factors • Culture • Student motivation • Personal management		Teaching strategies	
		Cultural factors	
• The factors removed from the online survey as they did not load on any factor after EFA			
• The exclusion factors were chosen to be retained in the interview phase			
• Digital Technology factor was joined with E-learning management systems after the interviews			
• Cultural factors were deleted from the final framework			

5.5.1 The final framework (ELFSAU)

As discussed above, all participants confirmed the importance of all factors in the final framework except the cultural factors which were deleted, and digital technology was combined with E-learning management systems. The final E-learning implementation framework for Saudi Arabian Universities (ELFSAU) contains all factors considered important for the effective implementation of E-learning system in Saudi universities: Technical Learning Management Systems, TPTCK, E-learning Management Systems, E-assessment, Students' Readiness, and Personal Management Issues. Furthermore, all sub-factors have been included in the last column of Table 32, titled "The factors in the final framework". Figure 45 depicts the final framework of E-learning implementation in Saudi universities.

Personal Management Issues
• E-learning experience
• Time management
• Training programs

Technical Learning Management Systems
• Internet connectivity
• Technical support
• ICT resources
• Usability

Students' Readiness
• Interaction and motivation
• Knowledge and skills

TPTCK
• TPK
• TCK

E-assessment
• Reliability and security
• Practical issues

E-learning Management Systems
• Course design
• Communication tools
• Learning theories
• Teaching strategies

ELFSA

Figure 45: The final E-learning implementation framework for Saudi Arabian Universities (ELFSAU)

5.6 Chapter Summary

The purpose of this chapter was to evaluate and confirm the validity of the identified factors that were included in the refined E-learning framework, and the extent to which E-learning is effectively utilised in Saudi universities. The refined framework was evaluated by twenty-two academic staff who work in Saudi Arabian universities, who fit well with the objectives of this current research. The study used semi-structured interviews which included both open-ended questions and multiple-choice items measured using a five-point Likert scale to

confirm the importance of current factors in the refined framework. The data was collected using NVivo 12 software and themes were identified to provide the explanatory basis for the quantitative findings. Based on the findings of the interviews, all the identified factors were confirmed by the participants, except for the cultural factor which was subsequently deleted, and the digital technology factor was combined with E-learning management systems in the final framework. Although most of the findings were positive, there were a few negative opinions which indicates the need to assess other issues related to technical learning management systems and the use of E-assessment. The next chapter concludes with the findings and outcomes of this research. The limitations of the current research, and suggested future research avenues are discussed.

Chapter 6: Conclusion and Future Research

6.1   Introduction

The previous chapter discussed the interview data analysis and findings, and confirmed the factors for inclusion in the framework that were validated by interviewees. The data obtained from the interview phase was analysed using NVivo 12 software and led to the construction of a final framework for the effective implementation of E-learning in Saudi universities (ELFSAU).

This chapter concludes this research thesis. As discussed in Chapter 2, a comprehensive literature review was carried out to examine the previous models developed to promote the successful implementation of E-learning in the higher education sector. From this literature review, a list of factors was identified as being theoretically essential to the effective implementation of E-learning. Following this, all the factors were combined to develop an initial framework which was then evaluated using a mixed-methods approach which involved collecting quantitative and qualitative data described in Chapter 3 (the research methodology chapter). The analysis of the results confirmed the importance of the identified factors and yielded additional sub-factors which were later incorporated into the final framework (ELFSAU); the findings of this study were presented in Chapter 4 and Chapter 5.

This chapter provides an overview of this study. It begins with a summary of the research, including the purpose of the study, the research process and methodology. Subsequently, a review of research questions to summarise the main findings is provided. Then, recommendations are made, informed by the research findings and analysis. The limitations of this study are then discussed. At the end of this chapter, the significance of this research is explained, and future research avenues are presented, followed by the chapter summary.

6.2   Summary of Research

This section revisits the study's aims, processes and the research design and methodology. The growing number of E-learning initiatives around the world have prompted researchers to investigate the successful implementation of E-learning. E-learning has changed the knowledge acquisition process and the dissemination of information within the higher education sector. E-learning plays a vital role in teaching and learning, and its implementation depends on the quality of electronic sources of knowledge such as Internet

technologies, computers, social networks and new instructional technologies (Andersson, 2008; Keramati et al., 2011).

The effectiveness of E-learning is essential if it is to maximise and sustain the usage of this system within universities. Many previous studies have focused on ways to make E-learning successful. However, few studies have examined the factors influencing the adoption and acceptance of E-learning (Alenezi, 2012; Algahtani, 2017). Thus, it was necessary to focus on ways to implement E-learning effectively in higher education, especially in Saudi Arabia. The success of E-learning is not merely dependent on the ICT infrastructure. Other factors significantly influence how well E-learning is utilised by academic staff and students in universities. Therefore, identifying a set of important factors that influence the effective implementation of E-learning in Saudi Arabian higher education was the backbone of this research.

The aim of this study was to develop, using a mixed-methods approach, a conceptual framework to improve the attitudes of academic staff and students towards the use of E-learning. It is hoped that the outcomes of this research can assist Saudi universities to make E-learning effective, and will guide further research in this area. The research process is summarised in Figure 12, which includes a comprehensive review of relevant E-learning literature and previous studies, a quantitative online survey, and qualitative interviews. At the beginning of this research, the meaning of E-learning and various E-learning definitions were presented. The advantages and disadvantages of using E-learning in different fields were explained, and challenges were identified and discussed in Chapter 2. In the same chapter, an initial framework (Figure 6) was developed comprising factors (listed in Table 6) considered as significant for the effective implementation of E-learning. In this initial phase, this first list of factors was derived from a comprehensive literature review of previous studies on E-learning.

In order to investigate the factors in the preliminary framework, appropriate research methods and techniques were chosen (Chapter 3). The mixed-methods approach, specifically a sequential explanatory research design, was applied using quantitative and qualitative methods to obtain accurate and reliable results. Chapter 4 gives the details of the online survey data analysis and findings. A pilot study was conducted to validate the preliminary framework, and the feedback was used to refine and finalise the survey for the quantitative phase. Following the pilot study, an online survey was developed based on the initial framework. The purpose of the online survey was to investigate each of the factors and determine whether it should be included in the initial framework. The survey questionnaires

were disseminated online to students and academic staff in Saudi universities using the Qualtrics platform. Five hundred and eighty-six students, and 118 academic staff returned valid responses. The data collected from the online survey were analysed for reliability using IBM SPSS software (version 25).
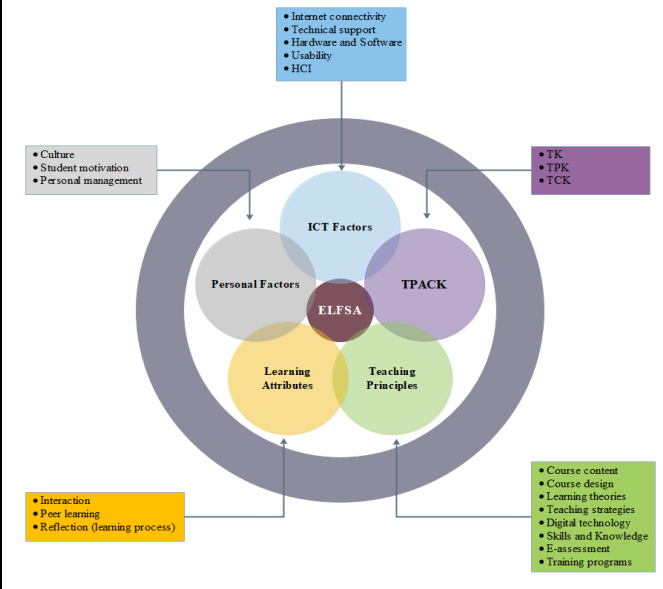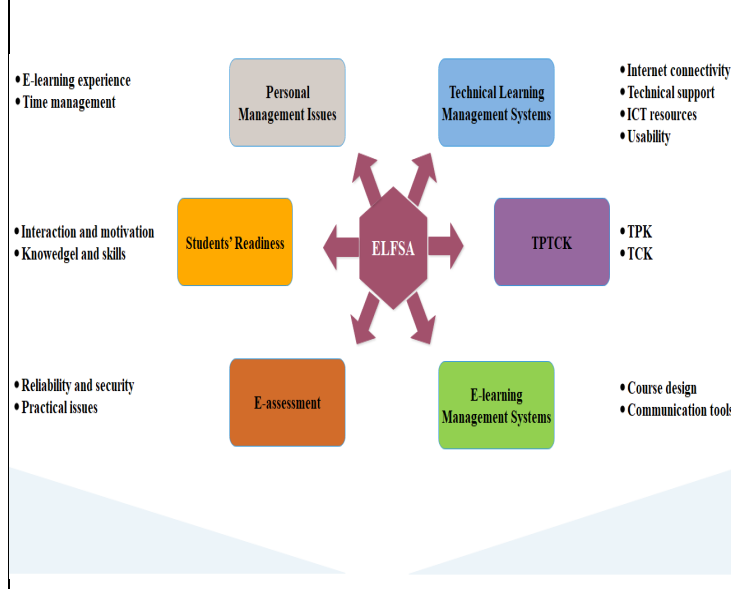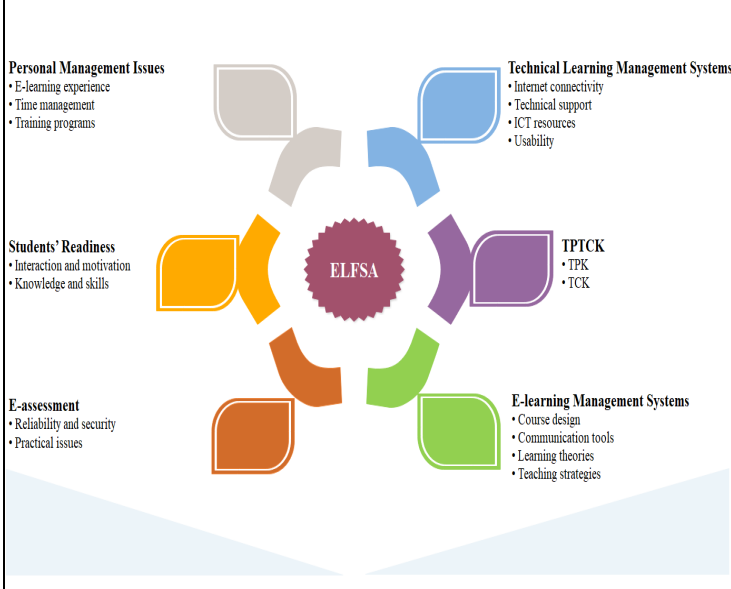
All the factors were validated using exploratory factor analysis (EFA) to reduce the number of factors to be utilised for the improved framework. The results obtained from the online survey are presented in Figure 28. As shown in Table 26, the outcomes of the data collection and analysis conducted in the quantitative phase reveal a number of changes to the way the initial framework was presented; those changes were incorporated in a refined framework. Six main factors were extracted from academic staff and students' findings and involved in the refined framework, namely, Technical Learning Management Systems, TPTCK, E-learning Management Systems, E-assessment, Students' Readiness, and Personal Management Issues. Most of the main factors have sub-factors, making the refined framework more inclusive. Five sub-factors were eliminated from the online survey as they did not load on any factor after EFA, but were retained for the final phase. These factors were: Digital technology, Training programs, Learning theories, Teaching strategies, and Cultural factors.

Interviews were conducted in the final phase of this research. Chapter 5 discussed the interview data analysis and findings in detail. The purpose of the interviews was to evaluate and confirm the validity of the identified factors that were included in the refined framework. The interviewees were selected from academic staff who work in Saudi Arabian universities and whose responses were likely to be relevant to the objectives of this research. The study utilised semi-structured interviews which involved both open-ended questions and multiple-choice items measured on a five-point Likert scale to confirm the importance of current factors in the refined framework. The data collected was analysed using NVivo (version 12) for the thematic analysis. The findings of interviews confirmed all the factors in the refined framework, except the cultural factors which were eliminated, and the digital technology factor was combined with E-learning management systems in the final framework presented in Figure 45. Ethics approval (HRE2018-0531) was sought from the Curtin University Human Research Ethics Committee prior to the commencement of the online survey and the interviews.

Finally, the outcome of this research is a conceptual framework for the effective implementation of E-learning in Saudi universities (ELFSAU). It is the hope of this researcher that this framework will assist Saudi universities to implement E-learning

successfully. For those universities that are already utilising an E-learning system, this framework offers valuable information to improve their current E-learning implementation strategy. Further, the proposed ELFSAU framework can benefit other countries in the Middle East which can adjust the factors based on their individual circumstances and characteristics. Another contribution of this study is the integrated research framework that could be applied in other developing countries and modified according to their needs. In Table 33, the research findings and all three stages of the research framework development are summarised.

Table 33: Stages of the (ELFSAU) development in this research

Stages of development of the framework for the effective implementation of E-learning in Saudi universities (ELFSAU)		
Version1	**Version 2**	**Version 3**
Initial framework (derived from the comprehensive literature review) (Figure 6)	Refined framework (developed based on the online survey of students and academic staff) (Figure 29)	Final framework (based on interviews with the academic staff - "E-learning experts") (Figure 45)

6.3   Fulfilment of the Research Objectives

This study investigated and analysed the opinions and attitudes of academic staff and university students regarding the effective implementation of E-learning in Saudi Arabian higher education in order to develop a novel framework for an E-learning system that would increase E-learning usage in the higher education sector in Saudi Arabia. Although E-learning is an excellent tool, it needs to be evaluated in terms of the factors which might support or hamper its implementation. To guide the research process, the following research questions were established:

RQ1: What are the factors that should be included in an E-learning framework for higher education in Saudi Arabia?

RQ2: What are the factors that will ensure the effective implementation of E-learning framework in Saudi higher education sector?

RQ3: What are the attitudes and opinions of academic staff towards the use of E-learning for higher education in Saudi Arabia?

In order to achieve the objectives of this research, answers to the following research questions were sought (shown in Table 4). Below, the extent to which each of these questions has been answered will be discussed. The first research question was:

- ***RQ1: What are the factors that should be included in an E-learning framework for higher education in Saudi Arabia?***

The discussion and results presented in Chapters 2, 4, and 5 – a comprehensive literature review, survey, and interviews – discovered the most common factors affecting the implementation of E-learning at Saudi universities, and these constituted the final E-learning framework shown in Figure 45. The first research question was intended to identify the factors necessary for developing an E-learning framework for higher education in Saudi Arabia. After reviewing the literature, an initial framework was developed comprising the factors shown in Figure 6, considered as being important for the successful implementation of E-learning. The preliminary framework contains five main factors, and each factor contains several sub-factors. The first factor relates to ICT: Internet connectivity, technical support, hardware and software, usability, and human-computer interaction (HCI). The second factor is TPACK, which consists of TK, TPK, and TCK. The third factor comprises teaching principles (including course content, course design, E-assessment, digital technology, skills and knowledge, learning theories, teaching strategies, and training programs). The fourth factor is the learning attributes, which involves interaction, peer

learning and reflection (learning process). The fifth factor consists of personal factors: culture, motivation, and personal management.

The answer to the first question provides the foundation for answering the second research question.

- ***RQ2: What are the factors that will ensure the effective implementation of E-learning framework in Saudi higher education sector?***

The aim of this question was to evaluate and validate the identified factors in the preliminary framework. This question was answered by conducting an online survey with academic staff and students. As discussed in Chapter 4, the data collected from the online survey were divided into two groups: academics and students. The results of the factor analysis of the data obtained from the academic staff and student survey were compared and yielded factors that shaped the second version of the E-learning framework for Saudi universities, depicted in Figure 29.

As a result of this analysis, several changes were made to the framework based on EFA results (see sections 4.7 and 4.8). These changes involved combining some factors and eliminating others based on the results obtained from this phase. The initial framework contained sub-factors called "Usability" and "HCI" which were grouped under one factor based on the analysis of the results.

Similarly, the factors named "Course content" and "Course design" were combined into one factor. Furthermore, the survey phase resulted in the removal of five sub-factors: Digital technology, Training programs, Learning theories, Teaching strategies, and Cultural factors. These sub-factors did not load cleanly on any factor. However, the researcher retained these sub-factors for further examination during the interview phase.

The third research question was:

- ***RQ3: What are the attitudes and opinions of academic staff towards the use of E-learning for higher education in Saudi Arabia?***

To answer this question, this research sought to evaluate the E-learning experts' opinions about the proposed E-learning framework. The aim of this question was to explore further the E-learning implementation factors and refine and assess the second version of the E-learning framework resulting from the responses of online survey. Although several concerns and challenges were raised, the interview data indicated that academic staff were optimistic about the use of E-learning system because of the diversity of useful tools that E-

learning can provide. The findings of this study confirmed that, based on the academic staff "E-learning experts'" opinions, all the main factors from the refined framework were important except two factors: cultural factors and digital technology. The cultural factors were removed because participants believed that E-learning is a smart technology that can address the gender segregation issues and can be implemented in virtual classes conducted for both genders, enabling an exchange of information through this technology (see section 5.4.11).

Moreover, digital technology was merged into E-learning management systems in the final framework as the participants considered this factor is a general theme for any technology, and it could create misunderstanding or confusion in participants during the interviews (see section 5.4.12). Therefore, in light of the research findings, the final framework (ELFSAU) was improved based on the interviewees' responses.

All the factors in the final framework were evaluated and confirmed by academic staff who actively engaged in E-learning within Saudi universities. In the interview phase, 77.27% of participants confirmed that the final framework was effective. The results of this research established all the important factors that must be included in this proposed framework to implement E-learning successfully. Finally, it can be concluded that academic staff generally have a positive attitude towards the use of E-learning system. The interviewees signalled the importance of all factors, indicated by their confirmation and level of agreement. This aligns with the reorganisation of the Saudi landscape through Saudi Vision 2030 which Saudi citizens are looking forward to realising.

Personal Management Issues
• E-learning experience
• Time management
• Training programs

Students' Readiness
• Interaction and motivation
• Knowledge and skills

E-assessment
• Reliability and security
• Practical issues

Technical Learning Management Systems
• Internet connectivity
• Technical support
• ICT resources
• Usability

TPTCK
• TPK
• TCK

E-learning Management Systems
• Course design
• Communication tools
• Learning theories
• Teaching strategies

ELFSA

The final E-learning implementation framework for Saudi Arabian universities (ELFSAU)

The (ELFSAU) framework can be utilised as a blueprint for facilitating the successful implementation of E-learning in Saudi universities. The proposed framework makes it easier for decision-makers to incorporate E-learning into the teaching environment in order to better meet the students' needs.

6.4   Recommendations

In this research, an investigation was conducted to determine the factors that would facilitate the effective, sustainable and efficient implementation of E-learning in Saudi universities. Based on the findings of this research, a set of recommendations is offered to stakeholders such as university managers, IT managers, E-learning designer and developers, academic staff and students to encouraged greater usage of E-learning for teaching and learning in Saudi university environments. These recommendations were derived from the participants' comments. Table 34 summarises the recommendations, and the following paragraphs discuss each recommendation in detail.

The successful implementation of E-learning in education depends on having good Internet connectivity, adequate technical support, the availability of ICT resources and usability of technology design. Hence, it is recommended that **universities consider providing a robust ICT infrastructure, Internet, computers, laptops and other necessary hardware and software**; otherwise, lecturers and students will be discouraged from using the E-learning system. IT managers also need to **organise any necessary upgrades to existing technological ICT infrastructure and allocate sufficient resources** to meet E-learning implementation and operational requirements. The provision of technical support in E-learning is imperative to encourage the use of E-learning by academic staff and students. The findings of this study show that some technical problems such as network failure and the delay in response from technical support when needed will limit the use of E-learning (see section 5.4.1.2). This suggests that **universities need to recruit qualified staff who are able to deal with enquiries from E-learning users – academic staff and students – and provide support services in a timely manner.** Furthermore, **an E-learning system should be easy to use and enjoyable, especially for those unfamiliar with E-learning.** E-learning systems need to be simple but at the same time appropriate for users in the higher education sector.

Among the recommendations important to academic staff is the need to actively increase their technological pedagogical knowledge (TPK) and technological content knowledge (TCK) to integrate E-learning system successfully. The selection of an appropriate pedagogy

is crucial in the implementation of E-learning technology. This study found that lecturers must be aware of the pedagogical perspective in order to incorporate E-learning effectively in their teaching (see section 5.4.2). Therefore, it is recommended that **universities ensure that lecturers are kept up to date with new techniques that help them to deliver course content more effectively, and how to select the appropriate kind of E-learning tools that can help deliver the desired learning outcomes.** Specifically, **academic staff need to have good experience on how to digitalise the content of subjects, solve problems and communicate effectively using E-learning** in order to address the learning needs of students. Also, with training, academic staff would be able to add flexibility to their teaching practice using a variety of E-learning tools to deliver course materials and increase student engagement.

University managers and E-learning designers and developers can take into consideration the findings of this research when designing E-learning activities for Saudi universities (see section 5.4.3). **The role of E-learning content designers and developers is crucial not only in developing E-learning content, but also in providing support to academic staff once E-learning has been incorporated into the university's existing learning streams.** For example, the clarity of course materials design that is suitable for E-learning was emphasised by the respondents as a necessary requirement if students are to benefit from E-learning management systems.

The design of E-learning content requires universities to provide a sustainable digital contents repository as well as development support from both management and the IT department to link and monitor the E-learning materials. Linking E-learning technology to learning theories needs to be taken into consideration. **Universities should consider the best practices that can incorporate E-learning with course materials and guarantee the successful integration of E-learning system to provide a high standard of pedagogical quality.**

It is highly recommended that more effort be made to improve the cooperation between universities and the private sector, particularly in the early stage of the application and usage of an E-learning system to address any issues, transfer the successful experience, and provide the latest developments in the field of E-learning. Furthermore, **universities need to develop strategic plans for E-learning involving all professionals who move from traditional to online learning, and for continually updating hardware and software.**

E-assessment was another concern for academic staff, and one that they believe will affect their use of E-learning (see section 5.4.4). In regard to reliability and security of technology,

the study participants mentioned that one of the key issues is that the lack of control when using E-assessment could allow students to cheat in the online classroom. Therefore, to ensure the reliability and security of assessment, **universities should invest in a robust security system to verify passwords and student identification.** Moreover, **it is recommended that the lecturer can prevent students from cheating in exams by providing different questions in different order, and making it impossible to download, print or copy the exam questions.**

Another important finding in this study is students' readiness to implement E-learning system. Some participants thought that in the E-learning environment, students can lose motivation and become isolated (see section 5.4.5). Hence, **lecturers should support student-centred learning that focuses on improving students' communicative and collaborative skills so that they become more engaged in their learning.** Fostering collaborative learning skills through online discussion, e-mail, audio, and video conferencing through the Internet would help to overcome the students' sense of isolation and the lack of interaction with their peers.

It is also recommended that lecturers increase students' awareness of the benefits of E-learning, allocating enough time to meet students' needs, helping them to think creatively and solving problems concerning their access to information, or giving them an option in terms of assessment. Overall, lecturers play an important role in motivating students to use E-learning, which in turn influences their teaching performance and increases students' learning efficiency.

As the research findings have shown, some personal management issues such as lack of E-learning experience, lack of time management, and training programs influence the implementation of E-learning (see sections 5.4.6 and 5.4.8). Therefore, **academic staff should be encouraged to link their use of E-learning to rewards and promotion and be offered incentives for their efforts (i.e., salary increase, reduced teaching load), as well as encouraging students by giving them extra marks for taking an active part in ensuring the success of E-learning at their institution.** E-learning experience is considered an important factor that influences the implementation of E-learning. The research findings show the need to provide training and skills to academic staff and students to enable them to implement E-learning effectively.

Universities should pay attention to the importance of training and encouraging ICT skills by producing intensive training programs for academic staff and students to improve their pedagogical and technical skills, respectively, and increase their enthusiasm for using

the of E-learning system. In particular, **universities should support lecturers by offering training on how to use E-learning tools and how to digitise the contents of a subject.** Further, **intensive training sessions could be offered to give students the knowledge and skills required to prepare them for the E-learning system.** This will increase the confidence of academic staff and student, and make them competent to use E-learning successfully.

Finally, the proposed framework can be used by other stakeholders in higher educational institutions. The research findings are expected to offer useful suggestions for decision-makers, E-learning designers, and developers, which enable them to acquire a better understanding of the status of E-learning in their organisation and provide them with an overview of important factors and challenges, thereby improving the decision-making process. In addition, due to the COVID-19 pandemic, educational institutions were shut down all over the world. Since this is an unprecedented situation, universities have been forced during this pandemic to shift rapidly to E-learning to maintain the delivery of education (Almaiah et al., 2020). In a country such as Saudi Arabia, the findings of this research may assist universities by raising the current understanding of how E-learning can be implemented to ensure the successful use of this system during the COVID-19 pandemic.

Table 34: Summary of the recommendations arising from this research

Recommendations for Universities
For universities in Saudi Arabia
It is recommended that:
• Universities should provide robust ICT infrastructure, Internet, computers, and laptops to facilitate the use of E-learning.
• Universities need to recruit qualified staff who are able to deal with enquiries from E-learning users such as academic staff and students, and provide support services in a timely manner.
• An E-learning system should be easy to use and enjoyable in order to attract users to utilise the system, especially for those unfamiliar with E-learning.
• Universities should ensure that there is a strong security system for student identification and password verification to guarantee the reliability and security of E-assessment.
• Academic staff should be encouraged by linking their use of E-learning to rewards and promotion and provide incentives for their efforts.
• Universities should pay attention to the importance of training and developing ICT skills by offering intensive training programs for academic staff and students.
Recommendations for the IT managers, E-learning designers and developers
For the IT managers and E-learning designers and developers in Saudi Arabia
It is recommended that:
• IT personnel manage necessary upgrades to existing technological ICT infrastructure and allocate sufficient resources.
• E-learning designers and developers provide support to academic staff once E-learning has been incorporated into the university's existing learning streams.
• Universities provide a sustainable digital contents repository for the designs of E-learning content.
Recommendations for the academic staff
For the academic staff in Saudi Arabia
It is recommended that:
• Academic staff take steps to increase their TPK and TCK.
• Lecturers be updated about the new techniques that help them to deliver course content.

- Academic staff need to have good experience on how to digitalise the content of subjects.
- Academic staff add flexibility to their teaching practice by incorporating E-learning.
- Lecturer can prevent students from cheating in exams by providing different questions in different orders.
- Lecturers should support student-centred learning that concentrates on enhancing communicative and collaborative skills amongst students to increase their engagement in their learning.
- Lecturers increase the awareness of the benefits of E-learning among students.

6.5   Research Limitations

Although a comprehensive analysis of the literature was conducted, and the findings obtained from the overall study are valuable, the research had several limitations. Firstly, it was limited to the Saudi context as it was intended to provide the most relevant factors that influence the effective implementation of E-learning for Saudi universities. Efforts were made both to ensure that sources were not biased and to select material from rigorous studies. Nevertheless, the selection of sources could be affected by the viewpoint of the researcher, the definitions of terms used for the search, and the literature database utilised to retrieve the relevant literature. Further, previous E-learning models were utilised to provide the basis for the theoretical research framework. Although the research aimed to provide an investigation of the current implementation of E-learning in Saudi universities by providing six factors (17 items), the researcher does not claim that all the identified factors in the final framework are the only factors to be utilised to determine the implementation of E-learning from academic staff and students' perspective. Thus, there may be other factors that are specific to particular contexts.

Regarding the research population, the data used in this research was collected solely from public universities in Saudi Arabia; private universities were not included. Factors and challenges affecting the implementation of E-learning might be very different in other teaching and learning environments in Saudi Arabia, such as private universities, and both elementary and secondary schools.

Another limitation of this study is that, due to time constraints, a cross-sectional study was conducted to collect data from academic staff and students. Therefore, it might be ideal for carrying out a longitudinal study to accurately confirm the research framework and to

understand the interrelationship of the different factors that may affect the implementation of E-learning. The explanatory research design implemented in this study required considerable experience on the gathering and interpretation of the findings. The implementation of a mixed-methods design may have some limitations, such as the researcher's lack of experience in methodological designs and research, and the limited period of time used for data collection. Further, the data was gathered and analysed by a single researcher, which may have led to biased outcomes. It was difficult for the researcher to ensure that the online survey was free of biased answers from the respondents. Although the online survey was based on validated and pilot-tested feedback, some of the participants' answers, especially those without any direct experience with E-learning, may have been influenced by the survey design. Furthermore, a lack of knowledge about some of the E-learning concepts included in the study may have led to incomplete responses, although the researcher spent a long time on collecting the data to ensure a high response rate and increase the validity of results.

Another limitation of this study was that the interviewees were academic staff only; involving other stakeholders such as students, university executives, IT managers, E-learning content designers, and developers would be favourable and could generate more representative outcomes.

6.6   Significance and Future Research Avenues

The main significance of this research is its proposal and validation of a conceptual framework that identifies the essential factors needed to guide the successful implementation of E-learning in teaching and learning approaches in Saudi universities. This study makes a contribution by addressing the research gap identified in the literature, and provides framework and results that can be utilised to identify possible success factors for the use of E-learning in the university sector in Saudi Arabia. With the tremendous changes taking place in Saudi Arabia as it makes the transition from oil producer to a country with diverse resources, a major set of strategies are in place intended to give Saudi Arabia a leading position in all fields. In particular, the education sector receives a great deal of attention in Saudi Arabia's Vision 2030 to accommodate the large demand for higher education, where the plan involves a shift to modern teaching methods, applying innovative technologies such as E-learning. E-learning is expected to play a significant role within Saudi universities to meet the increasing demand for higher education and to resolve the issues associated with the current higher education system.

This research contributes to theoretical knowledge in this domain by offering recommendations that will guide universities in Saudi Arabia and similar countries to achieve their strategic goals in their implementation of E-learning, and meet the high demand for quality education that can be accessed by students anywhere and anytime. The research framework (ELFSAU) helps the Saudi higher education sector to effectively harness the many advantages that E-learning can bring in terms of improving the standards of academic digital learning. In practice, the research findings can assist policymakers to develop appropriate strategies for the implementation of E-learning systems and improving current E-learning practices within their educational institutions, and offer a better understanding of the factors that influence E-learning implementation.

Regarding the limitations of this research, the outcomes suggest several possibilities for further exploration of E-learning implementation in Saudi Arabia at different education levels and in different settings. Future research on this topic should be conducted so that the research findings can be generalised to other universities in Saudi Arabia or to a different cultural context.

The targeted system in this study concerned the usage of E-learning in Saudi higher education where the system is voluntary, and the framework is considered a system-generic framework. Future work could be expanded to evaluate this framework in the context of a specific system within an institution.

This research developed and evaluated a conceptual framework without conducting corresponding implementation trials. The research methods could be extended by incorporating focus groups comprising academic staff and students. This would help to obtain a different perspective which would better represent a group or an institution. Future research could reveal real-time challenges associated with the implementation of E-learning in Saudi universities.

In order to ensure that E-learning is effective, comparative studies could be conducted of several Saudi universities to examine technological issues and discover the reasons for the slowness of the Internet despite repeated complaints, especially in rural areas. This type of investigation could reveal whether the fault lies with the universities' network system, or whether it is a problem associated with public networks.

Another future research undertaking could investigate the same framework in developing countries to determine whether the framework needs to be adjusted or expanded to suit different settings. All the identified factors in this research framework are independent.

Therefore, future research can be carried out to evaluate the factors in the framework using various methodologies and tools such as SmartPLS, structure equation modelling and LISREL, which might yield more information about the outcomes of implementing E-learning in universities.

Considering that this research was limited to gathering data from interviews with academic staff, future research could be conducted to examine other stakeholders such as students, university leaders, IT departments, E-learning designers and developers to determine the implications of successful E-learning implementation as an alternative permanent solution so that teaching and learning are not interrupted during and after COVID-19 pandemic.

6.7   Chapter Summary

This concluding chapter began with a summary of the research which included the purpose of this study, processes and the research design and methodology, and the outcome of this research. The research questions were answered, thereby fulfilling the research objectives. The research framework (ELFSAU) is the primary outcome of this research and comprises crucial factors that were identified for the effective implementation of E-learning within universities in Saudi Arabia. The research framework proposed in this work was confirmed and acknowledged by the respondents during all data collection phases as being the most important in seeking successful outcomes when incorporating E-learning system into universities on a wider scale. Recommendations were then derived from the ELFSAU to assist universities to implement E-learning technology successfully in the learning environment. These include the consideration of a number of issues: Technical Learning Management Systems, TPTCK, E-learning Management Systems, E-assessment, Students' Readiness, and Personal Management Issues. Limitations of the research were acknowledged, the significance of this work, and future research avenues were presented. During the COVID-19 pandemic, technology was utilised very promptly so that students' education could be maintained. Moreover, E-learning technology could help to ensure uninterrupted instructional delivery and improve online university teaching by offering an immersive and interactive experience during and after the COVID-19 pandemic.

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Appendices

Appendix 1: Ethical Approval

Curtin University

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Telephone +61 8 9266 7863
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15-Aug-2018

Name: Tomayess Issa
Department/School: School of Management
Email: Tomayess.Issa@cbs.curtin.edu.au

Dear Tomayess Issa

RE: Ethics Office approval
Approval number: HRE2018-0531

Thank you for submitting your application to the Human Research Ethics Office for the project **A Conceptual Framework for the Effective**

Implementation of E-learning for Universities in Saudi Arabia.

Your application was reviewed through the Curtin University Negligible risk review process

The review outcome is: **Approved.**

Your proposal meets the requirements described in the National Health and Medical Research Council's (NHMRC) *National Statement on Ethical Conduct in Human Research (2007).*

Approval is granted for a period of one year from **15-Aug-2018** to **14-Aug-2019**. Continuation of approval will be granted on an annual basis following submission of an annual report.

Personnel authorised to work on this project:

Name	Role
Alqahtani, Abdullah	Student
Issa, Tomayess	CI
Nau, S Zaung	Co-Inv

Approved documents:

Document

Appendix 2: Online Survey Questions (English Version)

Curtin University

Dear Sir/Madam

My name is Abdullah Alqahtani. I am undertaking a Doctor of Philosophy in Information System at Curtin University. I am conducting research regarding the effective implementation of E-learning in Saudi universities. This research involves a survey, which will take less than 15 minutes to complete. This survey contains twenty three sections. Please read each statement and then circle the number or tick the box, which shows how you feel.

If you feel uncomfortable in answering certain questions, please feel free to disregard them. We would appreciate it if you could complete this survey within a week. However, if this is too short a space of time, please respond as soon as you are able.

Participation in this research is completely voluntary and your responses will be completely anonymous. Participants may withdraw at any time without prejudice or negative consequences, and do not need to provide a reason. By completing this survey, you are consenting to participate.

Any information provided by you through the survey will be held as strictly confidential. Information will not be disclosed to any parties besides the researchers, unless required to do so by law. Finally, the researchers will ensure that published material will not contain any information that can identify you or your university.

We encourage you to participate because this research will provide valuable insights into students, academics attitudes toward E-learning technology in the higher education sector in Saudi Arabia. This research will help us to develop the higher education sector in Saudi Arabia. Your assistance in this research is greatly appreciated and is crucial for the success of its findings.

Your interest and consideration are greatly appreciated. If you need any additional information from us, please let us know by contacting Tomayess.Issa@cbs.curtin.edu.au (+61892667682) or abdullah.alqahtani1@postgrad.curtin.edu.au (+61406332132)

Curtin University Human Research Ethics Committee (HREC) has approved this study (**HRE2018-0531**). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Thank you in advance.

Yours faithfully,

Abdullah Alqahtani
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Part 1: Under this section, the researchers will examine the participants' Demographic information and background

- Gender

1. Male

2. Female

- Age

1. Under 25

2. 25-30

3. 31-40

4. 41-50

5. Above 50 years old

- What is your job title?

1. Academic staff
2. Student

- Experience in higher education

1. Less than 1 year

2. More than 1 year and less than 3 years

3. More than 3 years and less than 5 years

4. More than 5 year and less than 10 years

5. More than 10 years

- Academic rank

1. Professor

2. Associate Professor

3. Assistant Professor

4. Lecturer

5. Instructor

- Your administrative role

1. Vice-Rector or Deputy Vice-Chancellor

2. Dean

3. Associate Dean

4. Department Chairperson

5. Faculty member

6. Other: _____ (please specify)

- Your academic field

1. Humanities & Social Sciences

2. Natural Sciences

3. Applied Sciences (e.g., Engineering, Computing & IT)

4. Medical & Health Sciences

5. Other: _____ (please specify)

- How long have you used, or have been using e- learning?

1. Have not used a learning Management System (LMS)

2. Less than a year

3. 1-3 years

4. 3-5 years

5. More than 5 years

Part 2: the purpose of this section: To measure the availability of the Internet facility at any time, and the speed of browsing when there is access.

Internet Connectivity	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
My view on Internet connectivity at my university:					
easy on-campus access to the Internet.					
e-learning systems are reliable.					
browsing speed is satisfactory.					
search engines can be used confidently.					

Part 3: the purpose of this section: To offer permanent technical support and user-friendly assistance for individuals having technical problems with electronic devices.

Technical Support	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
When technical support is required:					

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I can receive technical support from technicians.					
I think that the university's e-learning support is good.					
I can access the required resources for my daily tasks.					
accessibility to learning material is provided.					

Part 4: the purpose of this section: To ascertain the resources and ICT equipment related to computers, and teaching-learning materials.

Hardware and Software	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The ICT resources provided by my university assist me to:					
enjoy using e-learning related technologies.					
use computers for work tasks.					
use the PC and software applications before I choose e-learning-based courses.					
use ICT and practise for e-learning.					

Part 5: the purpose of this section: To measure the quality of e-learning systems and the extent to which they and their components provide easy and effective interaction with users in order to maximise usage benefits.

Usability	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Regarding the evaluation of e-learning systems at my university:					
I can say that they are available all the time.					
I perceive the e-learning design to be good.					
they are easy to use.					
they are simple to learn.					
they are complicated.					

Part 6: the purpose of this section: To measure the ways that users interact with e-learning systems, including their response to the overall design of the system.

Human-Computer Interaction (HCI)	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
In regard to human-computer interaction, at my university:					
overall, the e-learning systems were easy to use.					
information was well structured/presented.					
the screen design pleasant.					
it enables interaction with fellow students/colleagues via the Web.					
it enables me to contact lecturers/students easily.					

Part 7: the purpose of this section: Measuring lecturers' knowledge of the capacities and applications of commonly accessible technology.

Technological Knowledge (TK)	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
I have enough technological knowledge enabling me to:					
solve my own technical problems.					
learn technology easily.					
use the web-based communication tools (google hangouts, skype, etc.).					
have the technical skills to use e-learning technology.					
keep up with important new e-learning technologies.					

Part 8: the purpose of this section: Technological content knowledge refers to the knowledge of how technology can create new representations of specific content. It suggests that lecturers understand that, by using a specific technology, they can change the way learners practise and understand concepts within a specific content area.

Technological Content Knowledge (TCK)	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
Considering my Technological Content Knowledge, I am capable of:					
using area-specific applications.					
using technologies to achieve course objectives.					
preparing a lesson plan requiring the use of instructional technologies.					

developing class activities and projects involving the use of instructional technologies.					
learning about e-learning technologies that I can apply to teach my subject and facilitate understanding.					

Part 9: the purpose of this section: TPK requires an understanding of general pedagogical strategies applied to the use of technology. It requires an understanding of how certain technologies can change teaching and learning practices.

Technological Pedagogical Knowledge (TPK)	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
Considering my Technological Pedagogical Knowledge, I can:					
choose technologies that enhance my teaching approaches.					
choose technologies that enhance students' classroom learning.					
adapt the use of the technologies that I am learning about to different teaching activities.					
evaluate the appropriateness of a new technology for teaching and learning.					

Part 10: the purpose of this section: To plan the course content so that it is adequate for and relevant to the subject, using multimedia tools.

Course content	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
To help me use online course content:					
I found the instructions for using the e-learning components to be sufficiently clear.					
I found the course content to be adequate and relevant to the subject.					
The course materials were placed online in a timely manner.					
Lecture notes are supplemented with multimedia tools (flash animations, simulations, videos, audios, etc.)					

Part 11: the purpose of this section: To determine structure and coherence of the curriculum and the learning material, and the ease of using a learning management system.

Course design	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*

The design of curriculum in an e-learning environment requires:					
a clear and organised structure of the course and learning material.					
an easy-to-use platform.					
often having to deal with technical problems (e.g., software error, slow access to the Internet).					
a learning environment that offers e-mail, chat, newsgroups and/or other communication facilities.					
interaction with other course participants.					

Part 12: the purpose of this section: To determine the attitudes of academics and students regarding e-assessment.

E-assessment	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
At my university, the use of e-assessment is:					
considered effective.					
creates concerns about the validity of e-assessment in my subject.					
a practical alternative for paper-based exams.					
a reliable alternative to paper-based exams.					
just as secure as paper-based assessment.					
beneficial for teaching and learning.					

Part 13: the purpose of this section: The integration of technology into teaching and learning whereby an effective learning process is created by combining digitally delivered content with (learning) support and services.

Digital technology	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
When integrating technology into learning and teaching practice, I:					
find it difficult to see how I can integrate into my teaching practice any digital technology that I have not used previously.					
can use digital technology to support the delivery of the curriculum.					
anticipate that the use of digital technology will increase my workload in the short term.					
can participate in a supportive lecturer network established for digital technology.					

Part 14: the purpose of this section: To ascertain users' ability to communicate effectively with others using online technologies, and to perform common e-learning tasks.

Skills and Knowledge	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
In regard to my skills and knowledge, online technologies would enable me to:					
express myself clearly through my writing (e.g., tone, emotions, and humour).					
schedule time to provide timely responses to other students and/or lecturer.					
ask questions and make comments in writing that is clear and succinct.					

Part 15: the purpose of this section: To determine the effectiveness of the course design and delivery, and the quality of work produced.

Learning Theories	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
In terms of assessing the quality of e-learning systems:					
course requirements and expectations were clear.					
the textbook and/or assigned readings helped me understand the material.					
the lecturers encouraged the students to be actively involved in the material through discussion, assignments, and other activities.					
the course was well organised.					

Part 16: the purpose of this section: To determine the ways in which a lecturer makes the learning process easier, quicker, funnier, more self-directed, more effective, and more adaptive to new situations.

Teaching Strategies	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
As a lecturer, I implement teaching strategies that include:					
using direct presentation					
moving from the abstract to concrete examples.					
using problem-solving strategies to enhance students' understanding.					
assisting students to identify their own most effective learning methods.					

Part 17: the purpose of this section: To determine the types of training strategies and workshops offered by organisations, and that are designed to assist users to effectively use e-learning systems.

Training programs	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
In regard to training programs offered by my university:					
training professionals are available to deliver e-learning training programs.					
I can't spare the time required to attend e-learning training programs that are arranged for university students.					
collaborative learning tasks are encouraged/provided.					
no training is provided for those involved in distance education.					

Part 18: the purpose of this section: To determine the interaction process whereby students share knowledge and interact with their peers and lecturers.

Interaction	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The interaction process in e-learning systems enables me to:					
Communicate with the lecturer via e-learning technology rather than face to face.					
learn in a group situation and cooperate with other learners (e.g., through group activities, discussions etc.).					
increase my motivation to learn.					
improve my interaction with my lecturer.					

Part 19: the purpose of this section: To what extent students reflect their comments during peer learning on and offline

Peer learning	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
E-learning systems facilitate peer learning because:					
they enable an easy and fast exchange of information and knowledge with peer students.					
they offer a variety of communication tools for exchanging information with peer students (e.g., e-mail, chat, newsgroups).					
they support students' cooperative learning and group work.					

they enable students to have personal contact with their peers.					

Part 20: the purpose of this section: To determine the extent to which e-learning gives students opportunities to examine the knowledge they have absorbed and refers to the learning process that assists students to express their attitudes, feelings, experiences, actions, and beliefs.

Reflection (learning process) in E-learning	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
E-learning enables me to:					
learn at anytime and anywhere (e.g., at the university, at home).					
learn at my pace and use learning strategies that work for me.					
make the most of opportunities to increase my knowledge and to control my success (e.g., via tests).					
access immediate feedback.					

Part 21: the purpose of this section: to determine the influence of the elements of culture, gender segregation, and attitudes toward e-learning usage.

Culture	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
Cultural factors influence my attitude to e-learning in the following ways:					
I believe e-learning is a good teaching method that may help to address the issue of gender segregation in the Saudi higher education system.					
I am concerned about students' attitudes toward e-learning.					
I am concerned that I may not have enough time to organise myself each day.					
I am completely occupied with other things.					

Part 22: the purpose of this section: Learning achievements and course satisfaction through the stimulation of learning motivation, and the facilitation of collaborative learning.

Motivation	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
Despite the possible influence that the nature of e-learning systems has on motivation, I would be able to:					
remain motivated even though the lecturer is not online at all times.					

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
complete my work even when there are online distractions (e.g., responding to friends' emails, surfing websites)					
complete my work even when there are distractions at home (e.g., television, children etc.).					
take other courses delivered via e-learning					

Part 23: the purpose of this section: to determine the various needs and preferences of the learner which involve the learning style and technical skills needed to solve the problems that occur when the learner accesses the e-learning system.

Personal management	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The use of e-learning systems raises the following personal management issues:					
not having enough time to organise myself each day.					
conflict between my interests and my responsibilities.					
inability to manage all that technology requires.					
time spent working with non-academic problems related to technology.					
very limited knowledge about the innovation.					

Appendix 3: Online Survey Questions (Arabic Version)

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Translation: English into Arabic   ترجمة من اللغة الإنجليزية إلى اللغة العربية

Curtin University

سيدي/سيدتي

السلام عليكم ورحمة الله وبركاته

أنا عبدالله سالم القحطاني، أحد أعضاء هيئة التدريس بجامعة أم القرى والمبتعث حاليا لدراسة الدكتوراه ـ جامعة كيرتن في أستراليا.

هذا الاستبيان لـ بحث متعلق بفعالية إستخدام التعليم الالكتروني في إطار الجامعات في المملكة العربية السعودية. ويتضمن هذا البحث الإستبيان المشار إليه، وهو يستغرق أقل من 15 دقيقة لإكماله. يحتوي هذا الاستبيان على ثلاثة وعشرين قسما. يرجى قراءة كل عبارة ثم اختيار الاجابة أو وضع علامة صح في المربع، حسبما ترى.

إذا كنت تشعر بعدم الارتياح في الإجابة على بعض الأسئلة، لا تتردد في تجاوزها.

يرجى التكرم بإكمال هذه الدراسة خلال أسبوع إن أمكن، او الرد في أقرب وقت ممكن.

المشاركة في هذا البحث تطوعي تماما، وإجاباتكم ستكون مجهولة تماما. يمكنك ان تنسحب من المشاركه في أي وقت دون أي عواقب أو آثار، ولست بحاجة لتقديم سبب. من خلال استكمالك للاستبيان فإنك توافق على المشاركة.

سيتم حفظ أي من المعلومات المقدمة من قبلك من خلال الاستبيان في سرية تامة. ولن يتم الكشف عن المعلومات لأي أطراف غير الباحثين، أو إلا إذا طلب منها ذلك بموجب القانون. وأخيراً، فإن الباحثين سوف يتأكدون من أن المواد المنشورة لا تحتوي على أي معلومات يمكن أن تدل على هويتك أو جامعتك.

نحن نشجعكم على المشاركة لأن هذا البحث سوف يوفر معلومات قيمة عن رد فعل الاكاديميين والطلاب نحو فعالية إستخدام التعليم الالكتروني في الجامعات في المملكة العربية السعودية. مساعدتكم في هذا البحث هي موضع تقدير وهو أمر حاسم لنجاح البحث.

نشكر لكم جهودكم وتعاونكم . إذا كنت بحاجة إلى أي معلومات إضافية منا، تواصلو معنا على:

E-mail: abdullah.alqahtani1@Postgrad.curtin.edu.au, mobile: (+61406332132) or
أو مع المشرف: Tomayess.Issa@cbs.curtin.edu.au, Phone: (+61 8 9266 7682)

وقد اعتمدت هذه الدراسة لجنة الأخلاقيات والأبحاث الإنسانية في جامعة كيرتن (HRE2018-0531). إذا أردت مناقشة هذه الدراسة مع شخص غير مشترك فيها، وبالأخص فيما يتعلق بتنفيذ الدراسة أو حقوقك كمشارك في الإستبيان، أو إذا أردت أن تقدم شكوى سرية، يمكنك التواصل مع مسؤول لجنة أخلاقيات البحوث الإنسانية أو مديرها في جامعة كيرتن، أو عن طريق الاتصال بـ 9266 9223 أو عن طريق البريد الإلكتروني hrec@curtin.edu.au
شكرا لكم مقدما،

اخوكم
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الجزء الاول: المعلومات الشخصية

نوع الجنس:
1. ذكر
2. أنثى

العمر:
1. أقل من 25 سنة
2. 25-30 سنة
3. 31-40 سنة
4. 41-50 سنة
5. أكبر من 50 سنة

سنوات الخبرة في التعليم العالي:
1. أقل من سنة
2. أكثر من 1 وأقل من 3 سنوات
3. أكثر من 3 سنوات وأقل من 5 سنوات
4. أكثر من 5 سنوات وأقل من 10 سنوات
5. أكثر من 10 سنوات

المرتبة الأكاديمية:
1. أستاذ
2. أستاذ مشارك
3. أستاذ مساعد
4. محاضر
5. معيد

المنصب الأكاديمي:
1. وكيل جامعة
2. عميد كلية
3. وكيل كلية
4. رئيس قسم
5. عضو هيئة تدريس
6. غير ذلك، الرجاء التوضيح

التخصص:
1. العلوم الاجتماعية والإنسانية
2. العلوم الطبيعية
3. العلوم التطبيقية (مثال:الهندسة، الحاسب)
4. العلوم الصحية والطبية
5. غير ذلك، الرجاء التوضيح

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كم المدة التي استخدمت فيها التعليم الالكتروني؟

1. لم أستخدم نظام إدارة التعليم الالكتروني
2. أقل من سنة
3. من 1- 3 سنوات
4. من 3- 5 سنوات
5. أكثر من 5 سنوات

الجزء الثاني: الغرض من هذا القسم: قياس معرفة قدرات المحاضرين في التطبيقات التقنية التي يمكن الوصول إليها بشكل عام.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	معرفة التقنية (CK)
					لدي معرفة تقنية كافية تمكنني من:
					حل المشاكل التقنية الخاصة بي.
					تعلم التكنولوجيا بسهولة.
					استخدام أدوات الاتصال على شبكة الإنترنت.(.google hangouts, skype, etc)
					لدي المهارات التقنية لاستخدام تكنولوجيا التعليم الإلكتروني
					مواكبة تقنيات التعليم الإلكتروني الجديدة والهامة.

الجزء الثالث: الغرض من هذا القسم: معرفة المحتوى التقني الذي يشير إلى معرفة كيف يمكن للتكنولوجيا إنشاء عروض جديدة لمحتوى معين، ونقترح أن يفهم المحاضرون أنه باستخدام تقنية محددة يمكنهم تغيير الطريقة التي يتدرب بها المتدربون ويتعلمون المفاهيم في نطاق محتوى معين.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	معرفة المحتوى التقني (TCK)
					بالنظر إلى معرفتي التقنية في مجال التكنولوجيا ، فأنا قادر على:
					استخدام التطبيقات الخاصة بمجالي
					استخدام التقنيات لتحقق أهداف المادة
					إعداد خطة الدرس التي تتطلب استخدام التقنيات التعليمية
					تطوير الأنشطة والمشاريع داخل الفصل التي تنطوي على استخدام التقنيات التعليمية
					تعلم تقنيات التعليم الإلكتروني التي يمكنني تطبيقها لتدريس موضوعي وتسهيل الفهم.

الجزء الرابع: الغرض من هذا القسم: التحقق من فهم الاستراتيجيات التربوية العامة المتعلقة باستخدام التكنولوجيا، وهذا يتطلب فهم كيفية قيام بعض التقنيات بتغيير ممارسات التعليم والتعلم.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	المعرفة التربوية التقنية (TPK)
					بالنظر إلى المعرفة التربوية التقنية، يمكنني:
					اختيار التقنيات التي تعزز أساليب التدريس الخاصة بي.
					اختيار التقنيات التي تعزز تعلم الطلاب داخل الفصل.
					التكيف مع استخدام التقنيات التي أتعلمها عن الأنشطة التعليمية المختلفة.
					تقييم مدى ملاءمة التكنولوجيا الجديدة للتعليم والتعلم.

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الجزء الخامس: الغرض من هذا القسم: قياس مدى توافر مرافق الإنترنت في أي وقت، وسرعة التصفح عند الوصول.

	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	الإتصال بشبكة الإنترنت
وجهة نظري حول اتصال الإنترنت في جامعتي:						
سهولة الوصول إلى الإنترنت داخل الحرم الجامعي						
أنظمة التعلم الإلكتروني موثوق بها						
سرعة التصفح مرضية						
يمكن استخدام محركات البحث بثقة						

الجزء السادس: الغرض من هذا القسم: قياس مدى توفر دعم فني دائم بحيث يساعد المستخدمين الأفراد في التعامل بسهولة مع المشاكل التقنية.

	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	الدعم الفني
عندما يكون الدعم الفني مطلوبًا:						
يمكنني تلقي الدعم الفني من الفنيين.						
أعتقد أن دعم التعليم الإلكتروني بالجامعة جيد.						
يمكنني الوصول إلى الموارد المطلوبة لمهامي اليومية.						
الوصول إلى المواد التعليمية متاحة.						

الجزء السابع: الغرض من هذا القسم: التأكد من وجود الموارد والتجهيزات المتعلقة بتكنولوجيا المعلومات والإتصالات مثل أجهزة الكمبيوتر وكذلك المواد التعليمية.

	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	الأجهزة والبرمجيات
تساعد موارد تكنولوجيا المعلومات والاتصالات التي توفرها جامعتي على:						
الاستمتاع باستخدام تقنيات التعليم الإلكتروني ذات الصلة.						
استخدام أجهزة الكمبيوتر لمهام العمل.						
استخدام الكمبيوتر وتطبيقات البرامج قبل أن أختار المقررات القائمة على التعلم الإلكتروني.						
استخدام تكنولوجيا المعلومات والاتصالات وممارسة التعلم الإلكتروني.						

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الجزء الثامن: الغرض من هذا القسم: قياس جودة أنظمة التعلم الإلكتروني ومدى توفر مكوناتها لتفاعل سهل وفعال مع المستخدمين من أجل زيادة فوائد الاستخدام إلى أقصى حد.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	سهولة الاستخدام
					فيما يتعلق بتقييم أنظمة التعلم الإلكتروني في جامعتي:
					أستطيع أن أقول إنها متاحة طوال الوقت.
					أرى أن تصميم التعلم الإلكتروني جيد.
					من السهل استخدامها.
					هي بسيطة التعلم.
					هي معقدة.

الجزء التاسع: الغرض من هذا القسم: قياس طرق تفاعل المستخدمين مع أنظمة التعلم الإلكتروني ، بما في ذلك استجابتهم للتصميم العام للنظام.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	التفاعل بين الإنسان والحاسب
					فيما يتعلق بالتفاعل بين الإنسان والحاسب، في جامعتي:
					بشكل عام ، كانت أنظمة التعلم الإلكتروني سهلة الاستخدام.
					المعلومات كانت جيدة التنظيم / متاحة.
					تصميم الشاشة ممتع.
					يتيح التفاعل مع الطلاب / زملائهم عبر الويب.
					تمكنني من الاتصال بالمحاضرين / الطلاب بسهولة.

الجزء العاشر: الغرض من هذا القسم: تخطيط محتوى الدرس بحيث يكون ملائمًا للموضوع وذا صلة، وذلك باستخدام أدوات الوسائط المتعددة.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	محتوى المنهج الدراسي
					لمساعدتي في استخدام محتوى المنهج الدراسي عبر الإنترنت:
					وجدت التعليمات الخاصة باستخدام مكونات التعلم الإلكتروني واضحة بما فيه الكفاية.
					وجدت محتوى المنهج الدراسي مناسبًا وملائمًا للموضوع.
					تم وضع مواد الدرس عبر الإنترنت في الوقت المناسب.
					تقديم المحاضرات يتم باستخدام أدوات الوسائط المتعددة (الرسوم المتحركة فلاش، والمحاكاة، وأشرطة الفيديو، والتسجيلات الصوتية، وما إلى ذلك.)

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الجزء الحادي عشر: الغرض من هذا القسم: تحديد هيكل وتماسك المنهج الدراسي والمواد التعليمية، وسهولة استخدام نظام إدارة التعلم.

تصميم المنهج الدراسي	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
يتطلب تصميم المناهج الدراسية في بيئة التعلم الإلكتروني ما يلي:					
هيكلا واضحا ومنظما للدرس وكذلك مواد التعلم.					
منصة سهلة الاستخدام.					
التعامل بكثرة مع المشاكل التقنية (على سبيل المثال ، خطأ في البرامج، وبطء الوصول إلى الإنترنت)					
بيئة التعلم التي توفر التواصل بالبريد الإلكتروني أو المحادثات/ أو استخدام مرافق الاتصالات الأخرى.					
التفاعل مع المشاركين الآخرين في الدرس.					

الجزء الثاني عشر: الغرض من هذا القسم: تحديد مواقف الأكاديميين والطلاب فيما يتعلق بالتقييم الإلكتروني.

التقييم	غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
في جامعتي، استخدام التقييم الإلكتروني:					
فعال.					
يخلق مخاوف بشأن صحة التقييم الإلكتروني في الموضوع الدراسي.					
عملي مقارنة بالامتحانات الورقية.					
بديل موثوق للاختبارات الورقية.					
أمن مثل التقييم الورقي.					
مفيد للتعليم والتعلم.					

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Translation & Interpreting

الجزء الثالث عشر: الغرض من هذا القسم: دمج التقنية في التعليم والتعلم بحيث يتم إنشاء عملية تعلم فعالة من خلال الجمع بين المحتوى المقدم رقمياً ودعم التعلم والخدمات الأخرى.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	النقنية الرقمية
					عند دمج التكنولوجيا في التعلم وممارسة التدريس، فإنني:
					أجد صعوبة في رؤية كيف يمكنني دمج أي تقنية رقمية لم أستخدمها من قبل في التدريس.
					يمكن استخدام التكنولوجيا الرقمية لدعم تقديم المناهج الدراسية.
					أتوقع أن يزيد استخدام التكنولوجيا الرقمية من عبء العمل على المدى القصير.
					يمكن أن أشارك في شبكة محاضرة داعمة أنشئت للتقنية الرقمية.

الجزء الرابع عشر: الغرض من هذا القسم: التحقق من قدرة المستخدم على التواصل بشكل فعال مع الآخرين باستخدام تقنيات الإنترنت وتنفيذ مهام التعلم الإلكتروني.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	المهارات والمعرفة
					فيما يتعلق بمهاراتي ومعرفتي، ستمكنني تقنيات الإنترنت من:
					التعبير عن نفسي بوضوح من خلال كتابتي (على سبيل المثال: النغمة، العواطف، والفكاهة)
					عمل جدول زمني لتقديم الردود في الوقت المناسب للطلاب الآخرين و / أو المحاضرين.
					طرح الأسئلة وتقديم تعليقات خطية واضحة وموجزة.

الجزء الخامس عشر: الغرض من هذا القسم: تحديد مدى فعالية تصميم الدرس وتقديمه، وجودة العمل المنتج.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	نظريات التعلم
					من حيث تقييم جودة أنظمة التعلم الإلكتروني:
					كانت متطلبات الدرس وتوقعاتها واضحة.
					ساعدني الكتاب المدرسي أو القراءات المعينة على فهم المادة.
					شجع المحاضرون الطلاب على المشاركة بنشاط في المواد من خلال المناقشة والواجبات والأنشطة الأخرى.
					كانت الدورة منظمة تنظيما جيدا.

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الجزء السادس عشر: الغرض من هذا القسم: تحديد الطرق التي تُمكن المحاضر من جعل عملية التعلم أسهل وأسرع وأكثر تسلية، وتلقائية، وفاعلية، وقدرة على التكيف مع المواقف الجديدة.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	إستراتيجيات التدريس
					كمحاضر، أقوم بتطبيق استراتيجيات التدريس التي تشمل:
					إستخدام العرض المباشر
					الانتقال من الأمثلة المجردة إلى الملموسة.
					إستخدام استراتيجيات حل المشكلات لتعزيز فهم الطلاب.
					مساعدة الطلاب على تحديد طرق التعلم الأكثر فعالية.

الجزء السابع عشر: الغرض من هذا القسم: تحديد أنواع استراتيجيات التدريب وورش العمل التي تقدمها المنظمات، والتي صممت لمساعدة المستخدمين على استخدام نظم التعلم الإلكتروني بفعالية.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	برامج التدريب
					فيما يتعلق ببرامج التدريب التي تقدمها جامعتي:
					يتوفر خبراء التدريب لتقديم برامج التدريب على التعلم الإلكتروني.
					لا أستطيع توفير الوقت اللازم لحضور برامج التدريب على التعليم الإلكتروني التي يتم ترتيبها لطلاب الجامعات.
					يتم تشجيع / توفير مهام التعلم التعاوني.
					لا يتم توفير تدريب لأولئك المشاركين في التعليم عن بعد.

الجزء الثامن عشر: الغرض من هذا القسم: تحديد عملية التفاعل من خلال مشاركة الطلاب للمعرفة والتفاعل مع أقرانهم وكذلك مع المحاضرين

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	التفاعل
					تمكنني عملية التفاعل في أنظمة التعلم الإلكتروني من:
					التواصل مع المحاضر عبر تقنية التعليم الإلكتروني بدلا من وجها لوجه.
					التعلم على شكل مجموعة والتعاون مع المتعلمين الآخرين (على سبيل المثال، من خلال أنشطة المجموعة والمناقشات وما إلى ذلك)
					زيادة حافزي للتعلم.
					تحسين تفاعلي مع محاضرتي.

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الجزء التاسع عشر: الغرض من هذا القسم: بيان إلى أي مدى يعكس الطلاب تعليقاتهم أثناء التعلم من الأقران سواءا كان متصلاً أو غير متصل عبر الانترنت.

التعلم من الأقران	غير بشدة	غير موافق	محايد	موافق	موافق بشدة
تسهل أنظمة التعلم الإلكتروني عملية التعلم من الأقران لأنها:					
تمكن التبادل السهل وسريع للمعلومات وكذلك المعرفة مع الطلاب الأقران.					
تقدم مجموعة متنوعة من أدوات الاتصال لتبادل المعلومات مع الطلاب الأقران (على سبيل المثال: البريد الإلكتروني، الدردشة، أخبار المجموعة)					
تدعم التعلم التعاوني للطلاب والعمل الجماعي.					
تمكن الطلاب من التواصل الشخصي مع زملائهم.					

الجزء العشرون: الغرض من هذا القسم: بيان الى أي مدى يمنح التعلم الإلكتروني الطلاب فرصًا لفحص المعرفة التي استوعبوها والتي تشير إلى عملية التعلم التي تساعد الطلاب على التغيير عن مواقفهم ومشاعرهم وتجاربهم وأفعالهم ومعتقداتهم.

انعكاس (عملية التعلم) في التعلم الإلكتروني	غير بشدة	غير موافق	محايد	موافق	موافق بشدة
يمكنني التعلم الإلكتروني من:					
التعلم في أي وقت وفي أي مكان (على سبيل المثال: في الجامعة أوالمنزل)					
التعلم بسرعة واستخدام استراتيجيات التعلم التي تعمل من أجلي.					
الاستفادة القصوى من الفرص المتاحة لزيادة معرفتي والتحكم في نجاحي (على سبيل المثال: الاختبارات)					
الوصول إلى ردود الفعل الفورية.					

الجزء الحادي والعشرون: الغرض من هذا القسم: التحقق من بعض العوامل مثل تأثير الثقافة المختلفة، والفصل بين الجنسين، والمواقف تجاه استخدام التعلم الإلكتروني.

الثقافة	غير بشدة	غير موافق	محايد	موافق	موافق بشدة
تؤثر العوامل الثقافية على موقفي تجاه التعلم الإلكتروني بالطرق التالية:					
أعتقد أن التعلم الإلكتروني هو طريقة تدريس جيدة وقد تساعد في معالجة مسألة الفصل بين الجنسين في نظام التعليم العالي السعودي.					
أشعر بالقلق إزاء مواقف الطلاب تجاه التعلم الإلكتروني.					
أنا قلق من أنني قد لا يكون لدي ما يكفي من الوقت لتنظيم نفسي كل يوم.					
أنا مشغول تماما بأشياء أخرى.					

Stilring WA 6021
Phone/ Fax: (61 8) 9310 7769

Email: mostafaperth@gmail.com
Mobile: 0422 886 413 – 0414 702 346

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الجزء الثاني والعشرون: الغرض من هذا القسم: التحقق من مدى رضا المتعلم عن المنهج الدراسي من خلال تحفيز التعلم، وتسهيل التعلم التعاوني.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	التحفيز
					على الرغم من التأثير المحتمل لطبيعة أنظمة التعلم الإلكتروني على التحفيز فسوف أكون قادرا على:
					أن أظل متحمسا على الرغم من أن المحاضر غير متصل بالإنترنت في جميع الأوقات.
					أن أكمل عملي حتى عندما تكون هناك إغراءات على الإنترنت (على سبيل المثال: الرد على رسائل البريد الإلكتروني للأصدقاء، تصفح مواقع الويب)
					أن أكمل عملي حتى عندما يكون هناك تشويش أو إزعاج في المنزل (على سبيل المثال: التلفاز ، الأطفال، الخ)
					أن آخذ مناهج دراسية أخرى تقدم عبر التعلم الإلكتروني.

الجزء الثالث والعشرون: تحديد الاحتياجات المختلفة للمتعلم والأولويات التي تنطوي على أساليب التعلم والمهارات التقنية اللازمة لحل المشكلات التي تحدث عندما يتصل المتعلم بنظام التعلم الإلكتروني.

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة	الإدارة الشخصية
					يثير استخدام أنظمة التعلم الإلكتروني بعض قضايا الإدارة الشخصية التالية:
					ليس لدي وقت كاف لتنظيم نفسي كل يوم.
					الصراع بين اهتماماتي ومسؤولياتي.
					عدم القدرة على إدارة كل متطلبات التقنية.
					أقضي وقتي في العمل على المشكلات الغير أكاديمية والغير متعلقة بالتقنية.
					معرفتي محدودة للغاية حول التعلم الإلكتروني.

Appendix 4: Interview Consent Form

Curtin University

Interview consent form

HREC Project Number:	HRE2018-0531
Project Title:	A Conceptual Framework for the Effective Implementation of E-learning in Saudi Universities
Principal Investigator:	Dr Tomayess Issa
Student Researcher:	Abdullah Alqahtani
Version Number:	01
Version Date:	01/10/2019

- I have read (or had read to me in my first language) the information statement version listed above and I understand its contents.
- I believe I understand the purpose, extent and possible risks of my involvement in this project.
- I voluntarily consent to take part in this research project.
- I have had an opportunity to ask questions and I am satisfied with the answers I have received.
- I understand that this project has been approved by Curtin University Human Research Ethics Committee and will be carried out in line with the National Statement on Ethical Conduct in Human Research (2007).
- I understand I will receive a copy of this Information Statement and Consent Form.

Participant Name	
Participant Signature	
Date	

Declaration by researcher: I have supplied an Information Letter and Consent Form to the participant who has signed above, and believe that they understand the purpose, extent and possible risks of their involvement in this project.

Researcher Name	
Researcher Signature	
Date	

Note: All parties signing the Consent Form must date their own signature

Appendix 5: Participant Information Sheet

Curtin University

Participant Information Sheet

My name is Abdullah Alqahtani. I am undertaking a Doctor of Philosophy in Information Systems at Curtin University and I am a lecturer at Umm Al-Qura University – Saudi Arabia. I am conducting research regarding the effective implementation of E-learning in Saudi universities.

Purpose of Research

I am investigating factors that will have the most influence on E-learning system implementation in universities of Saudi Arabia in order to develop a conceptual E-learning model.

Consent to Participate

Your involvement in the research is entirely voluntary. You have the right to withdraw at any stage without it affecting your rights or my responsibilities. When you have signed the consent form I will assume that you have agreed to participate and allow me to use your data in this research.

Participant Requirements

This research carries no risks, although you shall be asked questions about your university and job. Interview questions shall pertain to your experiences, opinion about E-learning factors and the potential use of this technology in higher education sector. The interview should not last more than 40 minutes.

Confidentiality

The information you provide will be kept separate from your personal details, and only my supervisors and I shall have access to this. The interview transcript will not have your name or any other identifying information on it and in adherence to university policy, the interview tapes and transcribed information will be kept in a locked cabinet for seven years, before it is destroyed.

Ethics

Curtin University Human Research Ethics Committee (HREC) has approved this study (**HRE2018-0531**). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Further Information

If you would like further information about the study, please feel free to contact me on +61 406332132 or by email on abdullah.alqahtani1@postgard.curtin.edu.au. Alternatively, you can contact my supervisors Tomayess Issa on +61 8 9266 7682 or by email Tomayess.Issa@cbs.curtin.edu.au and S Zaung Nau on +61 8 9266 7102 or by email Z.Nau@curtin.edu.au

Thank you very much for your involvement in this research. Your participation is greatly appreciated.

Appendix 6: Interview Questions

Curtin University

Dear Sir/Madam,

My name is Abdullah Alqahtani. I am undertaking a Doctor of Philosophy in Information Systems at Curtin University and a lecturer at Umm Al-Qura University – Saudi Arabia. I am conducting research regarding the effective implementation of E-learning in Saudi universities. This research involves semi-structured interviews, which will take up to 40 minutes to complete. This research aims to generate the factors influencing the adoption and implementation of E-learning in Saudi Universities.

The semi-structured interviews will start with general questions regarding your experience of E-learning and its use in higher education. Then you will be asked to evaluate my initial model comprising E-learning implementation factors. If you feel uncomfortable answering certain questions, please feel free to disregard them. We would appreciate it if you could complete this interview within a week. However, if this is not possible, please respond as soon as convenient.

Participation in this research is completely voluntary and anonymity is assured. Participants may withdraw at any time without prejudice or negative consequences and do not need to provide a reason. By completing this interview, you are consenting to participate.

Any information provided by you through the semi-structured interviews will be held as strictly confidential. Information will not be disclosed to any parties other than the researchers unless required to do so by law. Finally, the researchers will ensure that published material will not contain any information that can identify you or your university.

We encourage you to participate because this research will provide valuable insights into the attitudes of students and academics toward E-learning technology in the higher education sector in Saudi Arabia. The research outcomes will help us to improve the higher education sector in Saudi Arabia. Your assistance in this research is greatly appreciated and is crucial for the success of its findings.

Your interest and consideration are greatly appreciated. If you need any additional information from us, please let us know by contacting Tomayess.Issa@cbs.curtin.edu.au (+61892667682) or abdullah.alqahtani1@postgrad.curtin.edu.au (+61406332132).

Curtin University Human Research Ethics Committee (HREC) has approved this study (**HRE2018-0531**). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email hrec@curtin.edu.au.

Thank you in advance.

Yours faithfully,

Abdullah Alqahtani
PhD Candidate | Information System
Curtin University
Mobile |+61 406332132
Email |abdullah.alqahtani1@postgrad.curtin.edu.au
Web |http://curtin.edu.au

Q1. Your University:

_____

Q. 2. Gender:

1. Male

2. Female

Q. 3. Age:

1. 20 – 30

2. 31 – 40

3. 41 - 50

4. 51 – 60

5. Over 60

Q. 4. Academic Status:

1. Professor

2. Associate Professor

3. Assistant Professor

4. Lecturer

5. Instructor

Q. 5. Your administrative role:

1. Vice-Rector or Deputy Vice-Chancellor

2. Dean

3. Associate Dean

4. Department Chairperson

5. Faculty member

6. Other: _____ (please specify)

Q. 6. Years of Employment (University):

1. Less than 1 year

2. More than 1 year and less than 2 years

3. More than 2 years and less than 5 years

4. More than 5 years

Q. 7. Years of experience with E-learning systems:

1. Less than 5 years

2. 5 – 10 years

3. 11 – 15 years

4. 16 – 20 years

5. 21 – 25 years

Q. 8. Please describe your experience of using the E-learning systems, and list any advantages or disadvantages of the current E-learning system?

_____
_____
_____
_____
_____
_____

Q. 9. Indicate your level of knowledge and experience with the use of E-learning system:

Extremely competent	Somewhat competent	Neutral	Somewhat incompetent	Extremely incompetent

Q. 10. What factors would encourage you to adopt E-learning for your teaching and learning tasks?

_____
_____
_____
_____
_____

Q. 11. Assuming that you are already using an E-learning system for your learning and teaching tasks, what would make you stop using it?

_____
_____
_____
_____
_____
_____

Technical Learning Management Systems: refers to how the E-learning system is designed to perform from a technical and design perspective. This section is intended to determine whether E-learning has given you better access to the Internet to obtain technical support, use ICT resources including teaching and learning materials, and plan the course content.

Q. 12. How important is the technical learning management systems for academics' implementation of E-learning?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 13. How important is the adequacy of Internet connectivity in your university?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 14. Why? Please give details.

_____
_____
_____
_____
_____

Q. 15. Do you think that your university currently provides adequate support for the use of E-learning? Please give details.

_____
_____
_____
_____
_____

Q. 16. Do you have the appropriate ICT resources, knowledge and skills to use E-learning systems in your university? Please give details.

_____
_____
_____
_____
_____

Q. 17. Do you think E-learning systems are easy to use?

o Yes
o No

Q. 18. Please give details.

_____
_____
_____
_____
_____
_____

TPTCK: is a combination of technological pedagogical knowledge (TPK) and technological content knowledge (TCK), and it indicates the knowledge that academic staff have of technology-integrated teaching environments. TPK refers to knowing how to use E-learning to implement different teaching methods, while TCK is the knowledge of how subject matter can be conveyed with E-learning. Here the focus is on how the academic staff integrates E-learning to facilitate teaching and improve the delivery of information (course content).

Q. 19. How important is the TPTCK for academics' use of E-learning? Why?

_____
_____
_____
_____
_____
_____

Q. 20. Do you think the academic staff has sufficient knowledge and skills to integrate E-learning in their learning and teaching practices? Please give details.

_____
_____
_____
_____
_____
_____

Q. 21. How important is TPK for academic staff to facilitate the use of E-learning in Saudi universities?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 22. Please add your comment:

_____
_____
_____
_____
_____

Q. 23. How important is TCK for academic staff to facilitate the use of E-learning in Saudi universities?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 24. Please add your comment:

_____
_____
_____
_____
_____

Q. 25. Do you think that academic staff are willing to use E-learning system in their learning and teaching in Saudi universities? Please give details.

_____
_____
_____
_____
_____
_____

E-learning Management Systems: are concerned with the interaction with the system and the communication tools.

Q. 26. How important is an E-learning management system for designing course content in an E-learning environment?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 27. Please give details:

_____
_____
_____
_____
_____

Q. 28. Below, select the tasks or learning activities (can be more than one) for the online course that can be facilitated by E-learning:

o   Quiz
o   E-mail group
o   Announcement
o   Discussion groups
o   Assignments
o   Exams
o   Other (…)

_____
_____
_____
_____
_____
_____

E-assessment: is concerned with the attitude of academic staff toward the use of e-assessment. Here we are interested in (e.g): reliability, security, and practical issues associated with e-assessment.

Q. 29. How important is it to use e-assessment for evaluating student learning outcomes?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 30. Please add your comment:

_____
_____
_____
_____
_____

Q. 31. Is e-assessment considered to be a practical, secure, and reliable alternative to traditional paper-based assessment? Please give details.

_____
_____
_____
_____
_____

Students' Readiness: concerns the awareness of E-learning systems, and the willingness to use such systems. Here the focus is on the learning process, peer learning, motivation, interaction, training, and knowledge and skills required to use the system.

Q. 32. Do you think the students' readiness factor is an important consideration when implementing E-learning in Saudi universities? Please give details:

_____
_____
_____
_____
_____
_____

Q. 33. Please rate the importance of students' readiness to use E-learning systems.

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Personal management issues: refer to the effect on academic staff of using E-learning systems. The focus is on time management and E-learning experience, etc.

Q. 34. To what extent will personal management issues influence the implementation of E-learning systems in your university?

Extremely	Very much	Moderately	Slightly	Not at all

Q. 35. Please add your comment:

_____
_____
_____
_____
_____

- E-learning experience
- Time management

- Interaction and Motivation
- Knowedgel and Skills

- Reliability and Security
- Practical issues

- Internet connectivity
- Technical Support
- ICT resources
- Usability

- TPK
- TCK

- Course design
- Communication tools
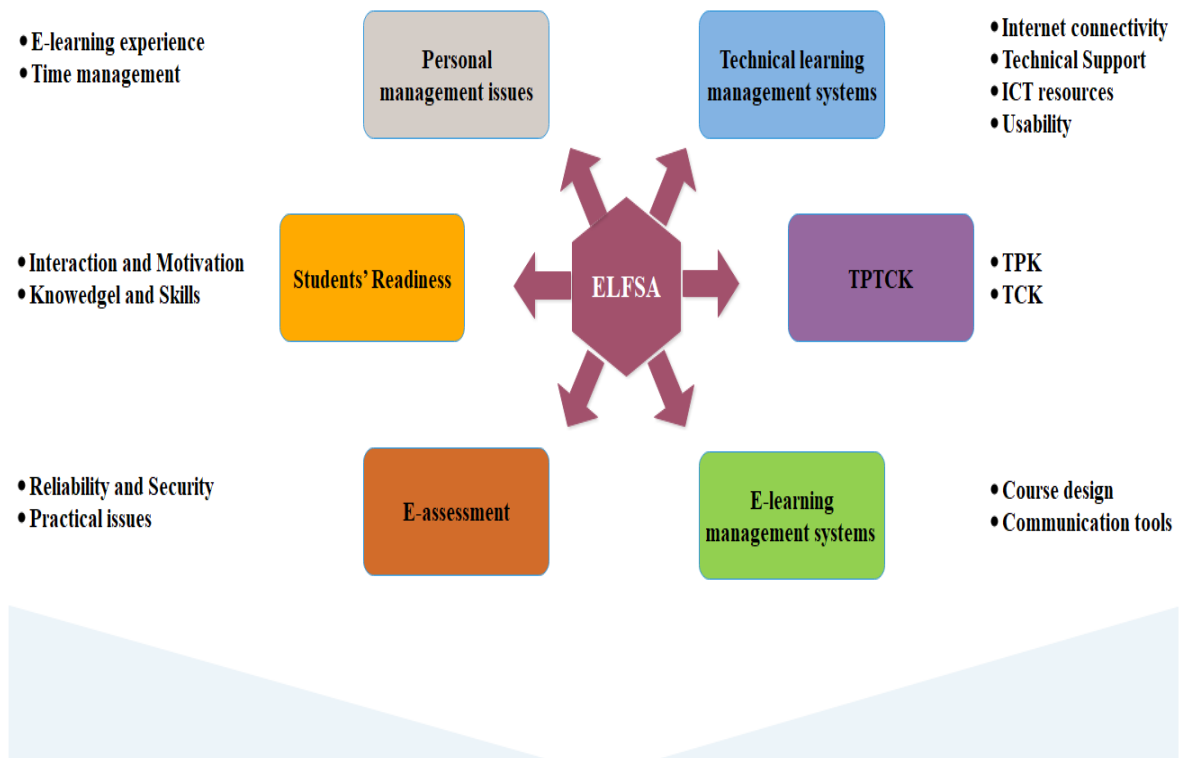
The refined version of E-learning framework

Q. 36. What is your evaluation of the overall refined E-learning framework?

Effective	Moderately effective	Not effective

Q. 37. Please add your comment:

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_____

_____

_____

Q. 38. Do we need to add new factors to the framework or delete any factors from the refined framework?

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Q. 39. To what extent is it important to offer training to academics and students in the use of E-learning systems?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 40. Have you received any formal training (offered or funded by the university) in the use of E-learning Systems? Please provide details.

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_____
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Q. 41. From your experience, do you think students' training is an essential factor for the use of an E-learning system? Give reasons for your response.

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Q. 42. What are the problems and challenges you face when using the E-learning system? Do the limitations outweigh the benefits?

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Q. 43. Do you think the current learning theories and practices in Saudi universities support the integration of E-learning systems? Why?

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_____
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Q. 44. To what extent is it important to consider this factor when implementing E-learning in Saudi universities?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 45. Do you think that the current teaching strategies in Saudi universities support the adoption of an E-learning system? Why/Why not?

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Q. 46. To what extent is it important to consider this factor when implementing E-learning in Saudi universities?

Extremely important	Very important	Moderately important	Slightly important	Not at all important

Q. 47. Do you think that cultural factors will influence the effectiveness of E-learning implementation in Saudi universities?

_____
_____
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_____

Q. 48. To what extent does this factor influence the implementation of E-learning in Saudi universities?

Extremely	Very much	Moderately	Slightly	Not at all

Q. 49. Would you like to add any comments in regards to the survey?

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_____
_____