

Cloud-based e-learning systems in Saudi universities



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To my beloved Father,

Mubarak Ali M Alsawayed

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.



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Abstract

The Kingdom of Saudi Arabia has recently seen phenomenal developments in advanced education and e-learning. The Saudi government has decided to use new technologies to improve the national education and learning systems and further develop educational opportunities, especially in universities. This study was undertaken to uncover the perspectives of academics and university staff on the question of how e-learning systems were serving their learning requirements within universities in the Kingdom of Saudi Arabia. A mixed method approach was used to obtain e-learning users' experience of e-learning systems within their own Saudi university. An anonymous online survey was used to collect both quantitative and qualitative data. A total of 114 survey responses were collected; however, after removing blank responses and cleaning the data, only 55 surveys were used for analysis. Key findings in the study included the fact that Saudi universities have a good e-learning infrastructure. In addition, shifting e-learning services in Saudi universities to the cloud services might allow educators the benefits of their current e-learning services as well as those of the cloud. From this study, a number of new aspects were found that contribute to the conversation, concerning when, or if, a move to cloud-based e-learning systems will better serve Saudi universities. It is hoped that this study can provide a useful perspective for decision makers as well as subsequent researchers.

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Chapter One: Introduction

This chapter presents a research overview, highlighting the thesis objectives, the research problem and question, the research significance and the target audience, the method used in this study, and the research design. It concludes with the structure of the remainder of the thesis.

1.1 Research overview

Although the origins of the term e-learning are uncertain, it has been referred to in the literature since the 1980s. Since then, e-learning has been defined as a method that uses any electronic device to deliver educational material (Moore, Dickson-Deane, & Galyen, 2011). In other words, e-learning deliberately incorporates technology to facilitate both online and offline learning (Naidu, 2003). The Saudi Arabian government has decided to use new technology in support of the national education system to enhance the learning systems available, and further develop educational options; especially in universities (Al-Sarrani, 2010).

Cloud computing presents a promising pathway to digital transformation in the Saudi Arabian education system at the university level. However, how well it may meet the learning needs of academics and campus technology specialists is yet to be discerned. Cloud computing technology has changed the way in which users can access and manage applications. In addition, cloud computing is designed for use via applications services on a flexible online infrastructure (Al-Zoube, Abou El-Seoud, & Wyne, 2010). Cloud computing has been described as a large container that combines many resources that can be reached and dealt with in an easy way. Usually, the use of these resources is based on a particular pattern offered by the provider of these technologies or services, such as an infrastructure, platform, or software (Vaquero, Roderomero, Caceres, & Lindner, 2008). In addition, it has been identified as a platform that hides the complexities of its function and provides service to users in a simple way. Furthermore, the

technological complexity of this platform simultaneously helps save on labour, maintenance service and data, cost, software, and system updates (Alshwaier, Youssef, & Emam, 2012).

According to Sedayao (2008), the revolution in multimedia, communication, and computing technology has helped to build a virtual environment for learning that can be unit shared. Recent advances in cloud computing have enabled the development of effective and scalable Web applications which can be used as important resources to provide educational services to users over the Internet.

1.2 Thesis objective

1.2.1 Purpose of study

The overall purpose of this study is to enhance the e-learning environment in Saudi Arabia by answering the following question: *How well do cloud-based e-learning systems serve tertiary learning requirements in the Kingdom of Saudi Arabia?* This investigation aimed to uncover some cloud-based e-learning requirements at Saudi universities. It is hoped that the study can identify factors such as:

- The current e-learning systems used in Saudi Arabian universities.
- The required changes to bridge e-learning systems gaps.
- The suitable cloud deployment model.
- The differences between cloud-based and traditional e-learning systems.
- The benefits of cloud computing for educational institutions.
- Concerns and challenges in cloud-based e-learning.

1.2.2 Research problem

The Kingdom of Saudi Arabia covers a large geographical domain with a large population living in remote areas, where the possibility of going to university is problematic (Al-Harbi, 2011 & Bates, 2009), a challenge that also offers an opportunity for e-learning. Moreover, the growth in the Saudi population, in line with a lack of qualified university staff, presents a challenge (Hassan, 2008 & Chatin, 2016), this is particularly true of female staff (Al-Asmari & Khan, 2014). The lack of university facilities, such as offices, also presents challenges (Bates, 2009). In addition, students' acceptance of foundational courses exceeds the limit (Al-Asmari & Khan, 2014 & Bates, 2009).

The increasing cost of university administration (Lungu, 2016) as well as the living expenses of students who travel to cities for educational purposes is another considerable issue. (Al-Harbi, 2011). Some parents are also unhappy to allow their children to go to cities to study (Al-Harbi, 2011), especially if they are female. (Alaugab, 2004). Moreover, the willingness of Saudi universities to advance their education system (Mirza & Abdulkareem, 2011; Reuben, 2008; Al-Nuaim, 2012; Bates, 2009), along with massive expansion of universities over recent decades, can be explained as a reason to employ e-learning. (Bates, 2009). Therefore, these issues encouraged the researcher to carry out an investigation into current e-learning systems in the Kingdom of Saudi Arabia. This investigation aimed to determine the state on the ground of e-learning in Saudi Arabia, how cloud-based e-learning systems may compare to conventional e-learning systems, and whether they can serve the tertiary learning requirements as articulated by those teaching in Saudi universities.

1.2.3 Research question

This research asked the following question:

- ❖ *How well do cloud-based e-learning systems serve tertiary learning requirements in the Kingdom of Saudi Arabia?*

1.2.4 Research significance

This study contributes to the field of e-learning by investigating current e-learning systems in the Kingdom of Saudi Arabia and identifying several factors of conventional e-learning systems and cloud-based e-learning systems. These factors will offer an insight into the prospects of e-learning and cloud computing in improving and enhancing the tertiary educational process in the Kingdom of Saudi Arabia. Moreover, the intended outcomes of this research may help universities in the Kingdom of Saudi Arabia to benefit from investment in cloud based e-learning, or inform technology selection decisions by having them based on the findings of this study. It might also help to determine if there is an improved match between technological systems and learning and teaching needs as an outcome of this study. This is expected to benefit those who use e-learning systems.

1.2.5 Target audience

The target audience of the research are people working in Saudi Arabian universities and specifically those working in, or making institutional decisions about e-learning or e-learning support. Participants could have been Saudi or any nationality working in Saudi universities.

1.3 Methodology

A concurrent mixed method approach was undertaken in this study by circulating a survey to academics and staff at universities in the Kingdom of Saudi Arabia. The mixed method approach has rapidly become a desirable method for researchers in the field of information

technology (Gable, 1994; Kwan & Ding 2008) and, according to Johnson, Onwuegbuzie, and Turner (2007), is used in many disciplines.

A mixed methods approach integrates quantitative and qualitative data collection and analysis (Johnson, Onwuegbuzie, & Turner, 2007). The aim of this approach is to provide the most comprehensive insight into a research issue. This study used a survey containing a mix of open-ended and close-ended questions provided to staff at Saudi Arabian universities. This survey started with some quantitative close-ended questions to enable the outcome of the research to be generalized to a wider population and then incorporates qualitative, open-ended questions to gather detailed opinions from the participants (Creswell, 2014).

1.4 Research design

In order to achieve the aim of this research, a suitable research design needed to be selected in order to gather data (Straub, Boudreau, & Gefen, 2004). The research design started from the research proposal and preparation through to postgraduate department approval, ethics committee approval, methodology, survey process, data analysis, findings, and final report development. Through all these procedures, the literature review was a continual process, as shown in Figure 1.1.

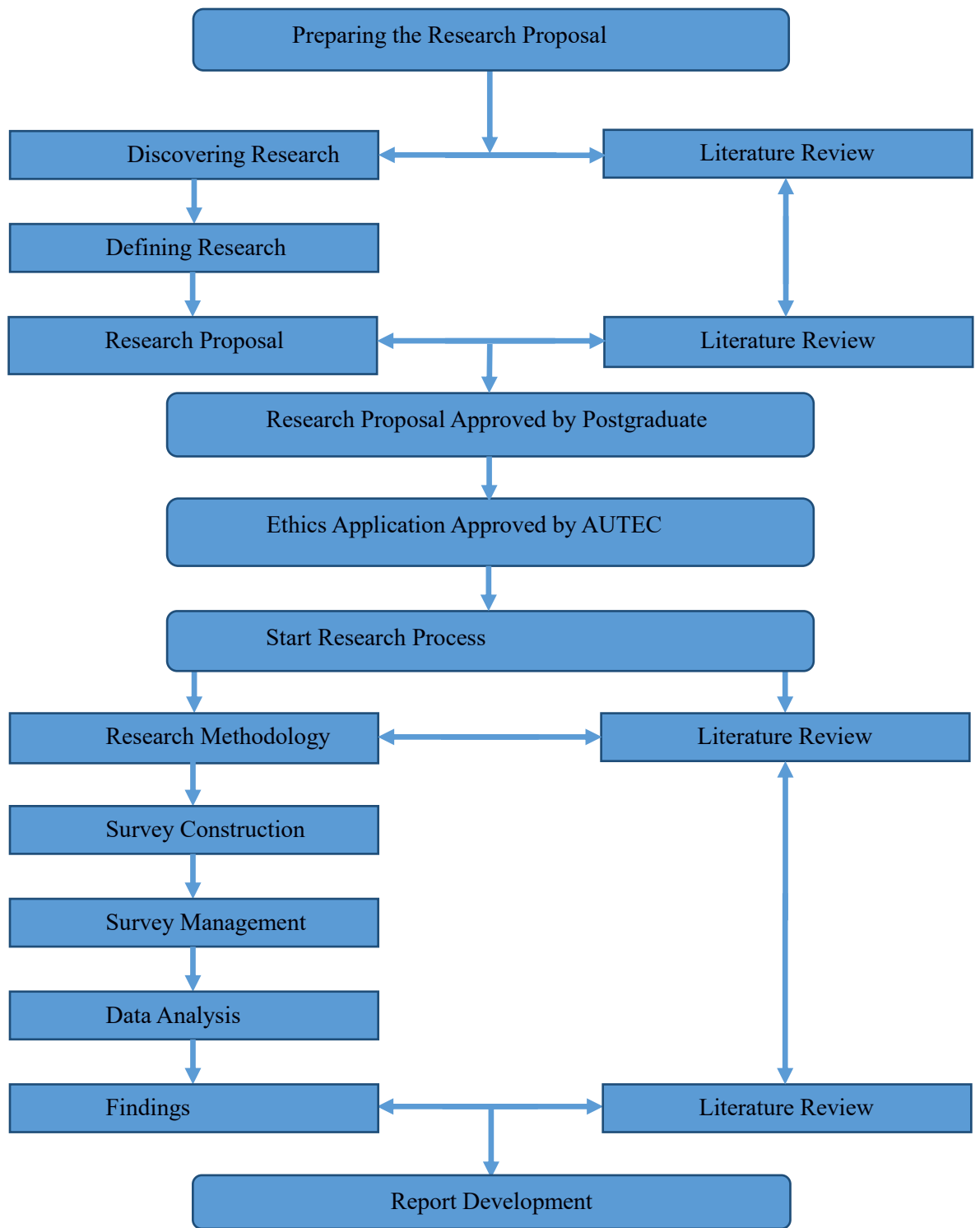


Figure 1.1 Research design

1.5 Thesis structure

This thesis contains six chapters and four appendices. These are summarized below:

- **Chapter One: Introduction.** This chapter presents the research overview, highlighting the thesis objective, the research problem and question, research significance, the intended target audience, and the method used in the study.
- **Chapter Two: Research Review.** This chapter gives an overview of the research area, including recent literature on e-learning and systems, current systems in Saudi Arabia, gaps in Saudi e-learning, and opportunities to go further through cloud based e-learning.
- **Chapter Three: Methodology.** This chapter defines and explains the selected research methodology used to achieve the main research objective. It includes an explanation of the survey progress and plan, followed by the ethical considerations that were addressed in the research design.
- **Chapter Four: Data Analysis and Results.** This chapter presents the analysis process used in the research study by investigating use of e-learning systems by staff at universities in the Kingdom of Saudi Arabia, along with the results of the analysis.
- **Chapter Five: Discussion.** This chapter gives an interpretation of the findings, discusses it in the context of previous literature, identifies some implications, presents the limitations of the study, and suggests future work.
- **Chapter Six: Conclusion.** This chapter presents an overview summarising the thesis and the conclusions drawn from the study.

1.6 Summary

This chapter presented an overview of the research study, including e-learning background, the interest in e-learning in the Kingdom of Saudi Arabia to advance their educational systems, and introduced a high level view of the technology of cloud computing. It

also presented an overview of the objective of this research, including the purpose of the study, the research problem and question, the significance of the research, and the intended target audience. Furthermore, this chapter introduced the selected methodological approach used to conduct the study as well as the research design and the thesis structure.

The following chapter presents recent literature on e-learning and its context in the Kingdom of Saudi Arabia.

Chapter Two: Literature Review

2.1 Introduction

E-Learning is a just-in-time education platform that is combined with value chains with a high degree of velocity. It addresses the delivery of customised, all-inclusive, exhaustive, and dynamic education content in real-time. It helps create knowledge communities and connect learners and professionals with experts in different fields or subjects (Drucker, 2005).

The primary objective of an e-learning system is the replacement of the conventional style of learning, which is primarily driven by predetermined aspects, such as time, content, and place of learning, with a just-in-time system that is a customised and typically on-demand process (Education Policy and Reform Unit (UNESCO), 2014). This innovative learning concept is founded on several pillars, such as management, culture, and information technology (Maurer & Sapper, 2001).

Management support is needed to define a clear vision and plan aimed at the creation of an e-learning platform, to create an environment conducive to learning, and to assimilate learning into everyday life. Significant changes in an organisation's behaviour may be required to institute a culture of "learn in the morning, do in the afternoon" (AlSultanny, 2006, p. 112). An information technology platform that facilitates effective implementation of this type of learning set-up is also required (Jones & Brader-Araje, 2002; Brown, 2010).

The advent of globalisation and continual increases in the sophistication of technologies have contributed to improving education in the last few decades (Henderson, 1989). Newer technological advancements are often exploited by the education sector, particularly with the advent of computer-related information technology (Devedzic, 2003).

E-Learning originated in the late 1980s in conjunction with another model of knowledge and information delivery: online learning. While a few scholars have offered clear-cut definitions of e-learning, several authors have suggested that there are various definitions because of the different perspectives that exist of the defining aspects of e-learning (Moore, Dickson-Deane, & Galyen, 2011). Essentially, e-learning is a process of learning that evolves from the interaction between learning content that can be digitally delivered (Brady, Holcomb, & Smith, 2010; Bowles, 2013) by services that employ networking techniques and tutoring assistance support (Jethro, Grace, & Thomas, 2012).

This remainder of this chapter covers topics such as:

- **E-Learning:**

Under this topic various themes will be discussed such as: the background of e-learning, popular e-learning systems, e-learning in the universities of the Kingdom of Saudi Arabia, the need for further research on e-learning and the learning objectives of courses offered by academics in Saudi universities, known gaps in e-learning systems, and changes required to bridge these gaps.

- **Cloud deployment models:**

Under this topic various areas will be discussed such as: the differences between cloud-based software and traditional e-learning software, the benefits of cloud computing for educational institutions, and concerns and challenges in cloud-based e-learning

- **Key considerations:**

This topic explores some key questions for organisations to consider as they seek to leverage technology to exploit business advantages due to some barriers to technology adoption decrease and the education industry.

- **Survey justification for this research:**

This section will explore some literature to justify the use of survey method in this research.

2.2 E-Learning

With the advent of information technology, there has been a growth in research into, and utilisation of, various e-learning platforms. There has been a myriad of initiatives at different levels of the education industry associated with the use of e-learning systems. Almost all educational establishments and global universities that offer distance learning do so through e-learning platforms. Coursera, Alison, MIT Open Courseware, Lynda.com®, and the thousands of free online course available online are all examples of e-learning systems.

The virtual courses that e-learning mechanisms support are having a growing impact on the educational framework, in comparison to conventional on-campus university programs (Brunett, 2011). For instance, for the very first version of the course titled “Machine Learning” that Stanford University offered, there were at least 160,000 students enrolled from across various parts of the world. This illustrates the magnitude of the impact that e-learning has today (Al-Zoube, El-Seoud, & Wyne, 2010) on a plethora of issues, such as the fact that the infrastructure required to offer concurrent services for equal numbers of students obviously surpasses the capabilities of traditional Web servers (Fernandez, Peralta, Herrera, & Benitez, 2012). In addition,

the demand for various teaching resources tends to vary in a dynamic manner and scale very rapidly as well. To accommodate requests during peak activity periods without preventing access to various other system services, the ideal solution would be to build a better, highly enhanced infrastructure than that which would be sufficient for conventional educational purposes. A solution would be to offer services based on real-time demand and facilitate payment for those resources and aides that are used in real time by users.

2.2.1 Popular e-learning systems

This section presents an overview of the most popular e-learning systems that are currently on the market and that are extensively used by educators and learners.

2.2.1.1 Easygenerator

Easygenerator is a Netherlands-based company that produces e-learning software for use by teachers, learners, course designers, and trainers. Easygenerator seeks to develop e-learning software that is powerful, innovative, interesting and simple (Easygenerator, 2016). The Easygenerator e-learning software offers students the following:

- Visually illustrated templates
- A path for accelerating learning
- Lessons associated with specific tasks
- Team chores and homework
- Curriculum advancement and strict supervision
- Rephrasing of content from time to time
- Single-click publishing to any website, device, or learning management system.

Easygenerator views e-learning as a collective learning process, i.e., that are various process designers, content developers, subject experts, and instructors who make the e-learning process a success. Easygenerator also allows people to co-author content. The company understands that students need flexibility in learning; hence, all of Easygenerator's e-learning programs are designed to address the functional requirements of students. Easygenerator gives students the freedom to choose their own curriculum through self-directed learning and individualisation of their assignments (Allen Interactions, 2016). Easygenerator's core product is its NextGen e-learning software. Using this software, students can achieve results through a deliberate approach to learning objectives, learner assessment, adaptive learning, blogs, videos, and question-and-answer sessions. Easygenerator helps students with a structured curriculum, creates interesting learning platforms, aligns content, uses regular assessments to measure the progress of its learners, and provides personalised skill-based training (Easygenerator, 2016).

2.2.1.2 Elucidat

Elucidat uses various game features, multi-device compatibility, and quick interactions to enhance the e-learning process. Through an introductory course, a student can meet the team that will be taking the student through the entire e-learning process (Elucidat, 2016). In a single morning, students can work through the basic information about the entire course and plan how to proceed with the course. Elucidat refrains from using unnecessarily long steps that take more time for students to create an effective learning process. Students are able to export the content to any supported system, such as SCORM, Tin Can, or MOOC, described below.

SCORM is an extensively used standard for e-learning. Its popularity is the result of the convenience that it offers in terms of playing any type of content that conforms to SCORM. Tin Can is an application programming interface (API) that allows e-learning platforms to record

learners' experiences, irrespective of the places and times at which the experiences occurred. Massive Open Online Courses (MOOC) are e-learning courses that are offered free of charge by a few leading global universities. Coursera is one such example.

Elucidat has an internal hosting system that helps course developers share learning material instantly. Elucidat analyses the e-learning performance of students on a daily basis and provides insights to them to make helpful learning changes. The Elucidat software has a course on health and safety issues, which is helpful for people in various work environments. It also has a Face Smile mini-challenge game, which teaches learners the importance of smiling in various situations. Elucidat also has a leadership training course, sales scenario training, compliance training, gamification technology, historical games, and a systems training course. It has a personal safety program for children, developed in collaboration with the Barnardos children's charity, to provide online personal safeguarding training to children.

2.2.1.3 Quick Lessons

Quick Lessons is a collective e-learning platform that allows users to use their online library of templates, animations, interactive tools, and games. Users can embed all these into PowerPoint. No design skills are needed to use the Quick Lessons program. The online program can be used from any geographic location at any time. Quick Lessons provides its users with out-of-the-box learning programs, games, and exercises to evaluate users' learning (QuickLessons, 2016). Quick Lessons employs HTML5, which is cross-platform and easily accessible worldwide. It also has a system to convert PowerPoint programs into Flash and vice versa. Quick Lessons also provides various export options and an offline, mobile, and online learning management system (LMS). Quick Lessons uses SCORM and MOCC compliance structures. The developer's list of clients includes Mundo Verde, Portal Educaco, Lojas Americans, and

others (QuickLessons, 2016). Quick Lessons provides an environment for multiple users to develop online programs at 60% of the cost and in 40% of the time of comparable conventional programs. Developers can instantly preview and review their programs and collaborate with tools. Quick Lessons helps new developers and engages them interactively. The content developed with the help of Quick Lessons has excellent visual quality and is suitable for all levels of classroom and outdoor training. Quick Lessons also helps developers to create modern content and maintain content online.

2.2.1.4 Smart Builder

Smart Builder is a participatory team-based cloud application that allows various virtual teams to collaborate to provide quality products and meet their deadlines. Smart Builder is a product of Vantage Path, a company based in Alberta, Canada that trains various global corporate companies (Vantage Path, 2016). The company delivers courses both online and through traditional methods. The Vantage Path team works to improve the productivity of their clients and enhance their profit and growth, primarily through the use of the client's own infrastructure. The company has served clients such as PwC, Ford, Shell, Encana, and Symantec. Another educational product of Vantage Path is SNAP Tree—an autism-awareness e-learning course that teaches supervisory skills to first-time leaders. (Allen Interactions, 2016). Using Smart Builder, a company can develop e-learning courses from scratch to meet the training needs of their clients. They can evaluate and understand the training requirements of the client, build courses that accelerate the learning process, develop employees, and bring about behavioural changes.

The learning management system of Vantage Path is a cloud-hosted system. This system evaluates, manages and tracks employee results. The courses are flexible, produce performance

reports, compare the progress of employees, create rectification programs, and provide certification on the completion of the training program.

2.2.1.5 Artisan by BankersEdge

Artisan increases the learner's creativity. The company, BankersEdge, believes in a visually appealing training environment. Thus, following this basic principle, Artisan transforms the content produced by developers into a huge training canvas. Artisan has innovative features that help developers to change fonts per their choice, change colour schemes, and import various learning tools. Students are motivated to be more involved and learn differently in a new, visually appealing environment (BankersEdge, 2016).

BankersEdge helps students develop and edit their programs easily. There is a spell-check program for theoretical content; it allows page-to-page editing and lets the user have a keyword search program. Users can choose from a variety of template pages, test out features, and various scoring parameters. Artisan also allows the users to leave work in-progress and save their work. It also has a unique bookmark facility. BankersEdge motivates learners with a stimulating visual flash-based program. BankersEdge engages students in innovative learning throughout the entire course program (BankersEdge, 2016).

BankersEdge has three types of programs:

- Simplified template editing program for users not very technology savvy
- Easy-to-use tools for skill level users
- HTML editing features for advanced users

Students can reproduce their thoughts in several unique using graphs, charts, etc. Students can manage their course content through a streamlined interface with clients. BankersEdge also allows a student to view his/her entire work on a single page before launching the program online. BankersEdge is in partnership with Training Pro for 44 new courses available on the Artisan platform.

2.2.1.6 Lectora Online by Trivantis

Lectora online is a Cloud-based e-learning program that combines various authoring tools. Trivantis was founded in 1999 and has its headquarters in Cincinnati, Ohio. Globally, nearly 125 countries today use Lectora's e-learning tools and their Course Mill management solutions for their e-learning programs. The company also has offices in Paris, London, Beijing, and Florida (Trivantis, 2016). Lectora is Trivantis' Flagship product and is the first authoring software that not only allows a rapid e-learning process, but is also cost friendly. Trivantis has made Lectora an affordable tool to create and engage content without any time and place boundary. The major products of the company are

- Lectora Online - helps the user create his/her own content with the help of Lectora's desktop authoring solution (Trivantis, 2016).
- Lectora Inspire – allows users to create interactive learning programs. It allows developers to create a quick mobile course and save time (Sharples & Beale, 2003). Once the program is developed, it can be launched on all devices. Lectora Inspire can adapt to tablets, iPhones, and Android phones equally well for the perfect look.
- Lectora Publisher – helps the developer enhance content with easy-to-use and easy-to-make tools with the help of a master desktop.

- Course Mill – prepares reports that are easy to make. Complies with the training program, has user friendly interface and is mobile ready (Jeng, Wu, Huang, Tan, & Yang, 2010).
- Course Mill Mobile – enables the user to download the app on a cell phone, track SCORM data, manage the content, and deliver the content in the required format, either Excel, Live Excel, or dashboard (Trivantis, 2016). The company has a large client list including P&G, FedEx, IBM Macys, and BMW.

2.2.1.7 ZebraZapps by Allen Interactions

Allen Interactions has been working to deliver custom based e-learning solutions for e-Learners for the past 20 years. Several e-learning professionals and organisations have benefited from the company's customised learning services and their instructional products. The company today has more than 500 clients and works in three core areas of e-learning:

- Custom learning services
- Training services and outreach
- ZebraZapps – visual Authoring System

ZebraZapps helps authors collaborate with one another, create content, publish on the Internet, and share content and learning experiences. This online publishing system is based on an online subscription. The authors' designs can range from a simple PowerPoint program to complex games and can be published on various online websites such as Amazon.com, Google Play, and iTunes (Allen Interactions, 2016; Thurow, 2015).

ZebraZapps helps the user in three ways:

- Creating a visual interaction – with the help of ZebraZapps, the user can create complex programs. Whether it is a game or academic content, ZebraZapps allows the use of a professional grade visual editor. The developers can engage themselves in the learning process and can be involved in the complex process. ZebraZapps allows users to create their own interaction as per their own imagination.
- Sketching and Brainstorming – ZebraZapps allows the user to sketch or prototype content and maintain it logically. ZebraZapps has sketches that have full functional objects and are very interactive. ZebraZapps brings learning events to life and has prototype delivering services.
- Publishing - with the help of ZebraZapps sophisticated e-learning program, where developers can select their own delivery platform, such as iOS, Android, and Windows desktop (Allen Interactions, 2016).

2.2.1.8 Amvonet Publish by Amvonet

Amvonet was established in 2002 by Mr. Vadim Eelen in Ohio, USA. The company provides Software as a Service (SaaS) e-learning solutions to a significant number of users globally. The company creates and publishes interactive textbooks for up to year K12 students. Amvonet focuses heavily on the graphical user interface. Amvonet offers interactive content and interactive assessment programs to help modern-day teachers across the globe (Hartel, Fujimoto, Strybosch, & Fitzpatrick, 2006). The pre-recorded interactive content of Amvonet is very popular with modern-day classroom instructors (Amvonet, 2016).

The Amvonet program is based on three stages:

- Amvonet Manage - this program helps teachers to manage content, progress reports of students, handle student accounts, and deliver courses based on student demand.
- Amvonet Connect - this program converts the traditional classroom into virtual classrooms, and students can interact live with the learning content. Students can also communicate with each other through audio-visual aids. Current sessions can be recorded and played on-demand by students as well. The classroom is also improved with the use of multimedia whiteboards and screen share.
- Amvonet Publish – this program helps users to create interactive programs, patent the same, and publish the same.

Amvonet provides solutions in four different forms—K12, higher education, corporate training and development, and healthcare. Amvonet partners with TAEC for cost effective course development, Totara Learning solutions as an open source option for corporate solutions, Nivel7 for generating human performance, VF Consulting as an independent research laboratory, RTKomm for telecommunication services in Russia, and Wide Services for telecommunication partners in Greece (Amvonet, 2016). Amvonet has transformed the traditional academic process into a digital academic process by using a 21st century collaborative e-learning environment (Freidberg, 1999).

2.2.1.9 Liquid Authoring by Landmark E-Learning

Liquid Authoring by Landmark E-Learning is a SCORM compatibility tool. The software is cloud-based; it has a media library. The software is compatible with HTML 5. Liquid Authoring creates dynamic e-learning courses and online presentations, which also include interactive video. All this can be performed very easily, quickly, and at an affordable cost (Liquid Authoring, 2016).

2.2.1.10 Atlantic Link by Assima

Atlantic Link by Assima is a flash-based interactive learning program. The company uses three basic components:

- Content point – is the core of Atlantic Link. E-learning can be performed globally on a single server. One does not need to have any specific skills to use this program (Assima Atlantic Link, 2016).
- Capture point – this program can run in combination with any IT application. The program can capture any screen with all its interactions. The developer can add an automatic audio narration to the program. There are also key features for advanced recording and sound editing as well. The annotated screens can enable the creation of powerful presentations within minutes and streamline the web delivery process.
- Knowledge point is an integrated learning management and content management system. The system provides user management, where a developer can easily add, edit, or delete any point. There is also an automatic progress tracker and a learner tracker.

Using Atlantic Link, the developer can create content in minutes by using the drag and drop feature. Atlantic Link has an extensive library, which can be accessed by users anytime, anywhere. Atlantic Link also has a free, built-in customised learning program that is an asset to the developers. These assets help the developers to develop more interactive and engaging content. Atlantic Link is offered as a SaaS model, which helps in collaborative e-learning solutions (Assima Atlantic Link, 2016).

2.2.1.11 Cameo by Yukon Group

The web based tool of Cameo enables scenario-based learning with the use of e-mail. The group uses a follow-up phase of learning which has been long forgotten. The group works on the basic principle that after-training implementation is more important than during the training process. Cameo keeps reinforcing e-learning points to users on a weekly basis. This gives a unique edge to Cameo as other e-learning companies only emphasise this during the learning process (Cameo, 2016). Reinforcement is delivered through email, so there are no multiple systems that require the user to log in to. The email takes only a moment to be read, and learners can use this in their office, while commuting, travelling, on the laptop, or on a cell phone. The design of the program is simple and the message is easy-to-understanding. Cameo also provides reports on the learner's perspective and shares results via email as well.

Cameo works on the following basic principles:

- Identify key learning points
- Build short learning scenarios for each key learning point
- Assign course sessions to learners
- Ensure learners attend the session
- Analyse and send the results
- Reinforcement and target areas for reinforcement (Cameo, 2016)

Cameo is an easy-to-use tool with no login options, improves learning retention, and helps the user to transfer the learned skills and knowledge to the job. Cameo's program is very popular in many universities and provides a continuous learning program to learners. Cameo's program

is also very popular with many corporate companies who are interested in training their employees. In 2009, Cameo received an award for the most innovative software product idea. Cameo takes responsibility for ensuring that users learn from their training programs and use it in their daily routine.

2.2.2 E-Learning in the universities of the Kingdom of Saudi Arabia

The Kingdom of Saudi Arabia has seen phenomenal development in advanced education and e-learning as of late. In recent years, 800 funding grants have been honoured each month for facilitating students studying abroad; a national community for e-learning has been set-up; and e-units, or divisions, have been set-up in practically every university (Al-Shehri, 2010).

The development of data and instructional innovations and their impact on education and learning have essentially achieved noteworthy changes in the scholastic atmosphere in the Kingdom of Saudi Arabia (Miniwatss Marketing Group, 2010). The new learning paradigm shift has made it obligatory to equip educators with important abilities in order to adapt to the new technologies (Wheeler, 2004). In 2002, “GOTEVOT, the government authority responsible for the Kingdom of Saudi Arabia’s technical education and vocational training, established the E-Learning Training and Resources Centre. The organisation publishes its technical and vocational courses in both Arabic and English on the web” (Al-Khalifa, 2010, p. 1). The urgent need for e-learning in the Kingdom of Saudi Arabia has come about because of the growing population compared with the shortage of teachers in both quantity and quality. e-learning has quickly picked up pace since it began in the Kingdom of Saudi Arabia in 2002 (Hassan, 2008), while also resulting in increased enthusiasm among educational institutions, and scholars as well as learners; however, the enthusiasm has grown at a more moderate pace (Al-Asmari & Rabb Khan, 2014; Sait, Al-Tawil, Ali, & Ali, 2003). E-learning in higher education is competing with a worldwide

pattern of introducing advanced education through the online model (Mirza & Abdulkareem, 2011, 2011; Reuben, 2008). Several educational establishments in the Kingdom of Saudi Arabia have fundamentally expanded their emphasis on e-learning and are aiming to transform their entire educational course programs through the use of learning materials used for e-learning into the already existing modules of education (Mirza & Abdulkareem, 2011; Al-Nuaim, 2012).

Universities, such as King Saud University (KSU), King Abdul Aziz University (KAU), Al-Baha University, Taiba University, Qassim University, King Khalid University (KKU), and Madinah Islamic University, have recognised agreements with the National Centre for e-learning and Distance Learning (NCeDL) to introduce e-learning technologies and mechanisms into their educational programs (King Abdul Aziz University, 2016; University World News, 2008). The E-Learning Centre, in the Deanship of Academic Development at King Fahad University of Petroleum and Minerals (KFUPM) (KKU Deanship, 2011), which was established in 2003, offers combined admittance to online resources through the use of WebCT (Course Tools) (Ramady, 2005). It delivers over 80 courses, covering subjects such as design, (Mirza & Abdulkareem, 2011; Sait, Al-Tawil, Ali, & Ali, 2003) sciences, and mechanical administration (Fraser, 1998), both in English as well as the local dialect Arabic, by using the Confederation of Open Courseware as a delivery mechanism. Alfaisal University also joined this confederation later (Al-Nuaim, 2012). King Saud University has also introduced a number of innovative projects, in conjunction with their existing e-learning program (Al-Draiby, 2010). A few delivery mechanisms that were part of this initiative were the “e-learn private university—the fourth stage of the Smart City project, the university’s electronic learning homepage and virtual television studio of its production and documentation centre” (Fazeelatunnisa, & Maniyar, 2013, p. 4). The Deanship of Distance Learning, which was set up at KAU in 2005, has completely left offline

course conveyance, including both a print medium and a postal mechanism. KAU utilises a dialect administration framework as a LMS as well as virtual classrooms in order to provide additional learning to support the students' progress during the first two years of the course, particularly in science courses (Al-Nuaim, 2012). KKU have introduced a comprehensive and expansive e-learning framework aimed at helping their more than 50,000 enrolled learners by aiding them to adjust, collaborate, obtain, and develop through different e-learning activities (Alwalidi & Lefrere, 2010). With the means to acquire world-class frameworks and learning procedures, KKU has recognised the capability for both educators and learners by facilitating enhanced proficiency and coordination, and access to coursework irrespective of the time and place of learning (King Abdul Aziz University, 2016).

In 2007, KSU built the Deanship for e-learning and Distance Learning, while the e-learning division at the King Faisal University was established a year later. King Fahd University and Effat University, both in Saudi Arabia, have likewise settled e-learning focuses to utilise online strategies to increase the instructive encounters of their learners as well as researchers (Sait, Al-Tawil, Ali, & Ali, 2003; Al-Asmari, 2005). Many universities in the Kingdom of Saudi Arabia have outfitted their premises with intuitive whiteboards, information tools, e-platforms, Polycom video-conferencing arrangements, and multimedia focuses. The arrangements have incorporated an exhaustive learning administration framework, virtual classrooms, joint effort instruments, content composing and capturing apparatuses, and computerised vault frameworks (Jethro, Grace, & Thomas, 2012). The Knowledge International University (KIU) was established in the KSA in 2007 and is devoted to the utilisation of e-learning materials and resources. The Ministry of Higher Education (MOHE) has established a vault for e-learning material to help universities in the Kingdom of Saudi Arabia adopt e-learning and eBooks. They will introduce

this for building, medicine, and software engineering subjects, and academics will be able to receive training on this (Al-Asmari & Rabb Khan, 2014).

There is an established relationship between the requirement for e-learning and growth in the Saudi population. For example, one study has demonstrated that during the last decade, the “Saudi populace under 20 developed by 52.88%, which implies an increment of 48.57% in instructive establishments. This has resulted in packed out classrooms and a diminishment in the level of learning” (Sharples & Beale, 2003, p.5). The population in remote territories, where the foundation of new schools and Universities is difficult, indicates there could be an expanded requirement for e-learning. Likewise, living expenses for students that travel to cities for continuing education are similarly high, and parents are reluctant to send their children to urban areas (Al-Draiby, 2010), especially if they are female (Alaugab, 2004). It has been suggested that these issues require a workable arrangement such as e-learning in schools and Universities (Al-Draiby, 2010). Within the Kingdom of Saudi Arabia, there is immense pressure to offer extra educational opportunities to an expanding population, in addition to a desire to increase the education rate (Albalawi, 2007). However, owing to the reasons cited above, and several other reasons, there is limited progress within existing universities in Saudi Arabia, along with limited development of a technologically feasible and unique option for formal classroom learning (Al-Asmari, 2005).

Given the fast expansion of universities frameworks in the Kingdom of Saudi Arabia, along with a desire to improve educational standards (Bates, 2009), the Saudi Arabian government, in 2008, set aside USD10 Billion for education for the following few years (Bates, 2009). In addition, universities are in urgent need of highly qualified and experienced staff and are trying to employ teachers from other nations, for example, Egypt, India, Bangladesh, Sudan,

and Pakistan (Chatin, 2016). Another related issue is the increasing costs of university and school administration (Lungu, 2016). Many research studies have proposed a community-oriented method of dealing with e-learning in universities. There are a number of issues including a significant lack of female teachers in institutions; over acceptance of students for foundation courses, which results in students being given course materials and sent home to concentrate on studying individually, and requests for low maintenance study options. While the universities have good technical facilities, there is a need for better utilisation to facilitate quality instruction (Al-Asmari & Khan, 2014).

The e-learning industry in the Kingdom of Saudi Arabia was estimated to reach US \$125 million by the year 2008 and was set to develop at a compounded yearly rate of 33% through the subsequent five years, which implies it will have reached USD 1 Billion by the end of 2016 (Gazette, 2008). In accordance with its intention to build on the advantages of e-learning advances, Edutech Middle East collaborated with Saudi-based Effat University to arrange the sixth Annual Learning Technology Symposium at Jeddah in April 2008. The issues discussed included the potential need for, and use of e-learning. A few universities planned to proceed through, for example, providing video and sound recordings of lectures, including collaborations between staff and students, and computerised capturing of lectures and additional whiteboard work, to transform the students' experiences (Joiner, Nethercott, Hull & Reid, 2006). To foster and support the execution of e-learning in Saudi Arabia, the National Centre for E-learning and Distance Learning was set-up in 2005 with the purpose of creating a corresponding instructive framework that uses e-learning advancements (Ministry of Education, 2007). This initiative has focused on different methods to support the implementation of e-learning in Saudi Arabia, for example, the Saudi Digital Library Project. Regardless of the increasing availability of innovative

education (mostly e-learning) and the focus on its potential ability to upgrade learning results, lecturers still face difficulties in utilising existing e-learning (Alaugab, 2004).

Al-Harbi (2011) indicated that e-learning in Saudi Arabia is still in its infancy. Even in situations where e-learning had been undertaken in Saudi Arabia, there was no quantifiable evidence of its efficacy, nor any clear system or approach to support its development in Saudi Arabian universities (Hassana, 2008). Saudi Arabia needs to create a clear plan for implementing this new technology within the educational system (AlSultanny, 2006). Past efforts have been unsuccessful, not due to a lack of determination, but rather because its implementation was not completely planned (Al-Wakeel, 2001). The execution of a successful e-learning framework within the Kingdom of Saudi Arabia is an essential step towards achieving government goals in the data innovation area (Alsurehi & Youbi, 2014).

Enthusiasm for e-learning has grown over the previous decade or so in the Kingdom of Saudi Arabia, for various reasons (Albalawi, 2007). To begin with, the interest in advanced education has far surpassed its supply, such that foundation courses are overcrowded and there is a lack of university facilities such as offices and teachers for the delivery of a conventional style of education. The e-learning has been proposed as an approach to efficiently address these issues. Secondly, the Kingdom of Saudi Arabia covers a huge geological region, with a large number of groups living in remote areas; e-learning offers the possibility to deliver education to these areas, thereby diminishing incongruities over the different locales and ranges. Thirdly, in Saudi Arabian universities, males and females are instructed separately for social and religious reasons; this puts increased pressure on the relevant departments and on the Human Resources (HR) department. It has been observed that women are regularly among the firmest supporters of e-learning, which, understandably, more easily enables them to pursue higher education (Bates, 2009).

There is a focus at present on training in Saudi Arabia due to the exceptionally liberal government grant program; the ordinary techniques for Learning and Teaching (L&T) are not going to be adequate for Saudi society. Atypical individuals, such as full time workers, those living far from college grounds, older people, individuals with disabilities, and a large number of females believe they can further their education through ‘separate learning modes’ rather than the usual format of L&T. For these groups of people, distance learning is a compelling technique for self-learning (Lungu, 2016). Technological innovation is driving universities from across the world to offer distance learning programs alongside their conventional programs (Moore & Tait, 2002). For instance, a large number of learners are now opting for distance learning with the assistance of the Internet, and audio and visuals. Over time, even the best systems require examining and improving; an effective establishment needs to assess how effective it’s teaching and methods are (Al-Draiby, 2010). Therefore, distance learning programs should include a thorough quality assurance program, taking into account constant data from all stakeholders, including teachers and students.

2.2.3 Need for further research on e-learning and learning objectives of courses offered by academics in Saudi universities

The Kingdom of Saudi Arabia witnessed an increasing use of e-learning in the 1990s, when the use of computers and computer aided learning became more widespread (Al-Asmari & Khan, 2014). Due to the growing prevalence of e-learning in the universities of Saudi Arabia information and instructional technologies (ICTs) has been influential in teaching and learning and has brought about significant changes in academic environment (Al-Asmari & Khan, 2014). Unsurprisingly then, there is a lot of research that has been undertaken to understand the different dimensions of e-learning in Saudi Arabia. In the context of this research, it is also important to

see how much of this research actually answers the principal question that is raised in this research, which is, *how well do cloud-based e-learning systems serve tertiary learning requirements in The Kingdom of Saudi Arabia?*

Offerings of e-learning in Saudi Arabia are admittedly increasing, however, there is little research as to how these offerings are received by learners and how these offerings match the course needs of the academics. In other words, there is a need to put the focus on the academic learning providers. It is essential to understand this in greater depth, if the e-learning programmes are to be effective in reaching out and meeting learning outcomes of the different courses that are offered by institutes of higher learning. This research seeks to understand the nexus between e-learning courses and the actual learning needs that are sought to be met in institutes of higher learning from the perspective of the providers.

Despite the increase in use of e-learning in the universities in Saudi Arabia, there is research that shows that there is still a low degree of public awareness of ICT and e-learning in Saudi Arabia (AlMegren & Yassin, 2013). In the context of this study, there have been some survey based studies, that have attempted to shed light on e-learning or ICT related topics. For example, in 2007 a nationwide CITC survey was carried out with 7,500 respondents, which found that a large portion of the Saudi Arabian society remains unfamiliar with e-learning technical advancements and concepts (Mirza & Al-Abdulkareem, 2011). The survey found that only 49 % of respondents were aware of e-learning, out of which only 5 % of respondents actually used it themselves (Mirza & Al-Abdulkareem, 2011). This survey was not however addressed specifically at university learners or learning providers. If the universities in Saudi Arabia too demonstrate low levels of awareness on e-learning, then that would indicate the manifestation of challenges or barriers to e-learning. There are some studies that have undertaken Saudi Arabian-

specific research for e-learning. One study found that the backbone infrastructure across Saudi Arabia for Internet accessibility was good and the Internet accessibility and infrastructure was good in the universities as well, however, the study reported that some universities did not have wireless access (Bates, 2009). The study suggested that Saudi Arabian university students continued facing obstacles in accessing the Internet because “many students do not have reliable and cheap Internet access from home, and because campus IT security makes it difficult for students off campus to access the servers on campus” (Bates, 2009). Again, while this study provides valuable insight into the challenges faced by learners in Saudi Arabian universities in the context of e-learning, it does not address the issue undertaken in this research, that is, how do e-learning programmes address the learning needs of the courses offered by academics?

Further research into the prospects of e-learning programmes in Saudi Arabia and how they meet the actual needs of the learning providers is required. This will help to gain better insight into the area of research. The study therefore proves useful in shedding some light on the specific problem areas and challenges faced by learning providers in Saudi Arabia. Similar projects have been undertaken to understand learners’ problems and challenges in Saudi Arabia (AlMegren & Yassin, 2013). However, there is a paucity of such research for learning providers.

2.2.4 Gaps in e-learning systems and changes required to bridge these gaps

This section presents an overview of the difficulties or gaps faced in traditional e-learning, web-based methods. There is a lot of debate about the advantages and disadvantages of integrating information and communication technologies in education through e-learning techniques. The aim of this literature is to bridge the existing gap that exists between the theoretical understanding of learning and its current reality, while also helping to answer several pivotal question such as, if a creative framework can be obtained from both virtual, as well as

personal, learning atmospheres, will using cloud computing further improve the process of education and learning (Abu El-Ala, Awad, & El-Bakry, 2012). This study will also review and comment on various smart cloud based learning products. Current research explores the various issues to be focused on, including challenges in cloud based e-learning and the benefits of e-learning based on cloud computing (Patnaik, Putta, & Ismail, 2014).

The expansion of a variety of e-learning systems will completely change the higher education system, especially with respect to the quality of e-education services and support processes (Barik & Karforma, 2012). There are so many varied systems of education that have been ranked as the best globally, and most of them today have adopted distance learning or an e-learning systems into their processes (Chatin, 2016; Mollis & Marginson, 1999).

These new systems enable universities to meet a broad range of requirements of students, through including conventional methods of teaching, and providing both direct and online learning opportunities. This enables students to learn, irrespective of where they are and when they would like to dedicate time to the task. They also offer several opportunities for engaging in new connections, while also providing opportunities in terms of effective resource distribution (Commission, 2014). The major advantages of e-learning include the following (Patnaik, Putta, & Ismail, 2014):

- Flexibility
- Learning at one's own pace and time
- Time savings
- Reduced paper usage
- Improved interactivity

- Environmental friendliness
- Ease of accessibility

Academic faculty and leaders are discovering that e-learning can improve teaching and learning, consistent with the popular belief that online courses can improve pedagogy without sacrificing quality. Any concerns the faculty might have about technological issues can be addressed with a good developmental program. However, persuading faculty to use these programs/e-learning initiatives remains a challenge for many institutions (Bichsel, 2013).

It is envisioned that in the next few years, cloud computing will have a substantial influence on learning and education (World Economic Forum & Accenture, 2010), eventually helping students, educational professionals, and various other stakeholders involved in the process “to perform their tasks effectively with less cost by utilizing the available cloud-based applications offered by the cloud service providers” (Madan, Pant, Kumar, & Arora, 2012, p. 3).

Cloud computing has played a crucial role in the enhancement of educational systems in the last few years (Malik, 2014), despite there being a lack of a standard definition for cloud computing in specific relation to e-learning. The National Institute of Standards and Technology (NIST) defines cloud computing as a model for enabling suitable access to networks and applications and a common set of configurable computing resources (Chapman & Thomas, 2007) (e.g., networks, servers, storage, and applications) that can be offered almost instantaneously, seamlessly, and without the need for too much involvement (Hashemi & Hashemi, 2013). Cloud computing offers services that are remote and accessible from any device with Internet access, in a way that is convenient to the user. Various cloud computing service providers exist: Google, for example, among others (Abu El-Ala et al., 2012). The basic idea of cloud computing is to provide access to a pool of virtual computing resources, with a focus on large-scale computing resources

that are connected to a network and allow “customers to share dynamic hardware, software resources and data, and according to their actual usage, paying costs” (Patnaik, Putta, & Ismail, 2014, p. 68). Hence, cloud computing is like any other merchandise that can be purchased and traded using a network at an economical price (Hashemi & Hashemi, 2013).

Apart from saving the considerable amount of money that would otherwise be spent on upgrading hardware and procuring software licenses, cloud computing is also beneficial in that it does not require periodic maintenance. In addition, it has been found to provide a high level of security and privacy (Abu El-Ala et al., 2012; Stuart, 2012).

Researches have suggested that the introduction of cloud computing into e-learning is practicable and can considerably enhance investment and management efficiency (Jethro, Grace, & Thomas, 2012). This can facilitate the development of profitable e-learning systems and achieve win-win situations for suppliers and customers (Laisheng & Zhengxia, 2011).

2.3 Cloud deployment models

A cloud deployment model is a specific type of cloud environment that is primarily differentiated by ownership, size, and access (Patnaik, Putta, & Ismail, 2014). The different cloud models are the following:

1. Public cloud—These services are available to the public. Applications, resources, and web services available over the Internet provide the infrastructure necessary for implementation (Gereffi, 2001).
2. Private cloud—These services are developed for individual organisations. Everyone within the organisation can access the services and applications, but no one outside the

organisation can access them. The infrastructure for a private cloud keeps an organisations' information protected and secure (Malik, 2014).

3. Grouped cloud – A cloud group is designed for a specific group of customers, and its infrastructure is shared between several organisations and addresses the specific security needs of the group. However, sharing between organisations within the group may lead to concerns (Malik, 2014).
4. Hybrid cloud – This is possibly the most recent development in the field of cloud computing. Hybrid clouds are blends of two or more public, group, or private clouds. In a hybrid cloud setting, internal and external cloud services are offered by several service providers and used by multiple users at a time (Hashemi & Hashemi, 2013)

Educational clouds provide apt solutions for educational institutions and organisations that want to switch to e-learning systems. They offer the choice to either build a private cloud or use a cloud service provider and share resources after defining their parameters. Before employing a cloud-based e-learning system, it is important that an institution first identifies the services that it requires and create a service catalogue to describe the organisation's needs to service providers (Baran & Davis, 2010).

Cloud-based e-learning includes the hardware and software resources required to develop traditional e-learning infrastructure systems. Cloud-based e-learning architecture consists primarily of the following five layers (Patnaik, Putta, & Ismail, 2014):

- Hardware layer
- Software resource layer
- Resource management layer

- Service layer
- Business application layer

2.3.1 Differences between cloud-based software and traditional e-learning software

A wide variety of Internet-based computing services are described as cloud computing. The difference between cloud-based and conventional software is that when the cloud is accessed, the device that is being used—a laptop computer or smart phone, for instance is not the device that does the actual computing. The computing happens in a large data centre outside the organisation; the user merely sees the outcomes of the computing on the screen of the device being used. Most cloud computing services are accessed through a Web browser, such as Internet Explorer, Safari, Mozilla Firefox, or Google Chrome. Cloud services can be used through a dedicated mobile application or a browser on a smartphone or tablet. Therefore, cloud services do not require users to have sophisticated computers that can run dedicated software. The term ‘*cloud computing*’ usually refers to an Internet-based alternative to an organisation’s in-house computer system, (Lynch, 2015). An example is a webmail service, which is an Internet-based alternative to an institution hosting its own email server (Lynch, 2015).

2.3.2 Benefits of cloud computing for educational institutions

Some of the main advantages of implementing cloud computing in the education sector are the following (Anand & Kamiyani, 2015):

1. Personalised learning: Cloud computing offers boundless learning choices for students. Cloud computing exposes students to a wide variety of software tools and resources in a rich and flexible environment.

2. **Economies:** Continual upgrades of software and hardware put unavoidable pressure on the budgets of educational institutions. This scenario makes cloud computing a viable option. Cloud computing provides software computing and other resources on a pay-per-use basis, which enables educational institutions to accelerate the use of new technologies and focus on imparting quality education.
3. **Elasticity and scalability:** The major advantage of cloud computing is that consumers are not confined to a specific set of resources. Institutions can scale up to more resources and storage when the user load increases or scale down when the need decreases.
4. **Accessibility:** Users can access resources from anywhere, 24 hours a day, seven days a week, 365 days a year. This is possible because of the quality of service provided by superior resources and skills.
5. **Reduced carbon imprint:** Cloud computing enables educational institutions to reduce their power consumption, which reduces carbon emissions. Cloud providers are also making efforts to create eco-friendly data centres, which will further reduce carbon emissions.
6. **Standardisation:** Cloud computing provides standardised software for use by individual or networked educational institutions. For example, an institution can develop its own set of applications and solutions and re-use them several times. This can reduce costs and reduce implementation time, with a resultant increase in reliability.

2.3.3 Concerns and challenges in cloud-based e-learning

Given the large assortment of e-learning technologies, staffing and business models, administrative configurations, compensation strategies, and opportunities for meeting student/consumer needs, part of the problem of identifying the most modern and well-suited e-learning options is that e-learning is a moving target. Because of differences between institutions,

what works for one institution does not necessarily work for another. There are several concerns and challenges that institutions may face in deploying effective e-learning strategies, including the following (Bichsel, 2013):

- Privacy: Data privacy protection in cloud computing faces many challenges, including issues of access, compliance, storage, retention, destruction, auditing, monitoring, breaches and controversies associated with several global legal structures. “Cloud computing has a vital impact on privacy. In addition, privacy concerns should be seen not only as a technical issue but also as a legal problem. In cloud computing, exploring this issue is quite complex because of the basic nature of the cloud computing model” (Alghali, Najwa, & Roesnita, 2014, p. 2).
- Security: Security plays an important role in e-learning. If data are stored in the cloud, the question of security on unknown cloud servers arises (Alghali et al., 2014). Security, in relation to the concept of cloud computing, encompasses a wide range of topics, including “user authentication/authorization, protection of private information from unintended access, and protection of data integrity (guarding against data corruption by attackers” (El-Khatib, Korba Xu, & Yee, 2003, p. 7). These and various other risks and threats can be minimised by using encrypted file systems, security applications, and security hardware to track unusual attacks across servers (Patnaik, Putta, & Ismail, 2014).
- Scalability: E-learning systems are weak in scalability at the infrastructure level. Various resources can be deployed to accomplish specific tasks so that when a high work load is received, the system can add and configure new resources of the same type. However, this makes resource and cost management very expensive,

and how to use resources effectively and efficiently without sacrificing performance levels remains a concern (Fernandez, Peralta, Herrera, & Benitez, 2012). The service agreements of cloud service providers are not adequate to guarantee availability and scalability. Thus, organisations are likely to be reluctant to switch to cloud computing without strong quality guarantees (Patnaik, Putta, & Ismail, 2014; Zairi & Youssef, 1995).

- Reliability: For educational institutions in developing countries that seek to implement cloud computing, reliability is a great concern. “Most of the cloud service providers in the United States and Europe may be reluctant to offer sufficient resources, such as technical support, bug fixes etc., to the smaller markets in developing countries” (Alghali et al., 2014, p. 4).
- Legal issues: Any organisation that wants to take advantage of cloud computing systems and services has to make clear which countries are hosting its private data and what are the country’s laws that govern that data (Alghali et al., 2014).
- Financial challenges: Business agility is mainly determined by the costs an organisation incurs (Garg, 2011). Businesses may save money on hardware but may need to spend more for the bandwidth necessary to deliver intensive and complex data over networks. Therefore, many clients are waiting for a reduction in cost before switching to cloud-based computing (Alghali et al., 2014). However, there are a few self-service-based, on-demand, public, inexpensive cloud computing solutions that have served as a wake-up call for many organisations. Low-cost price plans marketed by public cloud vendors have encouraged organisations to become more familiar with resource allocation

models, exact costs, and the variety of cloud models, including public, private, and hybrid models (Garg, 2011).

- “Currently cloud service providers are adopting proprietary APIs to implement their applications”, noted Patnaik, Putta and Ismail. (2014, p. 69).
- The transition of services from one service provider to another has therefore become extremely complicated and time-consuming (Patnaik, Putta, & Ismail, 2014).
- Enterprises and institutions may not be aware of where cloud servers are located. From a technological perspective, the location of data is not relevant. However, this has become a critical issue with respect to data governance requirements (Patnaik, Putta, & Ismail, 2014).
- Vendor lock-in is another concern. Most cloud providers provide access to their resources through web interfaces, proprietary application programming interfaces (APIs), or command-line tools (Garg, 2011). Institutions face the threat of dealer lock-in, wherein they face obstacles to considering alternatives to a particular vendor’s products. It can be quite complicated for an institution to migrate to a new system even if some other cloud provider develops a better product. This can create a significant financial burden on the institution (Anand & Kamiyani, 2015).
- Cloud computing vendors typically provide services on standard terms, including limited warranties, which tend to be structured for their own benefit. For example, a cloud provider can delete a customer’s data or take down a customer’s application for days or weeks at a time for breach of contract, including non-payment. This can create many problems for institutions or organisations. The fear

of non-availability of cloud-based applications is compounded by the risk of cloud outages (Garg, 2011).

- Time to market: Cloud computing can reduce the time to market from months to weeks or even days, depending on the size of the institution. A self-service-based, on-demand, and real-time monitored cloud-based application offers the following advantages:
 - Eliminating procurement delays for computing software and hardware
 - Expediting computing power at times when existing applications need to handle peak loads
 - Eliminating upfront time and capital investment for procuring hardware for proof-of-concept work or rapid application development (Garg, 2011).
- Data virtualisation: Virtualisation of data is not a new concept. It is the integration of data from multiple and contrasting sources across an enterprise/institution or external sources for on-demand consumption by a wide range of applications in a virtualised manner. Certain mandates require institutions to have a data virtualisation strategy in place to provide single sources of reference data, such as security master data, book and counterparty data, and single views of positions and holdings. “Risk and analytics calculations rely on many varied sources and types of data, including the relational, dimensional, and new big data types” (Garg, 2011, p. 9). Leveraging large volumes of data from such sources makes query performance a significant success factor. However, combining distinct data from public and private domains is a challenge. Thus, accessing data from a single

virtual source drives data consolidation and mash-ups within institutions (Garg, 2011).

- Enterprise technology standardisation: There is often a lack of standardisation in the architecture and technology approaches used by different groups within an institution. Software solutions may be similar in nature, but the configurations and components of application environments may be noticeably different. Duplication of effort can be reduced by standardisation of technology and architecture approaches. Additionally, the different units of cloud computing infrastructure, such as templates, architecture patterns, and virtual machine images, allow teams to create standardised environments (Cheung, 2010). The cloud also imposes development life-cycle standardisation across different teams once they start to access it through the same interfaces (Garg, 2011).
- Access: Many of today's business users want mobile access different types of reports pertaining to risk and analytics, performance attribution, and trading summaries. They see the advantages of being able to access this type of information via their email, smart phones, and tablets, almost anywhere and anytime. They desire similar interfaces for applications specific to student performance services. The development of such interfaces has started taking shape because the cloud enables users to access systems and infrastructure using a web browser or customised client software, regardless of location and time (Garg, 2011).
- Specialised technical skills: Last but not least, the teachers and staff in most institutions do not have the technical skills required to fully exploit cloud-based

computing. Teachers in higher education institutions must receive training in the relevant digital technologies and pedagogies as part of their initial training and their ongoing professional development (Commission, 2014)

2.4 Key considerations

As barriers to technology adoption decrease and the education industry seeks to leverage technology to exploit business advantages, the following are key questions for organisations to consider (PWC, 2014):

- Is there a business case for the cloud?
- Which cloud deployment model or service is the most suitable for my organisation?
- How can one profile, prioritise, and design services to migrate to the cloud?
- How can the cloud help me as I plan for a technology restoration or data centre expansion?
- How should I structure my vendor selection process, contracts, and service-level agreements?

2.5 Survey justification

The principal question raised in this research is: *How well do cloud-based e-learning systems serve tertiary learning requirements in the Kingdom of Saudi Arabia?* In order to really answer this question, the research uses a survey to analyse the perceptions of learning providers. Surveys have been found to be useful in similar such research studies in the past, as they are capable of bringing out the perceptions of users.

The survey is described as a quantitative method or a numeric description of perspectives, attitudes, or opinions of a population by studying a sample of this population, where by using the data collected and analysing them, the researcher draws inferences to the population (Creswell, 2014). The survey method is recognized to be useful in gathering both qualitative as well as quantitative data (Gill, Stewart, Treasure, & Chadwick, 2008).

There have been many studies related to e-learning that have used survey methods to collect data. Online surveys can also be used for such studies (Saunders, Lewis, & Thornhill, 2009). Online surveys are generally considered to be cost-effective, because of the use of an electronic medium instead of paper (Szolnoki & Hoffman, 2013). Online surveys also eliminate expenses that are usually incurred in paper surveys due to postage, printing, and data entry (Llieva, Baron, & Healey, 2002). Nonetheless, depending upon the types of features and services selected, more modern online survey creation software and web survey services expenses can accrue substantial costs, although this is not excessive in comparison with the price of distributing common paper surveys (Hohwu, et al., 2013).

Previous survey based research has been able to establish many useful facts and perceptions about e-learning. For example, a study surveying the universities that provide MOOCs such as, Harvard, MIT and Stanford, found that MOOC learners in these universities have access to education from Ivy League universities while not really physically being present in the universities. However, clearly this survey did not address the concerns of learning providers. In a survey of attitudes and perspectives of participants of the MOOC, CCK08, the MOOC characteristics of autonomy, diversity, openness and connectedness/interactivity were tested by the researchers (Williams, Karousou, & Mackness, 2011).

Similarly, a survey on participation in an open HPI course on “Internetworking” was conducted with 1,000 participants, which established that only less than 20% of the users found the discussion forum helpful, thereby calling into question the outreach potential of the programme (Grunwald, Meinel, Totschnig, & Willems, 2013). Another research showed that 12% of the participants targeted network collaborative learning as it helped them establish collaboration and support groups for learning (Yousef, Chatti, Schroeder, & Wosnitza, 2015). As indicated above, these research studies addressed the learners and not the learning providers.

Student attitudes towards e-learning have been examined through surveys but there is a paucity of similar surveys for learning providers in Saudi Arabia. However, survey method for this study can be justified on the basis of its success in similar studies for learners in the past. There are some studies that have used surveys in the past towards similar purpose, although a survey into tying up the course offerings and learning needs of Saudi Arabian academic courses may shed light that is relevant only to this population. Earlier studies are related to similar such projects undertaken for other countries. A survey was conducted in Pakistan’s Virtual University in 2002 and it showed that 90% students had positive perceptions of e-learning. Another study used survey method in the Libyan students’ context (Rhema & Miliszewska, 2014). Yet another survey based research was able to uncover the Iranian students’ attitudes towards e-learning (Omidinia, Masrom, & Selamat, 2011).

There are a number of factors that may be related to e-learning efficacy and which may come to light with the use of a survey of about 100 or more participants. For instance, in a similar study, computer literacy and skill on mobile devices were found to be key to positive perceptions towards e-learning (Selim, 2007). In other research contrary outcomes have been noted for students without computer skills (Vrana, Fragidis, Zafiropoulos, & Paschaloudis, 2006). If a

similar survey is carried out in the context of Saudi Arabia with special focus on learning providers, it may prove valuable to uncovering important areas that relate to e-learning and course outcomes of academic courses.

Saudi Arabia is a developing country and, as such, many of the outcomes of e-learning may be impacted by issues related to infrastructure, accessibility to Internet, etc. Accessibility to ICT infrastructure is an important issue that has been reported as an impactful factor in e-learning experiences in developing nations. It is also possible that traditional methods of learning may prove to be more popular in the context of developing nations (Rhema & Miliszewska, 2014). It is also possible that survey may manifest a popularity of traditional learning methods as compared to e-learning as it may be seen as more sustainable and reliable in developing countries (Gulati, 2008). At the same time, some surveys have pointed to higher use of ICT for learning in developing nations as well (Omidinia, Masrom, & Selamat, 2011). In the context of Saudi Arabia, there are specific studies that relate to e-learning but these studies do not relate specifically to learning providers' experiences. For example, in a study conducted into the effect of supporting a traditional course with e-learning material on the performance of English course students in Saudi Arabia in comparison with students taking the same course through solely traditional means of course delivery, the traditional course was preferred (Alkhalaf, Drew, AlGhamdi, & Alfarraj, 2012). Again, this study does not delve into the learning provider perspectives. In another Saudi Arabian study, it was found that the younger age group (15-25 years old) showed more willingness to adopt new technologies than the older one (Al-Gahtani, Hubona, & Wang, 2007). Would this have implications for learning providers who fall in the older age group? In other words, a deeper research is required to understand the perspectives and problems of the learning providers as this will help to consolidate knowledge on this issue and help to gain insight. Such

insight will help to formulate suggestions and recommendations for the better implementation of e-learning programmes in Saudi Arabian universities.

2.6 Summary

E-learning removes dependence on a traditional classroom model for learning. However, an individual must connect to a Local Area Network (LAN) or have server access, in one form or another, to use e-learning tools. Movement of storage and a shift in IT architecture to cloud-based applications have liberated today's online learners. Students are in a position to access e-learning tools from anywhere that they can access the Internet. Cloud computing has evolved as a technology that works strictly on a pay-per-use basis. This technology has proved to be beneficial for educational institutions, which would otherwise need to spend large amounts of money to procure the latest hardware and licensed software (Anand & Kamiyani, 2015). Thus, one can view cloud computing as an empowering tool that helps educational institutions to create an enriched learning experience for students pursuing different courses and that can be offered at an affordable price (Anand & Kamiyani, 2015).

However, there are some issues associated with the use of cloud computing. Security, reliability, and inter-operability are some of the major problems that need to be addressed if cloud computing is to be implemented in the education sector (Anand & Kamiyani, 2015). Cloud computing provides a great opportunity for educational institutions in developing nations to improve their teaching and learning methodologies and performance. Educational institutions in developing countries should take advantage of the opportunity to implement cloud technologies to enhance the overall quality of learning (Alghali et al., 2014).

Some of the challenges of cloud-based e-learning have not yet been addressed. In fact, these issues are more complicated in developing countries (AlMegren & Yassin, 2013). Nonetheless, the pace of development of cloud-based e-learning applications is not expected to slow (Madan, Pant, Kumar, & Arora, 2012).

Cloud-based computing is expected to be the next major trend in the development of efficient e-learning systems because of the features and capabilities of cloud-based computing and the advantages that it offers over traditional e-learning systems from technological and cost perspectives (Alghali et al., 2014). As cloud computing technologies become more refined and applications of cloud computing become increasingly widespread, users of cloud-based e-learning increasingly benefit (Madan, Pant, Kumar, & Arora, 2012).

There are a range of educational institutions around the world that do not have the money to invest in costly on campus technologies to enhance education. Cloud computing is the most appropriate solution to helping these organisations in terms of technological advancement in the process of learning and education delivery.

This literature review has presented information pertaining to a variety of aspects of e-learning tools, the numerous benefits that they offer to clients and users, and ways in which the cloud-based architecture can be effectively integrated into existing educational technologies. The focus of this literature has been primarily on the advantages of cloud computing, with specific relevance to e-learning, and effective management of the wide range of challenges that this technology poses to users.

Chapter Three: Methodology

3.1 Introduction

This chapter defines and justifies the mixed methodology used in this study. A mixed methods approach was adopted to investigate how well cloud-based e-learning systems serve tertiary learning requirements in the Kingdom of Saudi Arabia. This study used an anonymous survey to collect quantitative and qualitative data. A full explanation of the survey progress and plan is presented, followed by the ethical considerations addressed in this study.

3.2 Purpose of the study

The overall purpose of this study was to enhance the e-learning environment in Saudi Arabia by answering the following question: *How well do cloud-based e-learning systems serve tertiary learning requirements in the Kingdom of Saudi Arabia?* This investigation set out to determine the cloud-based e-learning requirements in Saudi Arabian universities.

The study aimed to identify many factors, such as:

- The current e-learning systems used in Saudi Arabian universities.
- The changes required to bridge e-learning system gaps.
- The optimum cloud deployment model.
- The differences between cloud-based and traditional e-learning systems.
- The benefits of cloud computing for educational institutions.
- The concerns and challenges facing cloud-based e-learning.

These factors offer an insight into the prospects of e-learning and cloud computing as they relate to the enhancing of tertiary educational processes in the Kingdom of Saudi Arabia. Moreover, the intended outcomes of this research may help universities in the Kingdom of Saudi

Arabia to make better investment or technological selection decisions by basing them on the findings of this study. Furthermore, if the results of this study were to give rise to a better match between the technology systems and the learning or teaching needs, it will benefit those who rely on e-learning systems.

3.3 Research methodology and justifications

Creswell (2014) defined multi-method research approaches as schemas and courses of action for research which cover the stages of a process from wide-ranging assumptions to a comprehensive "method of data collection, analysis, and interpretation" (p. 31). This includes various decisions with the ultimate decision determining the approach that should be taken to conduct the research. The selection of the research approach depends on several factors:

- Type of research problem or the matter being addressed.
- Researcher's experience.
- Target audience of the study.

Any research study can become more quantitative than qualitative, or vice-versa. However, mixed method research combines the components of the qualitative and quantitative approaches. Three advanced types of research approach are qualitative, quantitative, and mixed methods. The distinction between qualitative and quantitative types of research often lies in the use of words (qualitative) rather than figures (quantitative), and the use of closed-ended questions (hypotheses quantity) rather than open-ended ones (qualitative questions).

Between the late 19th and the mid-20th centuries, the quantitative approach prevailed as the dominant form of research. By the end of the second half of the 20th century, research had

shifted to a qualitative approach. This coincided with the development of the mixed method of research (Creswell, 2014).

3.3.1 Research approaches

Qualitative research is a means of identifying and comprehending a problem. This type of research involves raising questions, determining courses of action, collecting data from participants, constructing data analysis inductively, covering specific to general themes, after which the researcher interprets the meaning of the data (Creswell, 2014).

A quantitative approach often involves a simple analysis, and thus can be generalised for application to participants' wider demographic group. In addition, it can be understood and interpreted by participants easily, which allows them to respond quickly when time is limited (Dillman, Smyth, & Christian, 2009).

The mixed methods research methodology integrates both quantitative and qualitative data collection and analysis (Johnson, Onwuegbuzie, & Turner, 2007). Creswell (2014) defined the mixed methods research as an approach to investigation which includes the gathering and subsequent integration of quantitative and qualitative data. The fundamental presumption of this investigation involves the combination of qualitative and quantitative approaches to obtain a more detailed comprehension of the problem being addressed than would be possible with any single approach.

The appropriate research approach can be determined based on the research problem. Therefore, the quantitative approach is preferable if the problem requires the determination of elements which have a direct effect on the consequences, when a tool is involved, or when setting

out to determine the best results likely to be obtained. Moreover, this approach can be good for clarification and for gauging a theory.

From the other perspective, a qualitative approach can be used when little research has been done on a notion or phenomenon, and there is need to explore and comprehend it. This approach is helpful when the researcher is not yet aware of the major variables to be studied. This approach might be taken when the research area is new, or when the topic has never been involved in a paradigm, and available theories cannot be applied to any examples or collections as part of the research (Morse, 1991).

When research uses only a quantitative or qualitative approach, but this is insufficient to comprehend the problem in question, the combination of both research approaches and data into a mixed method can facilitate the highest level of comprehension.

3.3.2 Justification for adopting the mixed methods approach

The research methodology used to conduct this research project was the mixed methods approach. As part of this approach, the researchers chose a survey tool to be used (Leedy & Ormrod, 2013). The mixed methods approach was selected as the best fit given the aims and constraints (time and location), since the study was conducted in New Zealand and the target audience was located in the Kingdom of Saudi Arabia.

3.3.2.1 Strength of the mixed methods approach

The reason for taking this approach was to provide the most comprehensive insight into the research topic. At a general level, this study started with some quantitative closed-ended questions to enable the outcome of the research to be generalised to a wider population, and

incorporated qualitative, open-ended questions to gather detailed opinions from the participants. Moreover, this reduced the limitations inherent to both approaches by combining them.

At the procedural level, this is a useful research approach when it is necessary to achieve the following:

- Complementing strengths and overcoming the limitations and weaknesses of a single design.
- Comparing various perspectives extracted from both approaches.
- Explaining and interpreting one approach result by using another approach to collect data and perform analysis.
- Developing and testing a new instrument.
- Understanding the perspective of individuals at different levels and merging their results (Creswell, 2014).

The mixed methods approach has rapidly become the preferred method for researchers in the field of information technology (Gable, 1994; Kwan & Ding, 2008) and, according to Johnson, Onwuegbuzie, and Turner (2007), is used in many disciplines.

In this study, relevant information was gathered from participants including demographic data, e-learning experiences and perspectives, and learning demands. By using the mixed methods approach, we were able to extract these data due to the following characteristics of the method:

- It collects numeric data from quantitative questions and rich data from qualitative questions.

- It provides the strength needed to elicit sufficient information from both types of collected data (Creswell, 2014).
- It is able to successfully interpret the data authenticity (Onwuegbuzie & Teddlie, 2003).
- Regardless of the approach, the processes of data collection and analysis must be strictly observed (e.g. adequate sampling, sources of information, data analysis steps).
- The incorporation of two data forms occurs in analysis design during the amalgamation, connection, or inclusion of data.
- Mixed methods design has a very useful feature in that it "includes the timing of the data collection (concurrent or sequential) as well as the emphasis (equal or unequal) for each database" (Creswell, 2014, pp. 217).

3.3.2.2 *Limitations of the mixed methods approach*

This approach has some known weaknesses and limitations, as follows:

- The undertaking of a meaningful study of a phenomenon by applying two independent methods incurs greater demands on researchers in terms of effort, time, and experience.
- It may be difficult to compare the results of the two analysis outcomes if they are based on two different data forms.
- It can be difficult to decide when to proceed in a sequential process.
- The researcher may not be able to resolve discrepancies among different types of data, while collecting data, checking the original data, and getting new perspectives from the differences between the data that address the discrepancy (Creswell & Plano Clark, 2007).

3.3.2.3 *Implementation sequence of data collection*

The data collection and analysis performed as part of this study used both quantitative and qualitative data to corroborate the findings made within the study. Integration was performed for those findings in which the results of the qualitative or the quantitative data dominated. A theoretical perspective was adopted to bring both data forms results together in the findings and discussion (Creswell, 2014).

Exploratory research was undertaken as part of this study. The use of an exploratory approach is beneficial because of the flexibility that it can offer the researcher undertaking research based on needs (Zikmund & Babin, 2006). By using the exploratory research approach, the researchers can shape a methodology to focus on investigating a phenomenon existing at multiple levels within the universities of the Kingdom of Saudi Arabia.

The design strategy taken in this approach was originally planned to follow a *sequential exploratory* strategy with a survey, followed by in-depth interviews, which would call for more time and extra approvals to complete each data collection phase. However, a *concurrent triangulation* strategy was ultimately used, with this choice being based primarily on the timing of data collection, with both data types being collected concurrently. Moreover, as Creswell (2014) states, this most closely corresponds to a sequential exploratory strategy where the two methods are used to confirm, cross-validate, or corroborate findings within a study. Data collection is concurrent, and both quantitative and qualitative data are collected to overcome a weakness that would arise when using just one method. The mixing of data strategies will appear during the interpretation or discussion.

3.3.2.4 The data collection instrument

This study used a mixed methods approach with an online anonymous survey that contained a mix of open-ended and closed-ended questions provided to staff at Saudi Arabian Universities between August and November, 2016. Surveys are one of the fundamental means of collecting data in research efforts. However, it is important that a survey be constructed in such a way as to make it “valid, reliable, and unambiguous” (Richards & Schmidt, 2013, p. 478). Surveys can be divided into three main types, namely, closed-ended questions, also known as a structured survey, open-ended questions, also known as an unstructured survey, and a mix of closed-ended and open-ended questions. Researchers can collect quantitative data from closed-ended questions and qualitative data from open-ended questions. Therefore, open-ended questions can complement closed-ended questions, and vice-versa, when both are included in a survey (Zohrabi, 2013).

3.4 Survey

This section describes the survey process and contains information about the survey tool, type, design, and testing. It will also cover data collection and the analysis approach.

3.4.1 The survey instrument

The research used an online semi-structured, self-administered survey based on the Qualtrics survey platform. Survey questions were divided into three sections: demographic questions, which were closed-ended; e-learning questions, which were a mix of closed- and open-ended questions; and learning needs questions, which were open-ended.

The survey could be taken in either English or Arabic to suit respondents, as shown in Appendix E. The survey can also be accessed at the following URL:

https://aut.au1.qualtrics.com/jfe5/form/SV_cTiem86ZOWdITXv

3.4.2 Qualtrics

Qualtrics is an instrument platform that can be used over the Internet to create and distribute surveys, as well as analyse the collected data. It is considered easy to use and supports an extensive choice of methodologies (Ginsberg, 2011).

The Auckland University of Technology (AUT) has purchased a full-featured license for the Qualtrics online instrument and is therefore available to all AUT students and staff free of charge, through the university web site.

Qualtrics allows users to import questions from a Word document, includes advanced question types and design features, incorporates a wide range of help documents, translates between languages using the Google translation tool, and provides training options (Auckland University of Technology, 2016).

In this study, Qualtrics was used as an online instrument for creating survey questions and distributing them to university staff in the Kingdom of Saudi Arabia who responded to an advertisement that was circulated to university staff by email.

3.4.3 Self-administered survey

Saunders, Lewis, and Thornhill (2009) stated that self-administered surveys can be as valid as a survey directly administered by the researcher. The participants' responses to this survey were collected via a URL using the Qualtrics instrument.

The study focused on Saudi Arabian universities. However, the researcher was based in New Zealand. Due to the geographical distance between the researcher and the study participants, an online, self-administered survey was determined to be the best means of collecting the data.

This helped the researcher and participants to save time, and provided an easy way to access the survey instrument. In addition, it allowed the participants to respond at a time that was suitable to them, in their chosen language, while the researcher could collect many responses within a short time. This decision was influenced by Dillman, Smyth, & Christian (2009), who claimed that using an online survey reduces the time needed to execute the survey and improves the response rate.

3.4.4 Survey design

The aim of this survey was to be descriptive which enabled to understand participants' opinions and their perceptions, rather than concentrating on a statistical summary. Also, to identify the issues and perspectives of e-learning users, as well as their self-identified key learning needs.

This survey consisted of 28 questions in three sections. The first section asked the participants four demographics-related, closed-ended questions to gather data about their age, gender, job role, job title, and number of years spent in the role.

The second section focused on e-learning questions and consisted of 10 mixed, open, and closed-ended questions. These questions asked the participants about their experience in e-learning, including the number of years of experience, the type of e-learning user, the e-learning systems and platforms they had used, methods of teaching using e-learning systems, the tasks, features, or functions they had used most in their e-learning systems, the features or functions they had wished to use but were not available in their e-learning systems, and the difficulties faced with their systems.

The third section asked participants nine open-ended questions that related to their learning needs. It included key benefits of using an e-learning system, the key disadvantages of using an e-learning system, and the aspects of learning that they believed were well supported, or not supported, by an e-learning system. They were also allowed to rate their current system.

3.4.5 Pilot test

To increase the efficiency and correctness of the results, the researcher had the option to pilot test the survey before the data collection stage (Saunders, Lewis, & Thornhill, 2009). A survey pilot test offers many advantages, such as determining the average time the survey will take to complete, checking that there is no bias or encoding errors in the questions, ensuring that the survey is easy for the participants to follow, and whether any error has been made in, or during, the survey design (Dillman, Smyth, & Christian, 2009). Five subjects undertook the survey pilot test and, based on their feedback, changes were made to some of the questions such as question 13 was asking about the e-learning user experience and a comment box was available for participants to fill in, however, from the pilot study it was suggested that if it stated as a level choices of experience were offered then it would be easier for participants to choose the answer that best described their experience rather than trying to explain it in some words.. The respondents who participated in the survey pilot test indicated that the time frame to complete the survey was accurate, the questions were clear and easy to understand, and it was easy to respond to the questions.

3.4.6 Data collection

Creswell (2014) explained that the mixed methods approach consists of collecting qualitative and quantitative data consecutively. It was anticipated that gathering various types of data would result in a better comprehension of the research problem, which features some issues

that encouraged the researcher to conduct this study. These included the fact that Saudi Arabia covers a large geographical area and has a large population, its population growth, and the fact that foundation courses are over-subscribed to by students. Other issues included the increase in the cost of university administration, students' living and commuting costs, and the willingness of Saudi universities to improve their education systems. The survey begins with wider, quantitative questions to better generalise the outcome and then concentrates on particular, qualitative, open-ended questions designed to gather more detailed opinions from participants (Creswell, 2014).

The target population of this research were the teaching and administrative staff of Saudi Arabian universities.

Prior to data collection, to ensure that the research would be relevant to Saudi Universities and to acquire the official support of Saudi Universities, consultation was undertaken with Dammam University in Saudi Arabia. An ethics application was also approved by both the Auckland University of Technology (ref: 15/407) and the Ethics Committee of Dammam University. Data were collected from August 15, 2016 until November 26, 2016 through the anonymous online survey instrument.

The survey link was sent to the Saudi universities' teaching and administrative staff, and they were also asked to share the link with their colleagues – giving rise to so-called “snowball sampling.” Dillman, Smyth, and Christian (2009) explained that snowball sampling is helpful when it is difficult to reach the participants. This study collected data from many universities in Saudi Arabia and, due to the complexity of reaching individual participants in each university, a snowball sample was used in this research.

3.4.7 Data analysis

A researcher can acquire a wider understanding of a problem by using a mixed methods approach rather than a single method (Creswell & Clark, 2007). Therefore, a quantitative and qualitative process was used to collect and analyse the data obtained from the responses to the closed-ended and open-ended questions. This study used descriptive analysis to comprehend and organise participants' views and perceptions, instead of concentrating on a statistical summary (Much, 2005). Once the data collection was complete, the data were prepared for analysis by being exported into an Excel file. The researcher cleaned the data by eliminating any incomplete responses, and checked each response manually to make sure that all of them were related to the questions. According to Sarantakos (2005), when performing data analysis, the method used to find the paradigms and pertinent links to research questions must be compatible with the research fundamentals. In this regard, the data analysis process was designed to allow the researcher to understand the views of the staff of the Saudi universities. This helped the researcher to base his interpretation on a clear understanding of the participants' experiences as e-learning system users.

3.5 Ethical considerations

For studies that involve human subjects, the researcher has an obligation to preserve the participants' rights, needs, values, and desires (Creswell, 2014). Participants should be provided with a detailed explanation of the aims of the research and how the data will be used. In addition, the researcher must receive written permission before starting any study (Creswell, 2014).

The ethical application for this study was approved by the Auckland University of Technology Ethical Committee (AUTEK) (ref: 15/407) on 13 April, 2016 (Appendix A).

This research involved mature adults who were provided with an information sheet (Appendix C), which presented a description of the study. This information sheet was provided at the beginning of the online survey and was followed by a consent form (Appendix D). The sheet detailed the process of the study, and the measures whereby privacy and confidentiality would be preserved. It also stated that if the participants felt uncomfortable responding to any of the survey questions then they were under no obligation to do so, and they could choose to abandon the survey at any stage prior to completion simply by closing the survey window. None of the questions were designed to be discomfoting or embarrassing, however. It also stated that every possible care would be taken to keep responses anonymous and not attributable to any one person.

The AUTEK approval stated that, if the study required management approval from an institution or organisation for the research, then this would need to be obtained. Since the study targeted academic staff at universities in the Kingdom of Saudi Arabia, an ethical application was submitted to the Ethics Committee at Damman University, which took care of all communications and sent the survey advertisement to every Saudi University. Approval was granted with reference number (IRB PCS- 2016- 09- 107) on 9 June 2016 (Appendix B).

Finally, the information sheet also stated that, if there were any concerns about the nature of the study, the participants could notify the Research Supervisor, Dr Stephen Thorpe, in the first instance, and if there were any concerns regarding how the research is conducted, they could notify the Executive Secretary of AUTEK. All the communication details for both the supervisor and ethics committee were provided in the information sheet.

3.6 Summary

This study used a mixed methods approach to investigate the experiences of e-learning users at Saudi Arabian universities with the goal of investigating whether cloud-based e-learning systems will be able to successfully serve the tertiary education platform. An anonymous online survey was designed using the Qualtrics instrument containing both closed and open-ended questions. An invitation was sent to the participants by coordinating with the Information and Public Relations Department at Dammam University in Saudi Arabia. In response, 114 survey responses were received online. However, after removing blank responses and cleaning the data, only 55 surveys were compiled for analysis. A consideration of the ethics of this study was undertaken, and an ethics application was approved by the ethics committees of both AUT in New Zealand and Dammam University in the Kingdom of Saudi Arabia. This study used a descriptive statistics method to analyse the collected quantitative data. The next chapter presents the data analysis, and presents the results.

Chapter Four: Data analysis and results

This chapter presents the analysis and results from a study investigating staff use of e-learning systems at universities in the Kingdom of Saudi Arabia. The analysis covered quantitative and qualitative data gathered from an online survey of 55 participants from Saudi Arabian universities. It contained a description of the data preparation and cleaning processes, as well as descriptive statistics for quantitative data and a detailed description of the results.

4.1 Data preparation and cleaning

The data preparation stage began once raw data was exported from the Qualtrics online survey tool to an Excel spreadsheet. The process of data preparation included deleting incomplete or empty rows, categorising the data, cleaning unrelated responses from it, and checking for missing data (Fink, 2006). The process was as follows:

- Export data from Qualtrics into an Excel spreadsheet.
- Manually check for any missing data that could have been lost during exportation.
- Delete incomplete rows approximately 59 rows were deleted.
- Organise the rest of the data by ensuring that data from participant responses was completed, consistent, related and ready to use.
- Translation of Arabic respondents' texts into English: see an example below in Appendix F.
- Clean unrelated answers.
- Create tables and charts for closed-ended questions and use multi-choice answers as criteria to obtain the overall percentage.
- Organise open-ended questions and categorise them by putting similar answers together, and grouping and categorising the answers to each question.

4.2 Quantitative and qualitative analysis

4.2.1 Data inclusion

Once data collection was complete, a quick overview showed that Qualtrics had recorded 114 ‘submitted’ responses and more than 300 responses were ‘under process’. Of the 114 submitted responses, only 55 were usable because the other 59 responses were empty or incomplete: for example, incomplete responses had only the first few demographics-related questions answered, and the rest were empty. Participants had the right not to answer any of the questions. Of the 55 responses used in the analysis, some participants had not answered one or two questions; overall, however, these 55 responses were included, as the respondents had consistently answered at least 19 of the 21 questions posed. The data collected is discussed more fully in the following subsections.

4.2.2 Demographic questions

Q1. What is your age group?

The overwhelming percentage of those who responded were between 30-39 years (40%) and 40-49 years (32.73%) of age. The categories 20-29 years and 50 years or older constituted a much smaller percentage of respondents, with 14.55% and 12.73%, respectively. Table 4.1 presents the total number and percentage of participants in each age group; these are also shown in Table 4.1

Table 4.1 Age group

Criterion	Total	Percentage
19 or younger	0	0.00%
20 - 29	8	14.55%
30 - 39	22	40.00%

40 - 49	18	32.73%
50 or older	7	12.73%
Total	55	100%

Q2. Your gender?

The survey results, as displayed in the bar chart in Figure 4.2, show that two-thirds of the participants were female.

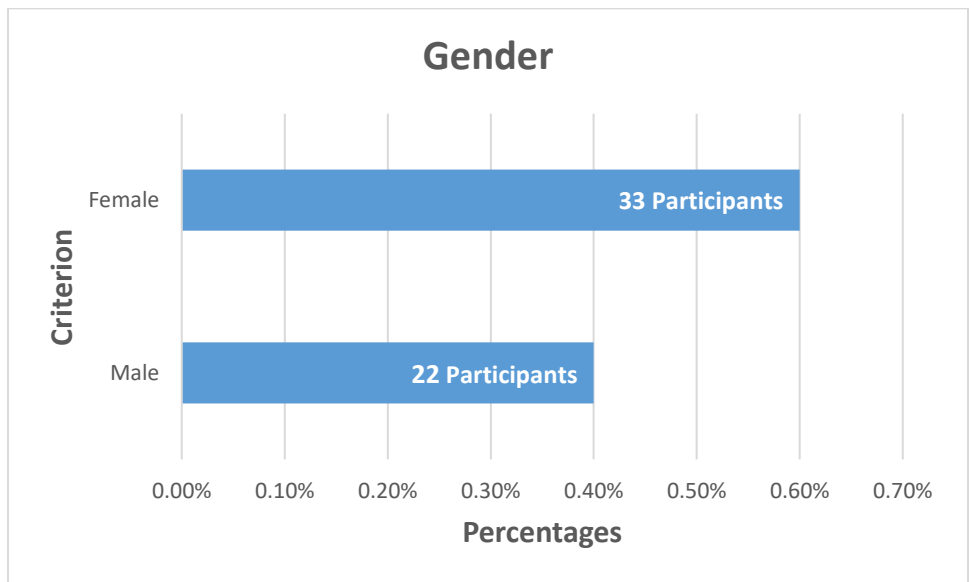


Figure 4.2 Respondents' genders

Q3. What is your job role?

Respondents were asked to categorise the types of role they were employed in at the university. The results of this question are displayed in Table 4.2. The vast majority of respondents were employed in an academic role: 48 of 55 (87.27%). This was followed by administrative staff (7.27%), whereas technical staff and uncategorised staff categories contributed the lowest number of respondents.

Table 4.2 Job roles

Criterion	Total	Percentage
Academic	48	87.27%
Technician/Technical	1	1.82%
Administrative	4	7.27%
Other (please specify)	2	3.64%
Total	55	100%

Q4. What is your job title?

Respondents to Q4 were able to choose from a variety of predetermined responses or, if not listed, specify their job titles. As displayed in Figure 4.3, the majority of the respondents were lecturers (40%) or assistant professors around (25%). Fewer respondents were associate professors around (11%), teaching assistants around (9%), and professors around (7%). There were also four uncategorised responses around (7%): secretary, clerk, and two other respondents preferred not to say.

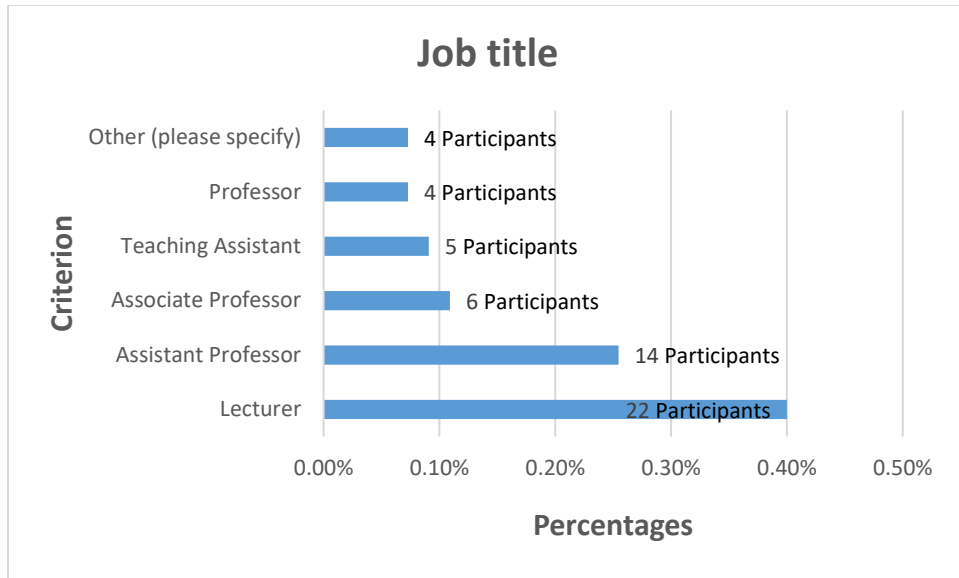


Figure 4.3 Job title

Q5. How long have you been in this role?

The majority of participants, around 58% as displayed in Figure 4.4 Number of years in the role, had not been in their roles for more than five years, while nearly one quarter had six-10 years of experience. A total of eight participants around (15%) had been in their roles for 16 or more years, and the lowest percentage of respondents around (5%) had spent 11–15 years in their roles.

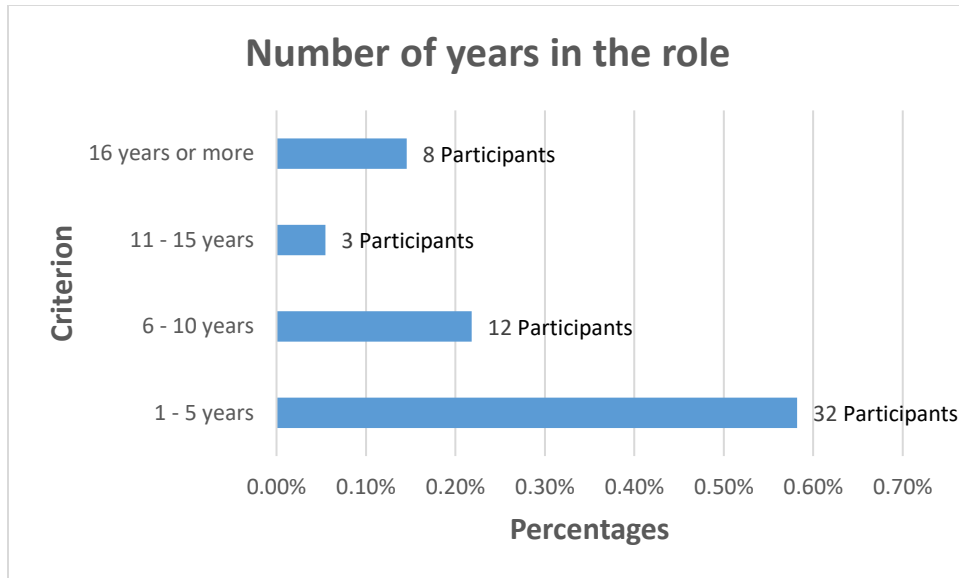


Figure 4.4 Number of years in the role

4.2.3 E-Learning questions

Q6. How many years have you been using e-learning?

As Table 4.3 Number of years using e-learning systems shows, approximately two-thirds of participants had been using e-learning for one to five years. Under one-third had been using e-learning six to 10 years, while only four participants had been using e-learning for more than 16 years.

Table 4.3 Number of years using e-learning systems

Criterion	Total	Percentage
1 - 5 years	35	63.64%
6 - 10 years	16	29.09%
11 - 15 years	0	0.00%
16 or more	4	7.27%
Total	55	100%

Q7. Would you describe yourself as an e-learning user?

Participants had to choose the best description of themselves as e-learning users see Figure 4.5 The highest percentage approximately (51%) identified themselves as intermediate users. This was followed by experts around (27%) and novice users around (22%).

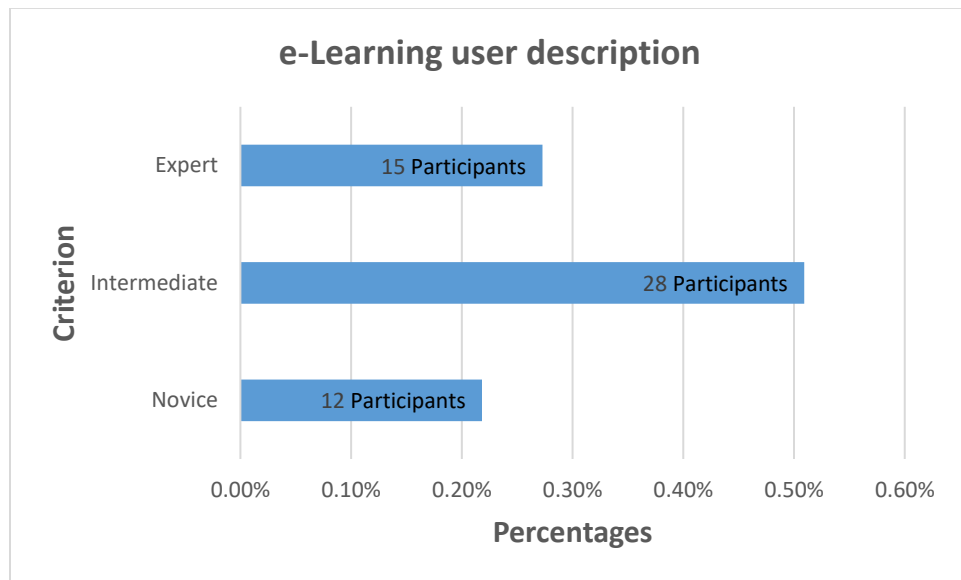


Figure 4.5 E-learning user description

Q8. What e-learning platform have you used?

Respondents to Q8 were able to choose from a variety of predetermined platforms or, if not listed, specify the platform they had used. As a result, around three-quarters of participants indicated that they had used Blackboard as an e-learning platform, and approximately 15% had used Moodle as well as Blackboard. Single respondents had used varying combinations of Blackboard, Moodle and WebCT; one participant had used Smartboard, and one elected not to

answer this question. Table 4.4 E-Learning platforms used shows the number of respondents and percentages of each e-learning platform they select.

Table 4.4 E-Learning platforms used

Criterion	Total	Percentage
Blackboard	41	74.55%
Blackboard - Moodle	8	14.55%
Moodle	2	3.64%
Blackboard - Moodle - WebCT	1	1.82%
Blackboard - WebCT	1	1.82%
Smart board	1	1.82%
No answer	1	1.82%
Total	55	100

Q9. What e-learning system have you used?

Respondents were able to choose from a variety of predetermined responses or, if not listed, specify the e-learning system they had used. The respondents had used a variety of e-learning systems, some respondents had used more than one system as displayed in Table 4.5 The highest percentage of respondents had used Quick Lesson around (47%), followed by the Easy Generator and the Smart Builder systems around 38% and around 35% of respondents, respectively. The other systems had been used by five around (9%) or fewer respondents. These were added to find the percentage that had used each system, as displayed in Figure 4.6 E-Learning systems' usage.

Table 4.5 E-Learning systems used

Criterion	Total each	Total
Easy generator	11	11
Quick Lessons	participants	11
Smart Builder	8 participants	8
Easy generator -Quick Lessons	4 participants	4
Quick Lessons -Smart Builder		4
Other (please specify)		4
Easy generator - Quick Lessons - Smart Builder	2 participants	2
Easy generator -Elucidat - Quick Lessons - Smart Builder		2
No answer		2
Cameo by Yukon Group	1 participant	1
Easy generator -Elucidat - Lectora Online by Trivantis		1
Easy generator -Elucidat - Quick Lessons - Smart Builder - Artisan by Bankers Edge -Lectora Online by Trivantis		1
Elucidat - Quick Lessons - Smart Builder - Atlantic Link by Assima		1
Lectora Online by Trivantis		1
Lectora Online by Trivantis - Cameo by Yukon Group		1
Quick Lessons -Smart Builder - Liquid Authoring by Landmark e-learning		1
Total		

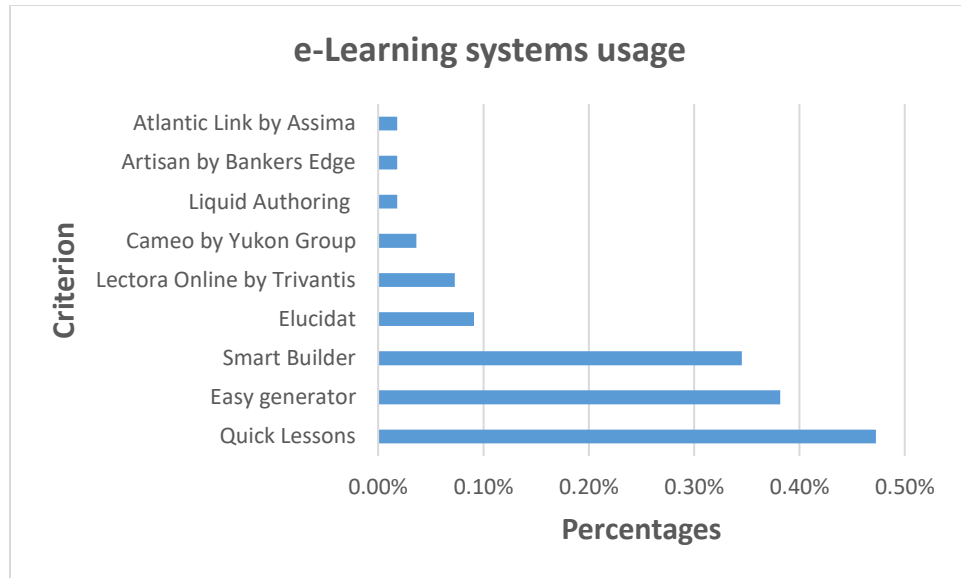


Figure 4.6 E-Learning systems usage

Q10. In your role, what methods of teaching do you use e-learning mostly for?

As Figure 4.7 Methods of teaching shows, more than half the participants around (58%) indicated that they had mostly used both hybrid and online courses for teaching. A smaller percentage around (24%) had used hybrid courses and around 15% had solely used online courses. A few participants indicated that they used other methods of teaching but did not specify what these were.

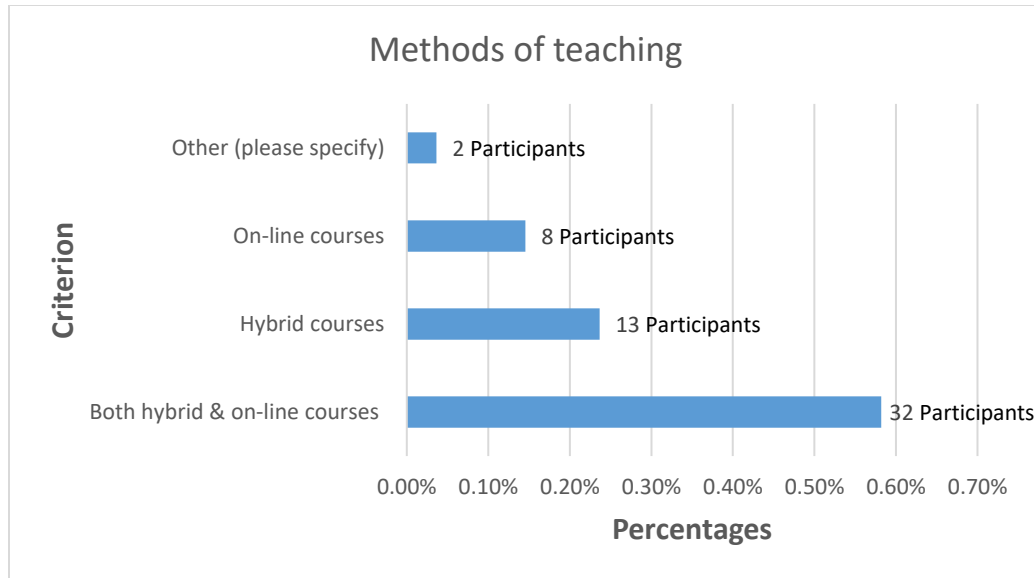


Figure 4.7 Methods of teaching

Q11. What tasks do you typically perform when using e-learning?

Respondents performed a wide variety of tasks during e-learning. The most common had been tests, uploading lecture materials, and assignments. This was followed by discussions, notifications, grading, teaching and communication. A smaller percentage of respondents had uploaded learning resources, study plans, assessments, and had used e-learning for the flipped classroom. Figure 4.8 displays each task the participants had mentioned as typically using during e-learning.

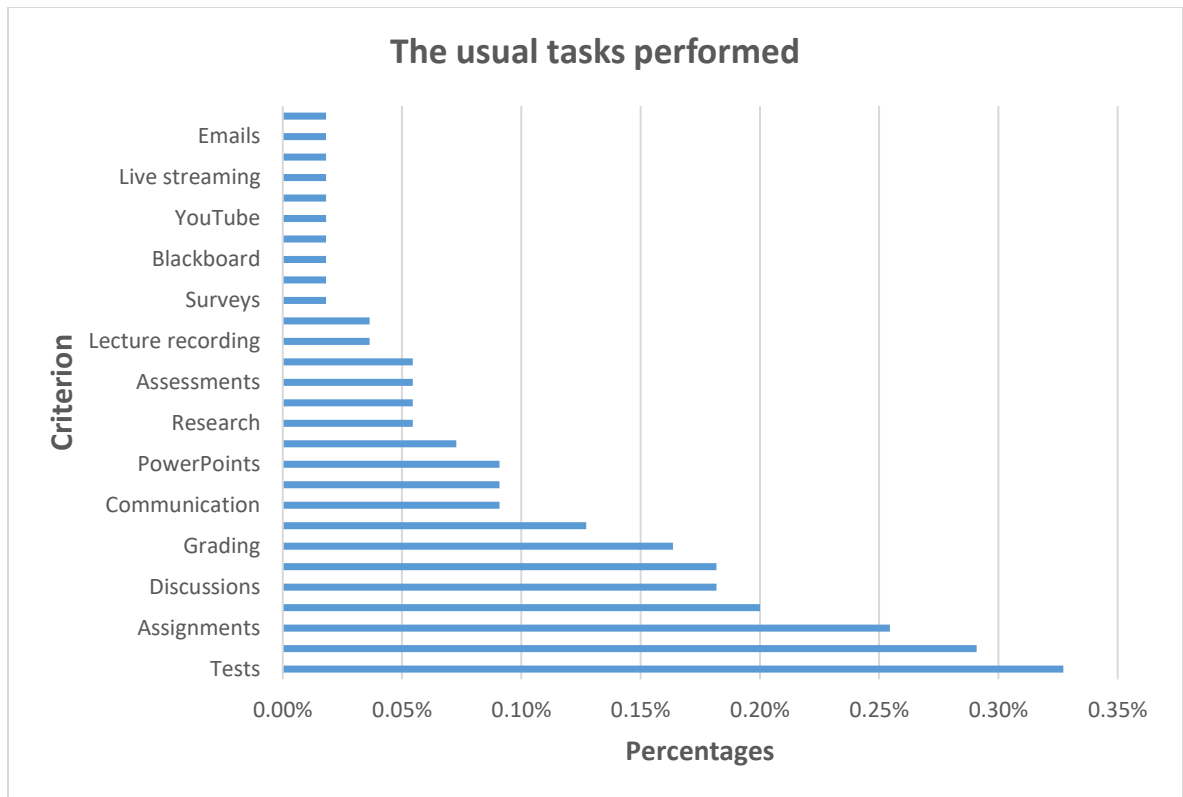


Figure 4.8 The usual tasks performed

Q12. What features or functions of e-learning do you use the most?

The majority of respondents had used the tests function of their e-learning systems. This was followed by discussions, notifications, uploading lecture materials, homework, submissions, communication, PowerPoint, auto-correction and the uploading of files. Figure 4.9 contains many other features or functions of e-learning that the participants had mentioned—functions they identified as having used, but had very low percentages compared to the rest.

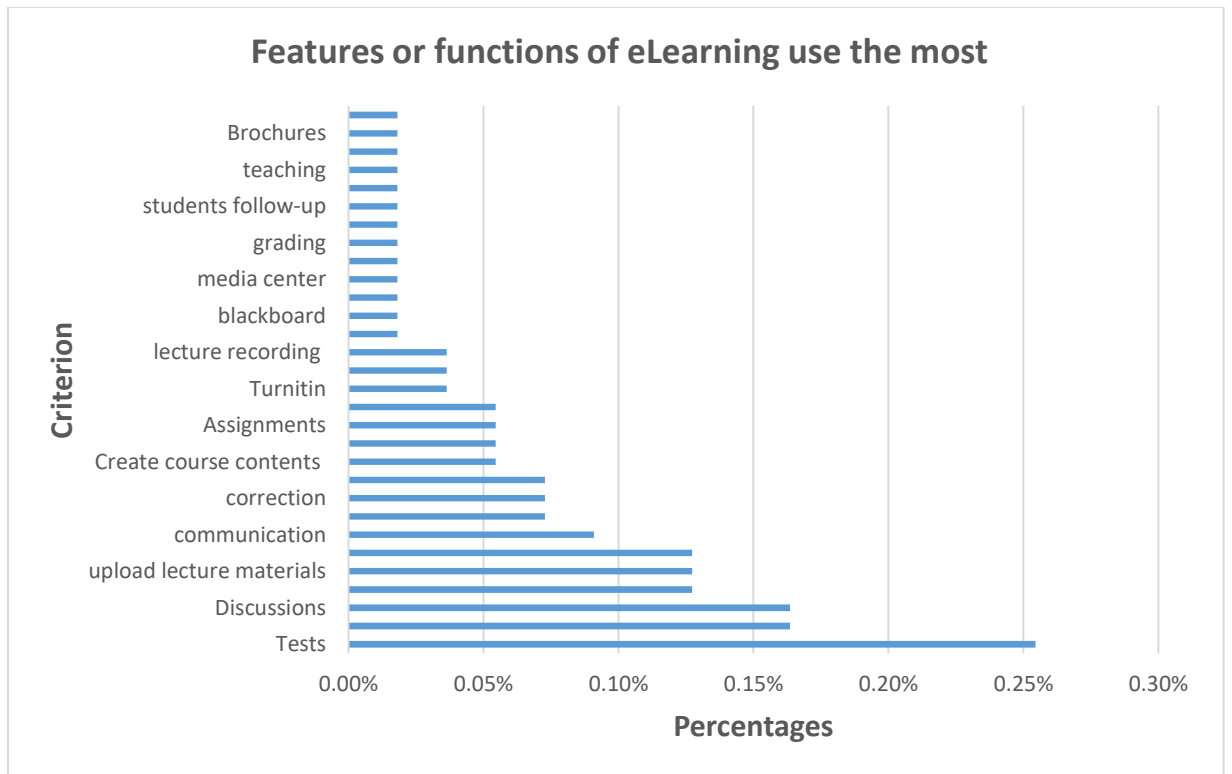


Figure 4.9 Features or functions of e-learning used the most

Q13. How do these support your learning outcomes or goals?

Some lecturers agreed that e-learning systems had always made communication between students and lecturers easier, more rapid and direct. Some agreed that e-learning systems helped them to deliver and receive information, including lecture materials, and also enabled these to be shared with their students.

From the respondents’ perspectives, e-learning systems helped students keep up to date with their learning material and receive feedback, and find out about their grades. Students could also track the submission deadlines of their assignments and retrieve any assignment or homework they might have missed. They also believed that these systems can be a good resource pool for students learning as all relevant information in one database. They allow students to be

responsible for their own learning by familiarising themselves with the learning materials, and helped them to deal with it by developing their skills.

The respondents believed that e-learning systems helped them to organise the learning process, and with evaluations and automatic grading of online tests. They also mentioned that it had helped them to ensure that the course material was kept up to date efficiently and quickly, as well as to create a knowledge base in one organised place. They believed that distance learning was one of the advantages of e-learning systems. They also mentioned that these systems had helped to support students, and had improved their learning outcomes and ability to deliver education to students by assisting them in a mentor-student environment.

The respondents commented that students these days prefer a modern and convenient method to obtain information. They spend a lot of time on their laptops and smartphones. This helped them to develop technological skills needed for university-level education and provided an opportunity to deliver learning in a way they enjoyed. These systems helped classes be easy, interesting, active, enjoyable, and effective. It also made access easier, saving time, facilitating the educational process, optimising contact time and saving students' and teachers' rights of achievements alike.

They also believed that a boon of these systems is that they can be further improved, for example through debugging. The majority of respondents said that these systems were well supported and provided an excellent service. They said it created common ground between teachers and students, which helped them to coordinate effectively with one another in terms of both time and course content.

Q14. What features or functions that are not currently available in your e-learning system would you like to use?

There was a variety of response to Q14 regarding features or functions respondents would have liked available in the e-learning system they had been using. While a large number of participants said that they did not know, or that there were no extra features they wanted to use, many respondents mentioned some functions they would like to use that were not available in their systems. These were as follows:

- Full integration with smart devices, such as phones and tablets; for example, using a camera on a device for live video broadcasting had not been available.
- Interaction with social media.
- Support for functions for analysis, which are available in Excel and SPSS.
- A comprehensive question base (a feature that currently has to be purchased through Blackboard) was not supported by all universities.
- Electronic attendance taking.
- Knowledge sharing tools.
- The ability to submit large files when posting videos: this was identified as resulting from insufficient computer labs and systems not supporting badges, like Moodle.
- System errors detector.

Moreover, one respondent mentioned that she was not familiar with all functions of their Blackboard system, and were hence unsure about what the complete set of available features was.

Q15. What aspects of using e-learning systems do you find most difficult?

Participants identified a number of aspects that they had found troublesome with the e-learning system they had used. Some of these aspects are as follows:

- Difficulties in training students to use the system.
- Issues with system orientation.
- Presenting the course through the Learning Management System (LMS) was difficult, in particular maintaining discussion and themes for each course.
- The notification function was not in real time.
- Appropriately designing course material or surveys.
- Marking, correcting and grading tests, in particular correcting essay questions, and other assessments.
- Technical difficulties when marking tests via Blackboard.
- The system (Blackboard) was not considered user-friendly, and the interface was difficult to use.
- The length of time taken to navigate and explore the features of the e-learning system: for example, the *Control Panel* was not easy to use, and had too many puzzling options.
- Updates to the system that introduced new features or added new technology functions created disorganisation with respect to the order of available functions or features for some users.
- Live streaming, virtual classes and uploading lecturing videos were challenging, and worsened if there was a technical fault.
- Other technical issues, such as updating in general, or when students submitted their work or updated their information but the system did not update correctly.

Some respondents stated that they had had no difficulties with their e-learning systems.

4.2.4 Learning needs questions

Q16. & Q17. What are the key benefits and the key disadvantages of using e-learning systems to meet learning needs?

In response to these two questions, the participants mentioned some benefits and disadvantages of using e-learning systems to meet learning needs. Table 4.6 summarises the key benefits, as well as key disadvantages identified by the respondents. The main key benefits identified were saving time and effort, having a communication channel, the availability to learn at anytime, anywhere as well as ease of access. On the contrary, the key drawbacks identified included slow Internet connectivity, technical problems, a lack of training and expensive licensing costs.

Table 4.6 Key benefits and key drawbacks of using e-learning systems

Using e-learning Systems to Meet Learning Needs	
Key benefits	Key disadvantages
Saving time and effort	Poor Internet connectivity
Communication channel	Technical problems
Learning availability anytime anywhere	Lack of adequate training
Facilitates the learning process	Lack of human interaction
Ease of access	High cost of licences
Abreast of technology	Limitation of tools
Attraction	

Q18. In your experience, what aspects of learning are supported well by e-learning systems?

Respondents identified various aspects of learning as being well supported by e-learning systems, as follows:

- Uploading lecture materials, as well as recording and uploading lecture videos, and attaching documents to any post.
- Using a projector.
- Submitting homework.
- Using e-references.
- Including quizzes, tests, research and activities.
- Communication methods.
- Discussion forums and announcement notifications.
- Evaluation, grading and feedback to students.
- Theoretical aspects.
- Easy access (from anywhere), time saving and facilitating the learning process.

Some respondents replied that it would depend on how the lecturer had constructed the Blackboard panel. Moreover, some lecturers stated that some features of Blackboard were well-supported, but some users did not know how to use them.

Q19. In your experience, what aspects of learning are not supported well by e-learning systems?

Various aspects of learning were identified as not being well-supported by an e-learning system. These were as follows:

- Interactive learning, such as Flash, animation support, online tutoring and voice-recorded lectures.
- Lack of discussion.

- Technical aspects, including saving data, were not well supported and the Internet connection was always slow and would cut out.
- Visual education.
- Application and practical aspects of courses, and maybe cognitive skills, were not well-supported.
- Students' interactions, such as group work, communications skills and practical skills.
- Direct encounters with students were sometimes unpleasant, potentially due to Internet connectivity issues.
- Student statistics, feedback, online exams and teaching methods.
- The interface was not user-friendly.

Q20. How well do you believe the e-learning systems serve the tertiary learning requirements at your university?

The great majority of lecturers believed that e-learning systems served tertiary education in their universities to a significant extent. They commented that it is an effective way to keep students on the right track. e-learning systems can save time, help students practice and gain more knowledge. They can also provide a flexible education option. Some respondents believed e-learning systems contributed to meeting higher-education requirements. Overall participants assigned a percentage rating of 75% or more, insofar as they thought e-learning systems were serving the university's tertiary learning requirements. Finally, many believed that e-learning is the future of education.

Q21. How would you rate the current e-learning system in serving the tertiary learning requirements at your university?

Participants rated their current e-learning system out of 10 based on how they saw it serving the tertiary learning requirements of their university. A score of 10 was excellent and 1 was very poor. The results were as follows for the 55 respondents:

The maximum rated value was 10, the minimum value was 3, and the median was 7; the mode, or most frequently occurring value, was 8. The standard deviation was 1.91. Table 4.7 Q21 spread of responses, presents the participants' ratings and Figure 4.10 Current e-learning systems ratings, depicts the results. Criterion 10 represented a very high level, indicating excellent performance, and Criterion 1 a very low one, indicating poor performance.

Table 4.7 Q21 spread of responses

Count	Minimum	Maximum	Median	STD Deviation	Mode
55	3	10	7	1.91	8

Table 4.8 Participant ratings of current e-learning systems

Criterion	Total	Percentage
10	5	9.09%
9	8	14.55%
8	11	20.00%
7	11	20.00%
6	7	12.73%
5	6	10.91%
4	5	9.09%
3	2	3.64%
2	0	0.00%
1	0	0.00%
Total	55	100

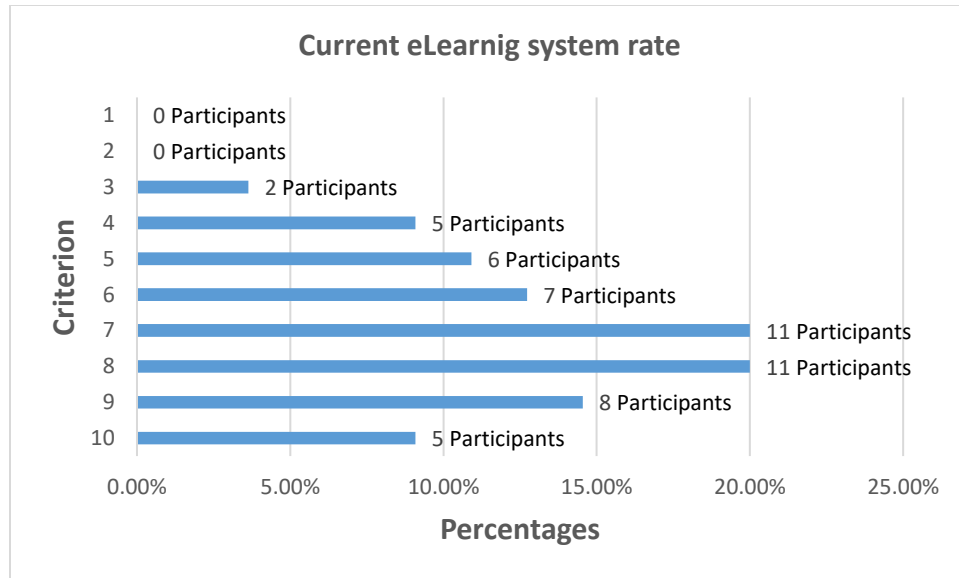


Figure 4.10 Current e-learning systems' ratings

Q22. What improvements are needed or could be made to improve the current system to match with learning requirements?

The survey participants believed improvements could be made to improve the current systems to better match the learning requirements, such as increasing tools and equipment to undertake the educational process. They identified that the systems' design stage needed to consider improvements to a greater extent to render it better suited for the desired educational outputs and enable more virtual classes. The ideas of moving the server to a wider network, like a cloud computing space, and better infrastructure were also proposed.

Most lecturers agreed there should be intensive training for both lecturers and students, and they should be encouraged to interact with technology. Many believed that their e-learning system was not user-friendly, and hence suggested making these systems easy to use and more flexible, with the aid of computing and online tools.

Some survey participants believed that the Blackboard system should be linked to people who design the software, who should also build templates for use. Another lecturer mentioned that they could integrate a survey tool for feedback from users. Other ideas regarding technical improvements included developing improved Internet connectivity, making the network available, and increasing the capacity and speed of downloading and uploading of content.

Other suggestions included online office hours for lecturers, a function to check assignments for similarity and plagiarism and improvements in communications. One respondent stated that distance learning (occurring online using only e-learning systems) should be recognised by the Ministry of Civil Services in Saudi Arabia as legitimate study.

Some participants commented that they had nothing to add, and provided no suggestions.

4.3 Summary

The total number of respondents who submitted their surveys online through the Qualtrics instrument was 114. However, once data was exported from Qualtrics to an Excel sheet, checked row-by-row to ascertain if anything was missing during exportation, and was cleaned by removing incomplete or entries considered irrelevant, 55 complete results were obtained for inclusion in the analysis.

The majority of participants were female in their 30s and 40s. The majority were working as lecturers in an academic field, and had been in their roles and using e-learning for no more than five years. They considered themselves predominantly intermediate-level e-learning users, and mentioned that they mostly used Easy Generator, Quick Lesson e-learning systems and Blackboard as an e-learning platform. Most participants taught both online and traditional courses, and believed that e-learning systems supported the outcomes or goals of learning. They

identified both the advantages and disadvantages of using e-learning systems and provided the average evaluation of their e-learning systems as 7 out of 10.

Further potential developments of e-learning systems will be signposted through the discussion in Chapter 5.

Chapter Five: Discussion

The purpose of this thesis was to investigate prevalent e-learning systems in universities in the Kingdom of Saudi Arabia to determine how well cloud-based e-learning systems served tertiary learning requirements. The aim of this investigation was for the outcome to provide guidelines for an enhanced learning environment in Saudi universities.

5.1 Interpretations and opinions

5.1.1 Participants' profile

There was potential for uncovering different results from different slices of the participant pool from the data collected. However, this was not a strong outcome except that the 55 participants of the study were primarily female and between 30 and 40 years of age. The vast majority of respondents served in an academic role, and most of them were lecturers and assistant professors who had served in their positions for no more than five years. They had an intermediate-level e-learning experience with fewer than five years on the job. Since the study was conducted in government universities only, it was clear that most respondents used the Blackboard online education platform at their university, which confirmed the findings of the study by Alharbi (2013). He had claimed that government universities in Saudi Arabia mostly used Blackboard, whereas private universities typically used Moodle as their e-learning platform.

5.1.2 E-Learning in Saudi universities

A total of 58% of the respondents indicated that they had used both hybrid and online courses side by side during teaching. They stated that they performed many tasks through e-learning, including uploading lecture materials, assignments, establishing discussions forums, notifications, grading, teaching, communication, uploading learning resources, uploading study plans, assessments, and for flipped classrooms.

The respondents expressed the belief that these tasks mostly supported learning outcomes by making classes easy, interesting, active, enjoyable, and effective. E-learning also provided easier access, saved time, facilitated the educational process, helped optimise contact time, and preserved students' and teachers' rights of achievements alike. They believed it created a common ground between teachers and students, which helped them to coordinate effectively with one another in terms of time and course content, and made communication between teacher and students easier, more rapid, and direct. This supported the learning outcomes by organising the learning process, which helped them to deliver and receive information, including lecture materials, and enabled these to be shared with students in a way they enjoyed. It also helped teachers with evaluations and automatic grading of online tests. Learning outcomes were also supported by allowing students to take responsibility for their own learning by familiarising them with the learning materials and enabling them to deal with it by developing their skills with technology and computers. The systems helped students to keep up to date with their learning materials, receive feedback, and look up their grades. The respondents also stated that these systems could be a good resource pool for students learning, as all relevant information is available on one database. This helped respondents to ensure the course material was kept up to date efficiently and quickly, and created a knowledge base in one organised place. This finding

showed how often e-learning was used in Saudi Arabian universities, and permitted from multiple and comprehensive tasks the inference that Saudi Arabian universities currently have a good e-learning infrastructure to support learning outcomes. This outcome of having a good e-learning systems was expected from this study, since Al-Asmari & Rabb Khan (2014) have claimed that many Saudi Arabian universities are well-equipped with e-learning supportive tools and technologies that enhance the learning process. Moreover, this quality of e-learning use in Saudi universities reflects the significant development in e-learning in the country since 2010, when Al-Draiby (2010) and in her study “E-learning and its effectiveness in Saudi Arabia,” and Al-Harbi (2011) in her study “E-Learning in the Saudi tertiary education: Potential and challenges,” stated that e-learning in Saudi Arabia was still in its infancy. Al-Harbi had cited the lack of information concerning its use as the reason.

5.1.3 Advantages of shifting current Saudi e-learning to cloud

This study also found that the respondents wanted some functions or features unavailable in their university e-learning systems. These functions or features included

- Allow user to have full integration with smart devices
- Include a comprehensive set of test questions, which is highly expensive currently
- Include knowledge-sharing tools for users
- A system errors detector

With regard to smartphone integration, Garg (2011) claimed that users these days want access and to multi-task via their smartphones; at the same time, cloud-based systems provide this opportunity by allowing user access through a Web browser anywhere and at any time. Cloud-based systems enjoy this benefit because they do not require sophisticated computers to

run dedicated software, where no computation occurs on the user's device, but instead on another device outside the organization in a large data centre (Lynch, 2015).

This study also found that the cost of adding functions to the system was one of the respondents' concerns. In this case, while organizations may save money on hardware, they may need to spend more on other services, such as the Internet, to deliver intensive and complex data over networks. Therefore, many clients are awaiting reductions in cost before switching to cloud-based computing (Alghali et al., 2014). Since cloud computing is like any other merchandise that can be purchased and traded using a network at an economical price (Hashemi & Hashemi, 2013), public cloud vendors have marketed low-cost price plans which encouraged organisations to become more familiar with resource allocation models, exact costs, and the variety of cloud models, including public, private, and hybrid models (Garg, 2011). Another advantage of cloud based e-learning systems is that cloud computing provides services on a pay-per-use basis, which allows universities to speed and advance the use of new technologies and focus on imparting quality education (Anand & Kamiyani, 2015).

Furthermore, this study found that the system errors detector function was a desire for Saudi Arabian university staff, and can be seen as needed for technical support, since e-learning systems require technical support like any other system. Therefore, a cost-saving feature that reduces the required maintenance needs is among the advantages of cloud computing because it does not require periodic maintenance like conventional e-learning systems, which require upgrading hardware and procuring software licenses annually (Abu El-Ala et al., 2012; Stuart, 2012).

Since respondents wanted to learning shared tools, cloud-based systems can meet this preference. The basic idea of cloud computing is to provide access to a pool of virtual computing

resources with a focus on large-scale computing resources connected to a network which enables clients to share these resources. (Patnaik, Putta, & Ismail, 2014). Moreover, Anand & Kamiyani (2015) stated that cloud computing provides unlimited learning selections to students by exposing them to an extensive diversity of software tools and resources in a rich and flexible environment.

Laisheng & Zhengxia (2011) have claimed that the introduction of cloud computing to e-learning is practicable, and can considerably enhance investment and management efficiency. This can facilitate the development of profitable e-learning systems and achieve win-win situations for suppliers and customers.

5.2 Research implications

In response to the research question “*How well do cloud-based e-learning systems serve tertiary learning requirements?*” the outcomes of this study present many benefits from e-learning systems, such as:

- Saves user time and effort
- Communication channel between users
- Learning available anytime, anywhere for users
- Facilitates the learning process
- Ease of access
- Helps users keep abreast of technology
- Attracts students

Cloud-based computing is expected to be the next major trend in the development of efficient e-learning systems because of the features and capabilities of cloud-based computing

and the advantages that it offers over traditional e-learning systems from the perspectives of technology and cost (Alghali et al., 2014).

The participants' responses consistently match with what the literature about shifting e-learning in Saudi Arabian universities to the cloud may allow universities to retain these benefits and add more, such as:

- Personalised learning by offering a boundless learning choices which expose students to a wide variety of software tools and resources in a rich and flexible environment.
- Economic benefits. Software and hardware require continual upgrades that tax the universities' budgets. Cloud computing can reduce cost by offering its services on a pay-per-use basis, which enables universities to accelerate the use of new technologies and focus on imparting quality education.
- Elasticity and scalability, such that universities can scale up to more resources and storage when user load increases, or scale down when need decreases. This can be considered a major advantage of cloud computing when consumers are not confined to a specific set of resources.
- Accessibility: Users can access resources anytime and anywhere. Hence, the quality of services provided through superior resources and skills make this possible.
- Reduced carbon imprint, since cloud computing allows universities to reduce carbon emissions by reducing power consumption. Cloud providers are also making efforts to create eco-friendly data centres, which will further reduce carbon emissions.
- Standardisation, since cloud computing provides standardised software for use of individual or networked universities. For example, universities can develop their own

collections of applications or solutions and re-use them. This can help to reduce cost and implementation time, with a consequent increase in reliability (Anand & Kamiyani, 2015).

The time is right for Saudi Arabian universities to consider a shift in their e-learning systems to the cloud particularly its government universities. The Kingdom of Saudi Arabia has recently generated a new vision for the future called the Saudi Vision 2030. It is a package of social and economic policies designed to free the kingdom of dependence on oil exports, and build a prosperous and sustainable economic future by focusing on the country's strengths and policy. Part of this vision is to develop education in Saudi Arabia by reshaping and modernizing the academic and educational systems. Alongside this, the Saudi Arabian government is looking to advance the education sector in line with growing market needs (Kingdom of Saudi Arabian Vision 2030, 2016). Therefore, adopting cloud-based e-learning systems is a positive contribution to this vision as it advances education and reduces the costs of hardware maintenance, systems upgrades, renewal of software licenses, and adds features (Abu El-Ala et al., 2012; Stuart, 2012; Anand & Kamiyani, 2015).

5.3 Study limitations

Some factors need to be considered as research limitations. Using a single survey to collect data may result in the common method bias (Sharma, Chhabra, Cheng, Brownell, Liu, & Yan, 2009). The initial research design for the collection of data in this study was to run an online survey followed by interviews. However, the time needed to obtain formal approval from Saudi Arabian universities to conduct the study involving their staff, and the distance to the location were limitations, since the study was based in New Zealand and the participants were in Saudi Arabia. In the end, this study used a single survey to collect a range of quantitative and qualitative

data. Further research can improve the depth of the study by conducting one with a longer timeframe including interviews to mitigate the time limitation.

Another factor that may have limited the results of this study is the small sample size of 55 respondents, which may not be sufficient to be considered representative of the actual population of Saudi Arabian academics when generalizing the results. However, the survey was designed to include many open-ended questions that could allow respondents to explain their thoughts in a rich manner; hence, the results could be potentially reflective of the wider population of Saudi Arabian academics.

5.4 Future research

This study concentrated on the usability of current e-learning in the Kingdom of Saudi Arabia, and investigated the possibility of adopting cloud-based e-learning, and whether this could better serve tertiary education in the country. Since the study found that shifting current systems to the cloud will be useful, to tackle issues of dropouts and connection issues, future research may be needed to conduct a more comprehensive investigation into the Saudi Arabian telecommunications infrastructure. This study showed that respondents had complaints about Internet connectivity. Since cloud e-learning is completely reliant on effective Internet connectivity, the researcher agrees with Al-Draiby's (2010) suggestion that the need for investigating e-learning in the Kingdom of Saudi Arabia is based on the reasons of need, such as that the country has a wide geographical domain that makes it difficult for people in remote areas to access universities (Al-Draiby, 2010). Moreover, additional pressure on the system is expected due to the growing population in Saudi Arabia (Albalawi, 2007).

Future research can investigate, through interviews, the demands of people in remote areas of the country as well as staff at Saudi Arabian universities to explore possible e-learning

delivery methods based on their capabilities. A comprehensive survey can then be circulated among Saudi Arabian telecommunication companies, followed by in depth interviews if needed, to locate issues of Internet connectivity and identify possible improvements for faster Internet services with a wide coverage across all Saudi regions, including rural areas.

Therefore, it is proposed that the following topics be considered for future research:

- How well can the Saudi telecommunication infrastructure serve cloud e-learning systems in the Kingdom of Saudi Arabia?
- What is the impact of Internet connectivity efficiency on cloud e-learning systems in the Kingdom of Saudi Arabia.
- How can the adoption of cloud e-learning systems contribute to the Kingdom of Saudi Arabia Vision 2030?

5.5 Summary

This chapter discussed several aspects of the overall study, including respondent profiles from the study results, which showed the most respondents were female academic staff in Saudi universities between 30 and 40 years of age with intermediate e-learning experience. They had not been in their roles for more than five years. It also discussed e-learning in Saudi Arabian universities from the respondents' perspectives. Past literature has reported that Saudi Arabian universities have equipped their campuses with technological tools that help the performance of e-learning tasks throughout the learning process. These enhancements show how well Saudi Arabian universities have developed the use of e-learning since 2010. Moreover, the traditional client-server modes of e-learning and cloud e-learning were discussed from the point of view of respondents with regard to their preference for features or functions not available in their systems. Therefore, it was concluded that cloud-based e-learning systems can serve tertiary educational

requirements in Saudi Arabia in an enhanced way through cloud computing due to its flexibility of time and location, potential for cost reduction, and unlimited device support. It can thus contribute positively to the Saudi Vision 2030. This chapter also proposed some implications of using cloud e-learning in Saudi Arabian universities, whereby it can help retain the current benefits of using e-learning systems, such as saving time and effort, making communication between educator and learner easier, and ease of access, and can add other benefits of cloud services, such as providing unlimited learning choices, cost reduction, and allowing access from anywhere at any time.

The limitations of the study and possible directions for future research were also presented. A possible study involving personal interviews can address the limitations of this study over a longer timeframe. Future research can also focus on the Saudi Arabian telecommunication infrastructure, since technical issues and Internet connectivity are important issues that influence e-learning in Saudi Arabian universities.

Chapter Six: Conclusion

Reliance on the learning model of traditional in-person classes at universities has been evolving with the advent of e-learning. However, the user still needs to be attached to, or have server access to, a local network to effectively use e-learning services. These days, online learners have become more freely engaged because of the shift of IT infrastructure to cloud-based systems. Thus, as long as students have Internet access, they can access e-learning services anywhere and at any time. The technology of cloud computing has been developed to work on the basis of pay per use. Universities can benefit from this approach to provide technologies to its staff and students and save a significant amount of money that they would otherwise spend on hardware maintenances and software licenses. Therefore, cloud computing can be seen as a useful tool which can enable universities to create an enhanced learning experience for students to enrol in various courses at affordable cost. However, security, reliability, and inter-operability are major problems associated with cloud computing, and need to be addressed if it is to be adopted and implemented in universities (Anand & Kamiyani, 2015).

Cloud computing can be the next major e-learning systems development trend because of its superior features and capability over conventional server-based e-learning systems from the perspectives of technology and cost (Alghali et al., 2014). Nonetheless, the pace of development of cloud-based e-learning applications is not expected to slow down (Madan, Pant, Kumar, & Arora, 2012).

The literature review in Chapter Two presented information pertaining to a variety of aspects of e-learning tools, the numerous benefits that they offer to clients and users, and ways in which the cloud-based architecture can be effectively integrated into existing educational technologies. The focus of the literature has been primarily on the advantages of cloud computing,

with specific relevance to e-learning, and effective management of the wide range of challenges that this technology poses to users.

A mixed method approach was used in this thesis to obtain e-learning users' experience - to investigate how well cloud-based e-learning systems serve tertiary learning requirements in the Kingdom of Saudi Arabia. This study used an anonymous online survey using Qualtrics instruments to collect quantitative and qualitative data. A total of 114 surveys responses were collected online. However, after removing blank responses and data cleaning, only 55 surveys were included for analysis. Ethics applications were secured for this study. Approvals were obtained from both the Auckland University of Technology Ethics Council, where the researcher conducted the study, and from Dammam University, where the data was collected from. The ethical approvals are attached in Appendices A and B.

The majority of participants in the study were female in their 30s and 40s, working as lecturers in an academic environment with five or fewer years of experience of e-learning. They considered themselves intermediate level e-learning users, and mentioned that they mostly used Blackboard as an e-learning platform. Most participants' teaching methods involved online and hybrid courses, and they believed that e-learning systems supported the outcomes of learning. They identified both advantages and disadvantages of using e-learning systems from their points of view, and provided an average score of 7 out of 10 to their e-learning systems, with a standard deviation of 1.9. The findings of this study show the extent to which e-learning systems are being used with success in Saudi Arabian universities. This strong result might be an indication of a good e-learning grounding based on the rapid development of e-learning since Draiby (2010) and Al-Harbi (2011) mentioned in their study that e-learning was still in its infancy.

From this study we now know that:

- (a) E-learning in Saudi Arabian universities has been quite successful in the last five years.
- (b) The staff in Saudi Arabian universities is interested in using e-learning, especially early career female staff.
- (c) Cloud e-learning can contribute to advancing Saudi Arabian education as well as forwarding the Saudi Vision 2030.

Al-Wakeel in 2001 considered the efforts of e-learning in Saudi Arabia as unsuccessful due to incompletely planned implementation. Draiby in 2010 and Al-Harbi in 2011 claimed that e-learning in Saudi Arabia was still in its infancy. This study can confirm that e-learning in Saudi Arabia appears to have successfully developed over the last five years because of the enthusiasm in the growth of e-learning in the Kingdom of Saudi Arabia. Albalawi (2007) claims this is because of the interest in advancing education. Moreover, the need for e-learning arose because student admissions in foundational courses were well exceeding their limits. Another reason was the inability to deliver conventional education because of their low level of facilities such as offices and teachers.

Chapter Five included some aspirations of survey participants to see functions currently unavailable in their university e-learning systems. This study pointed out that these functions are available in cloud-based e-learning systems. Moreover, the study recommends that shifting to cloud-based e-learning rather than a client-server approach in Saudi Arabian universities might contribute to the learning outcomes of tertiary education due to its flexibility of time and location as well as unlimited support for devices usage. In addition, the adoption of cloud-based e-learning systems in Saudi Arabian universities might contribute to the Saudi Vision 2030 by advancing learning technology as well as reducing the cost of using educational technology. Chapter Five also included some implications of using cloud e-learning in Saudi Arabian universities. The

study limitations and possible future research were discussed. Possible future studies involving personal interviews can address a limitation and deepen understanding. It can also focus on the Saudi Arabian telecommunications infrastructure, since technical issues and Internet connectivity were identified as problems that influenced participants' experience of e-learning in Saudi Arabian universities.

This study involved the perspectives of academics and university staff on the question of how e-learning systems are serving tertiary learning requirements within the Kingdom of Saudi Arabia. This study had hoped to develop a new framework; however, sufficient data was not available for this purpose. Subsequent work to establish a framework can be based on some of the findings of this study. It contributed a number of new aspects to the conversation on when, or if, a move to the emerging opportunity of cloud-based e-learning systems will better serve Saudi Arabian universities. It is hoped that this study can provide a useful perspective for university decision makers.

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APPENDICES

Appendix A:

A. Ethics approval (Auckland University of Technology)



AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

13 April 2016

Stephen Thorpe
Faculty of Design and Creative Technologies

Dear Stephen

Re Ethics Application: **15/407 An investigation of cloud-based eLearning systems use in the universities of the Kingdom of Saudi Arabia.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 12 April 2019.

As part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 12 April 2019;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 12 April 2019 or on completion of the project.

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this. If your research is undertaken within a jurisdiction outside New Zealand, you will need to make the arrangements necessary to meet the legal and ethical requirements that apply there.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

A handwritten signature in black ink, appearing to read 'K O'Connor'.

Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: Hassan Alsuwayed rtx1794@autuni.ac.nz

Appendix B:

B. Ethics approval (Dammam University)

Kingdom of Saudi Arabia
Ministry of Higher Education
University of Dammam
Office of the Vice President for
Research & Higher Studies



المملكة العربية السعودية
وزارة التعليم العالي
جامعة الدمام
وكالة الجامعة للدراسات
العلمية والبحث العلمي

اللجنة الدائمة لأخلاقيات البحث على المخلوقات الحية

Institutional Review Board

IRB Number	IRB-PGS-2016-09-107	أيرب-بجس -١٠٧-٩-٢٠١٦
Project Title	Cloud-based eLearning system among Saudi Universities	
Principal Investigator	Postgraduate Student / Hassan Alsuwayed	
Supervisor	Dr. Saleh Al Rashid	
College / Center	Computer Science and Information Technology	Department Computer Science and Information Technology
Approval Date	9/06/2016	

The application was reviewed and approved at the University of Dammam IRB meeting on Thursday, June 9, 2016.

Approval is given for one year from the date of approval. Projects, which have not commenced within six months of the original approval, must be re-submitted to the University Institutional Review Board (IRB) Committee. If you are unable to complete your research within the validation period, you will be required to request an extension from the IRB Committee.

On completion of the research, the Principal Investigator is required to advise the Institutional Review Board if any changes are made to the protocol, a revised protocol must be submitted to the Institutional Review Board for reconsideration.

Approval is given on the understanding that the "Guidelines for Ethical Research Practice" are adhered to. Where required, a signed written consent form must be obtained from each participant in the study group.

Vice President for Higher Studies & Scientific Research
Chairman of the Institutional Review Board

Professor Abdulsalam Al-Sulaiman



- CC. - Dean
Deanship of Scientific Research
- Director General
King Fahd Hospital of the University
- Director
Center for Research and Medical Consultations
- Supervisor General for Quality and Safety
King Fahd Hospital of the University
- Director
Monitoring Office for Research and Research Ethics
- Director
Pharmacy @ KFHU

Appendix C:

C. Participant information sheet Page 1



Participant Information Sheet - Survey

Date Information Sheet Produced:

21 October 2015

Project Title

An investigation of cloud-based eLearning system use in the Universities of the Kingdom of Saudi Arabia

An Invitation

Greetings, my name is Hassan Alsuwayed and I am a Saudi student studying a Master of Computer and Information Sciences at the Auckland University of Technology (AUT) in New Zealand.

It is my honour to invite you to participate in my research that is investigating of Cloud-based eLearning system use in the Universities of the Kingdom of Saudi Arabia.

This Information Sheet will give you information about my study and how your thoughts and perceptions of eLearning systems and their ability to match Learning and Teaching needs may help the Universities of the Kingdom of Saudi Arabia with improving their systems.

What is the purpose of this research?

This research aims to enhance the e-learning environment in Saudi Arabia by answering the following question: How well do cloud-based e-learning systems serve tertiary learning requirements in The Kingdom of Saudi Arabia?

Your comments and statements will help me in producing a thesis for my Masters programme at AUT which will be published in the AUT Scholarly Commons.

How was I identified and why am I being invited to participate in this research?

As potential participant I have found your contact details through a coordination with the Deanship of Scientific Research .

What will happen in this research?

This research involves participation in an online survey taking approximately 25 minutes asking you questions about your use and perceptions of the eLearning systems in use at your university, and potentially a follow-up 45-60 minute interview should you indicate that you would be willing to participate in one.

C. Participant information sheet Page 2

The logo for Auckland University of Technology (AUT) features the letters 'AUT' in a bold, white, sans-serif font on a black rectangular background.

TE WĀNANGA ARONUI
O TĀMAKI MAKĀU RAU

What are the discomforts and risks?

It is not expected that the questions asked will be highly discomforting or embarrassing. However I appreciate that organisational issues may surface in information provided and every care possible will be undertaken to keep your responses anonymous and not individually identified.

How will these discomforts and risks be alleviated?

If you are uncomfortable responding to any of the survey questions you do not need to answer any of the questions included and you may choose to exit the survey at any stage before completion by closing the survey window.

What are the benefits?

For myself as a researcher a benefit of your participation is that it will assist in my attaining a Master of Computer and Information Sciences degree from the Auckland University of Technology in New Zealand and it will enhance my knowledge in the eLearning research area.

Universities in the Kingdom of Saudi Arabia may benefit as the intended outcomes of this research may help in the investment or technology selection decisions by having them based on the findings of the study

There may also be a benefit for those using eLearning systems if there is an improved match between technology system and learning and teaching needs as an outcome of this study.

How will my privacy be protected?

The survey will be 100% anonymous and no identifying information will be collected. After the survey is completed you will be invited to participate in a 2nd survey should you wish to also be interested in participating in interviews on the subject of eLearning systems use at your university.

What are the costs of participating in this research?

It is anticipated that the survey will take around 25 minutes of your time.

What opportunity do I have to consider this invitation?

The survey URL will be open from 15 August 2016 until 26 November 2016 and you may participate at any time in that time frame.

C. Participant information sheet Page 3

The logo for Auckland University of Technology (AUT) features the letters 'AUT' in a bold, white, sans-serif font against a black rectangular background.

TE WĀNANGA ARONUI
O TĀMAKI MAKĀU RAU

How do I agree to participate in this research?

Completion of the survey via in the URL link at the bottom of this information sheet will be taken as indicating your consent to participate.

Therefore, by completing the survey you are indicating to the researcher your consent to participate in this research.

Will I receive feedback on the results of this research?

A summary report of the survey findings will be provided via the following URL link after Monday 26 December 2016:

https://aut.auckland.ac.nz/qualtrics.com/SE/?SID=SV_5d9EZRMrBLYg05v

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr. Stephen Thorpe, stephen.thorpe@aut.ac.nz, +649 921 9999 ext 5159.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz, +649 921 9999 ext 6038.

Whom do I contact for further information about this research?

Researcher Contact Details:

Mr Hassan Alsuwayed, School of Engineering, Computer and Mathematical Sciences, rtx1794@aut.ac.nz, 0562953117

Project Supervisor Contact Details:

Dr. Stephen Thorpe, stephen.thorpe@aut.ac.nz, +649 921 9999 ext 5159.

Approved by the Auckland University of Technology Ethics Committee on 13-April-2016, AUTEK Reference number 15/407.

Appendix D:

D. Consent form



Consent Form

Project title:

An investigation of Cloud-based eLearning system use in the Universities of the Kingdom of Saudi Arabia.

Project Supervisor: Dr Stephen Thorpe

Project Researcher: Hassan Alsuwayed

- I have read and understood the information provided about this research project in the Information Sheet dated 21 October 2015.
- I have had an opportunity to ask questions and to have them answered.
- I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.
- I understand that although anonymous, the privacy and confidentiality of the information provided in my interview may not always be preserved given the size of my team or business unit.
- I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- I understand that I will have an opportunity to review the transcript of my responses and make adjustments and changes to improve clarity of my meaning.
- If I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- I agree to take part in this research.

I wish to receive a copy of the report from the research (please tick one):

Yes NO

Participant's name and Contact Details (Optional)

Note: The Participant should retain a copy of this form.

Approved by the Auckland University of Technology Ethics Committee on 13-April-2016 AUTEK Reference number 15/407.

Appendix E:

E. Survey Questions Page 1

Q1. What is your age group?

- 19 or younger
- 20 - 29
- 30 - 39
- 40 - 49
- 50 or older

Q2. Your gender?

- Male
- Female

Q3. What is your job role?

- Academic
- Technician/Technical
- Administrative
- Other (please specify)

Q4. What is your job title?

- Teaching Assistant
- Lecturer
- Assistant Professor
- Associate Professor
- Professor
- Other (please specify)

Q5. How long have you been in this role?

- 1 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 years or more

E. Survey Questions Page 2

Q6. How many years have you been using eLearning?

- 1 - 5 years
- 6 - 10
- 11 - 15
- 16 or more

Q7. Would you describe yourself as eLearning user?

- Novice
- Intermediate
- Expert

Q8. What eLearning platform have you used?

- Blackboard
- Moodle
- Other (please specify)

Q9. What eLearning system have you used?

- Easy generator
- Elucidat
- Quick Lessons
- Smart Builder
- Artisan by Bankers Edge
- Lectora Online by Trivantis
- ZebraZapps by Allen Interactions
- Amvonet Publish by Amvonet
- Liquid Authoring by Landmark eLearning
- Atlantic Link by Assima
- Cameo by Yukon Group
- Other (please specify)

E. Survey Questions Page 3

Q10. In your role what methods of teaching do you use eLearning mostly for?

- Hybrid courses
- On-line courses
- Both Hybrid courses and On-line courses beside each other
- Other (please specify)

Q11. What tasks do you typically perform when using eLearning?

Q12. What features or functions of eLearning do you use the most?

Q13. How do these support your learning outcomes or goals?

Q14. What features or functions that are not currently available in your eLearning system would you like to use?

Q15. What aspects of using eLearning systems do you find most difficult?

Q16. What are the key benefits of using eLearning systems to meet learning needs?

E. Survey Questions Page 4

Q17. What are the key disadvantages of using eLearning systems to meet learning needs?

Q18. In your experience, what aspects of learning are supported well by eLearning systems?

Q19. In your experience, what aspects of learning are not supported well by eLearning systems?

Q20. How well do you believe the eLearning systems serve the tertiary learning requirements at your university?

Q21. How would you rate the current eLearning system in serving the tertiary learning requirements at your university?

	1	2	3	4	5	6	6	7	8	9	10
Current System											

Q22. What improvements are needed or could be made to improve the current system to match with learning requirements?

Appendix F:

F. Translation example of Arabic text into English for one question of the survey Page 1

	Raw column	Translated column
Q11	What tasks do you typically perform when using eLearning?	What tasks do you typically perform when using eLearning?
1	التدريس	Teaching
2	دور المحاضر ودور تقني بسيط	Uploading lectures materials - assignments
3		
4	Assessment and discussion	Assessment and discussion
5	Creating contents	Creating contents
6	Uploading lectures materials and assignments	Uploading lectures materials and assignments
7	نقل المحاضرات و تبليغ التعليمات للطلاب و الواجبات	Uploading lectures materials - notifications - assignments
8		
9	Lecturing, assessing, and contacting students.	Lecturing, assessing, and contacting students.
10	اختبارات_ واجبات - تقييمات / الفصول المقلوية	Tests - assignments -grading - The flipped classroom
11	administrator	administrator
12	ارسال المحاضرات، استقبال الواجبات، ارسال الواجبات، ارسال الاعلانات، وضع النتائج، المناقشات	Uploading lectures materials - notifications - assignments - homeworks - online discussions
13	جميعها	all
14	Don't really understand how you define "tasks". I post learning resources, summative and formative assessment activities, notices, surveys, assignments and have discussion boards in addition to posting grades.	Don't really understand how you define "tasks". I post learning resources, summative and formative assessment activities, notices, surveys, assignments and have discussion boards in addition to posting grades.
15	Preparing material	Preparing material
16	توفير مصادر الكترونية - عمل اختبارات قصيرة - تمارين - واجبات	upload learning resources - tests - exercises activities - assignments
17	التوجيه والارشاد	Guidance and Counselling
18	Posting guidelines, announcements, lectures, assignment, tests and grading.	Posting guidelines, announcements, lectures, assignment, tests and grading.

F. Translation example of Arabic text into English for one question of the survey Page 2

19	البلاك بورد واليوريوينت	blackboard and PowerPoints
20	واجبات، اختبارات، منتدى النقاش، صفوف مقلوبة، أبحاث، إعلانات، إعلان الدرجات، إعلان الخطة الدراسية، معايير التقييم، عروض لليوريوينت، المراجع اذا متوفرة في المكتبة الرقمية	Homeworks - tests - discussions forum - The flipped classroom - researches - notifications - grading - upload study plan - PowerPoints- upload learning resources
21	assignments / activities	assignments / activities
22	الشرح / الاختبار / المراجعة	teaching - tests - reviews
23		
24	lecture PowerPoint upload / we blink / study plan / assignment and their due date	lecture PowerPoint upload / we blink / study plan / assignment and their due date
25	Using YouTube, and other methods to explain	Using YouTube, and other methods to explain
26	تحضير للمحاضرات وشرح لها - اعداد اختبارات قصيره - رصد للدرجات	Uploading lectures materials - tests - grading
27	Course requirements, such as assignments, quizzes, lessons and notifications	Course requirements, such as assignments, quizzes, lessons and notifications
28	مهام تعليمية بالمقام الأول مثل التدریس والتقييم.	teaching - grading
29	Assignments, quizzes, report submission, lectures referencing, discussion forum and grading.	Assignments, quizzes, report submission, lectures referencing, discussion forum and grading.
30	presentations, on line lectures, homework. tests. on line group discussions. messages	presentations, on line lectures, homework. tests. on line group discussions. messages
31	التدریس والواجبات	teaching - homeworks
32	to earn time. / to make learning easy.	to earn time. / to make learning easy.
33	ارسال المحاضرات و التحضير الالكتروني كذلك اجراء الاختبارات بلاك بورد	teaching - tests
34	التدریس	teaching
35	Theory is presented.	Theory is presented.
36	تنزيل المحاضرات / متابعة الطلاب و التواصل معهم / اعداد الاختبارات و استلام البحوث و الواجبات	Uploading lectures materials - communication - tests - homeworks - assignments
37	ارشادات للطلاب / كتب / مقالات / أبحاث	Guidance and Counselling - researches

F. Translation example of Arabic text into English for one question of the survey Page 3

38	Grading, submitting homeworks, quizzes, discussion forums, flipped classrooms	Grading, submitting homeworks, quizzes, discussion forums, flipped classrooms
39	uploaded the courses material, / discussion board, / exam, / analysis	uploaded the courses material, / discussion board, / exam, / analysis
40	بث مباشر، اختبارات، محاضرات، اختبارات مفاجئة، واجبات.....	live streaming - tests - Uploading lectures materials - sudden tests - homeworks
41		
42	المحاضرات النظرية والعملية / التواصل بين المعلم والمتعلم	Uploading lectures materials - communication
43	تسجيل المادة العلمية لتكون مرجعية للطلاب 2- رفع المقرر الدراسي الكترونياً 3- جميع الاعلانات والتوجيهات الخاصة بالمقرر عن طريق البلاك بورد	lecture recording - Uploading lectures materials - notifications
44	Video lectures, online discussion, delivering materials, receiving homeworks and giving feedback, online quizzes, announcement,	Video lectures, online discussion, delivering materials, receiving homeworks and giving feedback, online quizzes, announcement,
45	ايميلات.بحوث علميه.تواصل	emails - researches - communication
46	upload lectures, lab manuals and assignments	upload lectures, lab manuals and assignments
47	استلام الملفات المختلفة من الطالبات	communication
48	حالياً لا استخدم	currently not using
49	Write the objectives and lessons goal, upload ppt, grading, announcement	Write the objectives and lessons goal, upload ppt, grading, announcement
50	عمل اختبارات مناقشات رفع الواجبات والمحاضرات فصول افتراضية	tests - discussions - homeworks - virtual classes
51	الاختبارات - المحاضرات - الواجبات	tests - Uploading lectures materials - homeworks
52		
53	رفع المحاضرات / اختبارات / واجبات / اعلانات	tests - Uploading lectures materials - homeworks - notifications
54	تصميم تدريس تدریس	teaching
55	اعرض مادة مجهزة على برنامج عرض الشرائح او ملفات مصورة	PowerPoints