Addressing Student Perception of E-learning Challenges in Higher Education Holistic Quality Approach

HENLEY BUSINESS SCHOOL
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A thesis submitted to the University of Reading in fulfillment of the requirements for the degree of Doctor of Philosophy in Business Informatics and Systems Science

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Declaration

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Abstract

E-learning is a significant model of learning, but questions are being raised about the trade-offs in switching from traditional classroom-based learning to e-learning; for example, e-learning is cost-effective, provides round the clock accessible and convenience, but there are questions raised about its quality and effectiveness.

E-learning facilitates the delivery of education and training to anyone, anytime and anywhere. The development and delivery of e-learning materials, by several organisations, and higher education institutions is under-pinned by a desire to solve authentic teaching, learning, and problems. The success of e-learning, however, depends, in part, on how learning takes place, that is, the underlying pedagogy; and the real value of e-Learning lies in the ability to deploy its elements to train the right people to gain the right knowledge and skills at the right time. Many recent efforts have been made to use e-learning system in developing countries across the world, as e-learning can play a vital role in helping governments reach their ambitious educational targets; but despite strong benefits, the overall adoption of e-learning has remained low as there remains a low perceived effectiveness of e-learning approaches.

This research argues that low adoption is due to e-learning being wrongly pushed as a technology solution in order to increase low-cost access to education. We propose that, in order to be successful, in addition to technology, e-learning has to deliver the high perception of quality pedagogical teaching and learning material. A well-designed e-learning system should have customised learning content, which is developed in the appropriate language with the right amount of interactivity, and delivered in the right format to be able to support the quality perception of learners. If learners perceive the learning experience to be of high quality, then they would be more satisfied with the content and would be more likely to adopt and advocate the system in the future. The aim of this research is to identify and analyse critical issues that are hindering e-learning systems implementation.

This research quantitative research investigates the impact of pedagogy on the quality perception of e-learning; with data collected using questionnaire surveys. Using a quantitative method approach, this thesis combines three interconnected objectives:

Objective 1 relates to investigating the effect of delivery modes on the quality perception of e-learning data from a sample of 475 university students; to understand their preference concerning different delivery modes for different e-learning quality dimensions.

The findings reveal that, when considering the perception of e-learning quality, if the e-learning system is provided in full audio/video format, it has a positive correlation with responsiveness, learning content and course website. This means students, associate the e-learning system quality with the media format in which the learning content is provided. When the learning content is provided in full audio/video, students perceive it to be of better quality. This supports the 'multimedia principle' proposed by Mayer (1997). Secondly, if the course website components are available in multimedia, student perception of quality also improves. Similarly, one of the dimensions of SERVQUAL, i.e. responsiveness, also improves, if multimedia is provided. This means that within an e-learning system if responses to the learner are provided in a multimedia form, they perceive it to be of significantly higher quality. Therefore, when designing and developing e-learning systems, educators and/or providers must consider these aspects to maximise system quality perception.

Objective 2 relates to our investigating the effect that language has on the quality perception of e-learners. From our experiment, it has been found that university students (in Pakistan) would perceive the quality of e-learning experience to be better if the written learning material is provided in English. This is understandable, as these students have consistently studied in the English language from grade 1. Students have not learned English as a second language, but have routinely studied subjects like science, mathematics, history, physics, chemistry, and business in the English language. Throughout their education, the books used in schools are in English and students always have to take their exams in English. Another important aspect is that there are no authentic technical books available in the local language (i.e. Urdu). Universities, therefore, do not use books in Urdu as the learning content has not be developed in the local language. Accordingly, students have become accustomed to reading and writing in English when undertaking education. Interestingly, when students are sometimes expected to read material in Urdu, they find it quite challenging, as the literal translations of English technical terms are often too difficult to understand in the local language.

From this experiment, it is evident that, for learners at the university level, it is better to design and provide e-learning content in the English language. However, live lectures and recorded

audio/video lectures may also be provided in the local language, as it would suit most students, and help them in their understanding of the ideas.

Objective 3 relates to our investigation concerning interactivity level on the quality perception of e-learners. Results, from a sample of 430 university students (in Pakistan), reveal that students perceive e-learning material to be of higher quality if that material is more interactive. This result is in line with the traditional literature which states that interactivity improves student perception of quality of the learning material. Research data suggests that online courses with higher levels of interactivity lead to higher levels of student motivation, improved learning outcomes, and satisfaction over less interactive learning environments (Espasa & Meneses, 2010; Liu et al., 2007; Mahle, 2011; Park & Choi, 2009; Thurmond et al., 2002).

In our research, we used the ELQ model (Uppal et. al, 2017), that considers 'service', 'information', and 'system' dimensions to assess holistic qualities of e-learning systems. This ELQ model, which is validated in chapter four, evaluated the moderating effect of different aspects of pedagogy, i.e. delivery modes, language and interactivity on 'service', 'information', and 'system' dimensions. Other studies have done similar work, but not considered moderating impact on all ELQ dimensions.

This thesis, as a whole, provides a significant contribution as the combination of the objectives allows us to investigate three significant aspects of pedagogy, i.e. delivery modes, language, and interactivity, which have been shown to impact e-learning implementation success and their relationship with student quality perception of e-learning. The practical contribution, from this thesis, is that universities, e-learning providers, and businesses can fundamentally apply the findings from this thesis when designing/implementing e-learning solutions; as this will help them in providing better holistic e-learning quality, not only from the service perspective, but from information and system perspectives as well, which have been found to be significant in this research.

This research finds that all three aspects of pedagogy, i.e., delivery modes, language, and interactivity play a role in improving the quality perception of e-learning - leading to satisfaction and repeat use. All considered aspects of pedagogy were found to be, in some way, significant to improvement and management of e-learning quality.

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Chapter 1
E-learning Quality Perception

1.1 Background

With the development of affordable pervasive technology devices, Information and communication technology (ICT) has expanded into all aspects of our lives. This technology revolution is seen as a relentless force that is changing our lives on a daily basis. Predictions suggest that this incredible rate of change in information management is not going to slow down soon, rather it will increase to cover most countries in the world (Chinn and Fairlie, 2006; Watson, 2006).

The exponential growth of in the number of people acquiring smartphones, tables, wireless technology, 3G and 4G networks, along with social media and MOOCs (massive open online courses), has opened doors to some amazing changes in an e-learning environment.

1.2 Research Problem and Rationale

In order to take advantage of the wide accessibility of e-learning, many educational institutions, and higher education institutions, in particular, have chosen to adopt e-learning in a range of different forms. There are a number of reasons for this, such as flexibility, use of interactive multimedia, access to large learning resources, low individual cost, etc. (McCormack and Jones, 1997; Keller and Cernernd, 2002; Conole and Oliver, 2007).

Due to the considerable benefits, many educational institutions started offering e-learning programs in different forms, and at different levels, but many of these programs have not been very successful, and/or resulted in failure.

There are numerous of benefits to use e-learning documented in the literature, which encourages educational institutions to implement e-learning in order to achieve different educational goals. However, the results/success of these e-learning initiatives vary significantly. Understanding the variance in success provides the motivation to this researcher. What are the reasons for this variation in success? What are the challenges and issues that stand in the way of e-learning success?

One of the issues with e-learning implementation identified in literature is that it is assumed that technology is the key success factor. Focus on technology, however, can result in implementers overlooking how e-learning system must consider the point of view of learning delivery, and/or content development.

How teaching material is prepared and/or used in a traditional class room is largely different from how learning material may be delivered online. Secondly, in an e-learning environment, students are free to choose the time and place where they want to learn, and can often decide what they want to learn, and in what order the learning material will be delivered. This flexibility means that students cannot be forced to sit through live-lectures, as in a traditional classroom, as availability means they may never complete the learning material provided to them online and/or may not find the content interesting and engaging.

One of the key elements that users value in any service is 'quality'. Since education can be seen as a service, the only way higher education institutions can expect learners to adopt to this service is by providing students with the delivery of a product that is perceived as being of high quality. If students perceive the quality of the educational service to be equal or greater than what they expect, then they are likely to keep using this service, which will improve the adoption and completion rates. If, however, students perceive the quality of the education service to be less than expectation, the students will most likely stop using the services and/or resist a return to the use of services.

The aim of this research is to assess aspects of e-learning that are perceived in literature to be of vital importance to e-learning system implementation success. This research will help understand what challenges need to be overcome, to make learners adopt new educational e-learning delivery mechanisms; that have the potential to solve the increasing problem of affordable access to high-quality education.

1.3 Research Questions

Based on the discussion above the research question for this research are:

- Why are e-learning implementations hindered and what challenges exist in successful e-learning systems implementation?
- Why for measurement of e-learning quality, we must consider 'service', 'information' and 'system' dimensions?
- Why do selected e-learning challenges impact student perception of quality; ensuring consideration of 'service', 'information' and 'system' dimensions?

The first question addresses the core issue of identifying key challenges that are detrimental to the implementation of e-Leaning. The second question addresses the fundamental question of how to overcome key challenges and barriers to e-learning failure to improve e-learning systems adoption and success.

1.4 Research Methodology

For this research, a theoretical model of e-learning quality (ELQ) is used to consistently assess student quality perception when considering different aspects of e-learning. This model is used since it covers the holistic quality dimensions of service, information, and system, which are considered vital for e-learning quality assessment (Uppal et. al, 2017).

Three dimensions of pedagogical challenges were tested by collecting data from 400 plus university students (from Pakistan). A quantitative method will be employed where self-administered survey questionnaire will be used to collect data. Structural Equation Modeling (SEM) will be used to test the models. SEM confirms the constructs of the model, known as confirmatory factor analysis (CFA). This will help the researcher in determining the construct validity and readability of both variables and at the item level. Confirmatory factor analysis must be performed on the constructs extracted through exploratory factor analysis, otherwise, it cannot be used for further analysis. SEM is used, as the relationship between independent and dependent variable can be reliably tested through this method.

1.5 Research Significance and Contributions

Expected contributions will be both academic and practical in nature. In terms of an academic contribution, the research aims to provide a debate concerning e-learning challenges, and what

challenges are important to address; combing consideration of technology, individual, and pedagogical aspects. The research will focus on structuring these key challenges so that e-learning implementation benefit may be maximised. Once the key challenges are identified, one of the hardest challenges will be related to test e-learning quality. The development an e-learning quality model would be a remarkable contribution since no such model, to the best of our knowledge, currently exists. Testing the different aspects of e-learning challenges through this model will hopefully provide considerable practical insights to help guide e-learning program designers and administrators when developing e-learning programmes.

1.6 Thesis Structure

The structure of the thesis is:

Chapter 2 – Literature Review: The aim of this chapter is to review the literature relating to e-learning, the benefits gained by using e-learning and the challenges faced when implementing e-learning. The focus of the chapter is to identify and highlight key challenges which are hindering e-learning implementation success, in order to highlight and justify the research problem.

Chapter 3 – Methodology: This chapter will explore the relevant contextual use of research methodologies. By initially considering the philosophical background, and the research paradigm, we aim to discuss what relevant methods should be used to obtain and analyse data in our research. Methods introduced in chapter 3 will be appropriately implemented in chapters 5-7 in order to meet the specific research objectives.

Chapter 4 – Validation Model: After identifying the issues of study, i.e. those factors hindering the success of e-learning, we will need to define a theoretical model that can be used to validate our experiments, i.e. to allow the definition of quality perception. For this purpose, we will look at different technology acceptance models and system quality models. Since e-learning is a phenomenon that uses computer and internet technology at its core, we will look at the technology acceptance and information system success models. Similarly, education can be considered to be a service, therefore, we will look at service quality models as well. All these models are suitable for testing a particular dimension but no current quality model can test the three dimensions (i.e. service quality, information quality and system quality). In this chapter,

we aim to develop and validate a model, the E-Learning Quality model (ELQ) that can test all three aforementioned dimensions at the same time.

Chapter 5 – Delivery Modes: This chapter starts by expanding upon the importance of delivery modes/media in e-learning systems design/delivery, and why mode/media is key to education pedagogy. The discussion then moves towards discussion of the theoretical underpinning concerning existing use of different media types for learning. Our work aims to explain media richness theory, cognitive theory of multimedia learning, and extended SERVQUAL model, by considering relevant constructs and their relation to this research. The research model for this quantitative research is then explained and step wise data analysis is presented. Results, supported by data collected from a sample of 475 university students, reveals student preference for different delivery modes for service, information and system dimensions, considered in the ELQ model.

Chapter 6 - Language: This chapter investigates the importance of language from the point of view of education, and considers the use of mother tongue in e-learning programmes. The chapter discusses the importance of mother tongue, and the benefits of use to support learning in the early years of education. The use of English as an international language is explained and a justification is given for why it is needed for higher education in the countries where teaching material is not developed and adopted in the local language. Although learning in the local language is considered to be beneficial, and has cognitive advantages, our research investigates whether students that they prefer to use the learning material in English in the context of e-learning systems.

Chapter 7 – Interactivity: This chapter reviews existing literature concerning e-learning and interactivity. It starts with the definitions of interactivity and moves toward consideration of benefits, from the point of view of both teacher and learner. Social cognitive theory, and its relationship with interactivity, and e-learning is also explored. Supporting literature, for different types of interactivity, is discussed in this chapter for e-learning, i.e. interactivity with the system, with the service provider and with the information. The E-learning Quality (ELQ) model will be used to study different dimensions of service, information, and system. The findings of this research conducted by collecting data from 430 university students reveal how students perceive the quality of e-learning to be affected by level/type of interactivity and for

which dimensions, i.e. service, information or system, interactivity is more important. This research aims to test the effect of interactivity on student perception of e-learning quality.

Chapter 8 – Conclusion: This chapter will evaluate and summarise the Ph.D. research as a whole. The researcher aims to present the reader with a clear summary of the work, critical consideration of the research contributions, i.e. consideration of how work could have been developed and/or improved, and consideration of recommended future work.

Chapter 2
Literature Review

2.1 Introduction

The aim of this chapter is to address the first research question, i.e. To determine what kind of challenges/issues exist in e-learning environment that hinder successful e-learning systems implementation? By reviewing the literature related to e-Learning, and through critical discussion, this work will expand upon the benefits gained by adopting e-learning, and highlight the challenges that still negatively impact e-leaning implementation success. The focus of the chapter is to justify the research scope and highlight key challenges, i.e. the factors of study, that are hindering e-Learning success, which will be investigated further in this research.

2.2 Background

The advent of e-Learning and information communication technologies has stimulated learning institutions to modify their systems (Westera, 2004), and e-learning has become an increasingly popular educational solution (Clark & Mayer, 2011; Ma, Zheng, Ye & Tong, 2010); providing knowledge to learners at an affordable cost, accessible and without the limitation of time and space (Engelbrecht, 2005). Increasing use of computers, and other technologies, in universities and schools for administrative purposes, content delivery, and content development, is ultimately changing the way that education providers think about information delivery to students (Westera, 2004). Face to face delivery of teaching is being replaced by more complex modes of teaching (Kalanidhi, 2010). Effective education therefore increasingly requires a managed blend of new developments in technology and pedagogy and involves effective modifications within the organisation to ensure delivery quality. Researchers have argued that it is vital to know how students learn and that most of them learn through collaborative, active working both inside and outside the classroom; as collaborative programs and courses help to boost student's engagement and learning (Springer, Stanne & Donovan, 1999). Extensive effort has been made in order to understand the complex factors that influence which the success of e-Learning implementation/adoption in learning/training programs. However, gaps exist in our understanding of the causes of variations in learning outcomes, and further investigation

concerning the impact of variation concerning the learners, learning content and/or technology use is necessary (Arbaugh, Desai, Rau, & Sridhar, 2010; Zhang & Nunamaker, 2003).
For example there is a huge difference in the learning style, attitude and perceptions of teachers and students, so aligning learning styles to match the use of ICT, would benefit students a lot (Cagiltay et al., 2006).

2.3 Theories of Learning

In order to better understand transformation in the education delivery and learning, it is important to look at the proposed theories of teaching and learning. A number of learning theories, i.e. behaviorism learning theory, cognitive learning theory, and constructivism, etc., will be expanded to identify the variation in current thinking concerning this point.

Behaviourism Theory: This theory states that learning is measured by observing the behaviour and change in the physical experience of the student. Skinner (1974) stated that "Learning is a change in observable behaviour caused by external stimuli in the environment". Accordingly, to the believers of this theory, the response of the individual to external stimuli exhibits the thought process of that individual.

Cognitive Learning Theory (CLT): As opposed to the concept of behaviourism, cognitivism says that learning is not only just a response to stimuli; as there are a number of factors which are neglected if the only behaviour is observed. Cognitive learning theory states that every individual/student / learner has their own method of processing information, which helps him/her in thinking, learning, and discerning at a problem in a unique way (Witkin, Moore, Goodenough & Cox, 1975). The cognitivist claim that for every new concept, everyone needs to appreciate the rationale behind it (Pløger, 2001). Accordingly, instead of just focusing on the stimuli, CLT tries to ascertain the background/experience environmental stimulus that caused the behaviour (Merriam & Caffarella, 1999). Since it is very difficult for e-learning content designer to effectively manage exactly the right dimensions for the successful delivery of the lesson to all students, it is quite challenging for the designer to build content that fits exactly to every student's cognitive style (McLeod, 2003). Hence to cover every aspect of learning, personalising the design of course content, i.e. to be compatible with learner experiences and skills levels, can be very time consuming and costly.

Cognitive Theory of Multimedia Learning: The cognitive theory of multimedia learning was presented by Mayer who argue that multimedia supports the way that the human brain learns. They emphasise that people learn better from words and pictures than from words alone, which is referred to as the multimedia principle (Mayer, 2005a). Multimedia researchers generally define multimedia as the combination of text and pictures; and suggest that multimedia learning occurs when we build mental representations from these words and pictures (Mayer, 2005b). The words can be spoken or written, and the pictures can be any form of graphical imagery including illustrations, photos, animation, or video. Multimedia instructional design attempts to use cognitive research to combine words and pictures in ways that maximise learning effectiveness.

The theoretical foundation for the Cognitive Theory of Multimedia Learning (CTML) draws from several cognitive theories including Baddeley's model of working memory, Paivio's dual coding theory, and Sweller's Theory of Cognitive Load. The term cognitive refers to perceiving and knowing. Cognitive scientists seek to understand mental processes such as perceiving, thinking, remembering, understanding language, and learning (Stillings, Weisler, Chase, Feinstein, Garfield, & Rissland, 1995). As such, cognitive science can provide powerful insight into human nature, and, more importantly, the potential of humans to develop more efficient methods using instructional technology (Sorden, 2005). Key Elements of the Theory The cognitive theory of multimedia learning (CTML) centers on the idea that learners attempt to build meaningful connections between words and pictures, and that they learn more deeply than they could have with words or pictures alone (Mayer, 2009). According to CTML, one of the principle aims of multimedia instruction is to encourage the learner to build a coherent mental representation of the presented material. The learner's job is to make sense of the presented material as an active participant, ultimately constructing new knowledge. According to Mayer and Moreno (1998) and Mayer (2003), CTML is based on three assumptions: the dual-channel assumption, the limited capacity assumption, and the active processing assumption. The dual-channel assumption is that working memory has auditory and visual channels based on Baddeley's (1986) theory of working memory and Paivio's (1986) (Clark and Paivio, 1991) dual coding theory. Second, the limited capacity assumption is based on cognitive load theory (Sweller, 1988,1994) and states that each subsystem of working memory has a limited capacity. The third assumption is the active processing assumption which suggests that people construct knowledge in meaningful ways when they pay attention to the relevant material, and organise it into a coherent mental Cognitive Theory of Multimedia Learning

structure, and integrate it with their prior knowledge (Mayer, 1996, 1999). This awareness and understanding of the multimedia principle can help the content designers in the development of e-learning content.

Constructivist Approach: Another important part of the pedagogy is the interaction of the students with other students, teachers etc. which plays a very crucial role in the education. The constructivist approach is the theory which explains all the factors which can affect the learning process. This theory states that learning is a continuous process, where an individual gains whilst interacting with social and/or cultural groups and the surrounding world (Papastergiou, 2006; Choi & Johnson, 2005; Motschnig-Pitrik & Santos, 2006). Vygotsky (1978) argued that discussion and collaboration help in increasing the learning.

Learning methodology/pedagogy applies to all forms of learning. So while designing e-Learning curricula, its pedagogical importance should also keep in mind for making it successful (Chin, Chang, Atkinson, & Parker, 2007). It is been also stated that pedagogical importance is critical for improving online teaching. Accordingly, literature asks whether e-learning success can be improved by modifying the pedagogical model (Fabry, 2012). Many studies mention that design of pedagogy and e-Learning success is very much dependent on the instructor (Dziuban, Hartman, Moskal, Brophy-Ellison, & Shea, 2007; Ellis & Calvo, 2007; Garrison & Vaughn, 2008; Kaleta, Skibba, & Joosten, 2007; Mitchell & Honore, 2007; Graham & Robison, 2007; Wasilik & Bolliger, 2009; Lareki, de Morentin, & Amenabar, 2010; Donnelly, 2010). In addition, there is nothing wrong in stating that the most sophisticated e-Learning systems have failed in successful implementation of learning. As a result, it is commonly referred as technology has failed in serving its purpose. However, the point of consideration here is to identify what are the root causes of the failure. Weather it is the failure of technology, the design, or the use of e-Learning content. While planning for the e-Learning system development, it is necessary to pay careful attention when designing and creating relevant content to consider the perspective of the learner (Teo, Chang, Gay, & Leng, 2006).

E-Learning is completely transforming the way of teaching and learning (Bonk & Zhang, 2006; Bailey & Card, 2009; Garrison & Vaughn, 2008; Schmid, Lowerison, Abrami, & Dehler, 2009). This is the reason why researchers tend to discuss the issues that exist in the teaching methodology (Georgouli, Skalkidis, & Guerreiro, 2008; Urtel, 2008; Díaz & Entonado, 2009). There is still a need to gain maximum advantage from the e-Learning systems; with many

studies stated the distinctiveness among the face-to-face and e-Learning is in the form of their design, activities, level of interaction, content and assessment process (Wilcox & Wojnar, 2000; Rovai, 2004; Salmon, 2004; Kearsley, 2005). Shaw (2001) stated that a problem arises when the methodology for the traditional learning is applied when deploying e-Learning system; as there is a significant difference amongst the success factor of conventional learning and e-Learning (Johnson, Sutton, & Poon, 2000).

Díaz & Entonado (2009) suggested that theoretical content, activities / practical content, design, and interaction should be present for both face-to-face and e-Learning methods. He further subdivided the categories: theoretical content includes virtualised and dynamic content; activities include the design of activities, the design includes; psycho-pedagogical and technical whereas interaction includes contact, orientation, interaction abilities and teacher-student involvement.
However, if we understand technology to be a social and cultural phenomenon, it 'cannot but influence the ways in which people learn, and therefore what makes for effective learning and effective pedagogy' (Beetham & Sharpe, 2007).

In order to adapt successfully, teachers must be trained to develop their pedagogical autonomy and to become proficient in the use of technical tools, in order to be able to make experimentations, to discover the need for a sound new pedagogy and to foster it in university teaching (Georgouli, Skalkidis, & Guerreiro, 2008).

2.4 E-Learning

Use of technology is in education is growing, and it is being adopted by many educational institutions and countries. However, the success of 'systems' varies with the implementation of these systems and technologies. The use of technology for learning is a complex subject and needs to be explored in further detail. There are many terms being used to describe learning using the technology, including digital learning, computer-based learning, online learning, distance learning, virtual learning, collaborative learning, technology enhanced learning, computer-assisted learning and e-Learning. For the purpose of consistency, we will expand upon, and use, the term "e-learning" throughout this document to discuss student's use of online technologies to support learning.

E-learning use has been growing strongly in the education sector (Naresh & Reddy, 2015), and has been disruptive to the future of education planning; catalysed by the widening availability to low-cost devices and network services (Wang, Qian, Scott, Chen & Soong, 2012). E-Learning is defined by many authors in literature: for example, "the use of new multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services, as well as remote exchange and collaboration" (Alonso, López, Manrique & Viñes, 2005); "learning in the workplace, the use of computer network technology, primarily over or through the Internet, to deliver information and instruction to individuals" (Welsh, Wanberg, Brown & Simmering, 2003); "a tool that uses the computer network technology, primarily via electronic media, such as internet, intranets, extranets or many others, to deliver learning materials to users, and utilizes web-based communication, collaboration, knowledge" (Raymond, Uwizeyemungu, Bergeron & Gauvin, 2012).

Definitions show that E-learning provides a flexible, collaborative and ubiquitous learning environment, where learning in delivered using multimedia technologies. Moreover, E-learning provides interactive learning resources that are available in different formats and languages.

2.5 Benefits of E-Learning

There is considerable research in the field of e-Learning. This research shows that, in comparison with traditional education, e-Learning has many benefits:

Time and location flexibility: E-Learning eliminates the obstacle of time and location/distance by providing an opportunity for virtual learning, part-time learning, and for on-job learning; for the people who cannot physically go to education institutions (Zhang & Nunamaker, 2003; Koller, Harvey & Magnotta, 2008). E-learning also provides quick reference, which means learners can quickly and conveniently check the sources of information and/or meaning of difficult words and terms which students don't understand, while they are on the internet (Kruse, 2002). Also, in an e-learning environment, students can mostly choose what they want to learn and when students want to learn, this considerably reduces stress and burden on the students.

Cost and time savings: E-Learning saves time and money. Learning can take place at any location, and at any time. Students using e-Learning do not have to travel to a specific location, which will result in significant time and cost savings on indirect expenses (Khirallah, 2000). E-learning also allows the material to be reviewed by the student multiple times in different locations, thus saving academic time/cost, teaching content, and/or time and cost traveling between physical locations.

Collaborative learning environment: E-learning encourages and facilitates learners in asking questions. Due to learners not being surrounded by colleagues, they are more willing to ask questions they would not be able to ask in conventional classrooms due to social influences (Hiltz & Benbunan-Fich, 1997). Arbaugh (2000) measured engagement in online courses by calculating the amount of time students spent on the course web-site, students generally showed a fairly high level of perceived learning. When students spend time in an engaging learning environment, as in e-learning, where they have control over accessing the learning material and choosing the learning resources, they spend more time in that environment. In this process, they are exposed to the learning material more than they would in a traditional environment; resulting in high level of perceived learning.

Better interaction and access to the instructors: Through e-Learning environments, learners can obtain more guidance and help from instructors via online platforms. E-learning provides greater opportunities for tutors/lecturers to communicate with students than in a traditional classroom (Hiltz & Wellman, 1997; Kim, Liu, & Bonk, 2005). Students can ask questions through e-mail or they can post questions in an online forum. Similarly, tutors can mark assignment and exams and give feedback online.

Unlimited use of learning materials: E-Learning allows unlimited access and retrieval of electronic learning materials, which means students can retrieve information repeatedly at any time from the system website (Zhang & Nunamaker, 2003). In a traditional learning environment, if students miss a class, it becomes very difficult to get the lecture resources for that class session. Moreover, the lecturer cannot repeat that lecture for each and every student who missed that lecture. This is very convenient in an e-learning environment, because the learning resource for all class sessions are available online, for students to access anytime. This may include reading material and/or video lectures. Many times, students need to go over some

lecture again, as they may forget or do not understand it well. In this case, also, online resources are very useful.

Many benefits of e-learning can solve the prevailing issues in the education sector. However, when we look at the actual situation, we find that e-Learning has not been as successful, as it promised or has the potential to be, which means that there are issues with e-Learning implementation. In the following section, we will look at the e-Learning challenges and barriers.

2.6 Barriers/Challenges in E-Learning

2.6.1 Technology Infrastructure

In the present world, where information is just one mouse click away, the speedy and compatible hardware is vital for e-learning success (Little, 2003). The main hurdle in e-Learning system deployment and success, which most of the institutions faced, is the problem of outdated and lack of access to technology infrastructure (Alshwaier, Youssef & Emam, 2012). As a result, the teachers, and more importantly learner's learning experience via e-learning is impacted due to a lack of technological infrastructure (Naidu, 2003).

2.6.2 Bandwidth and Connectivity Issues

E-learning is mostly dependent upon the internet. Accordingly, bandwidth and internet connectivity is another issue/challenge that commonly exists (Nor & Mohamad, 2013). Video conferencing, which is used for live lectures, requires high-speed internet. Therefore, it becomes infeasible for those students, who have slow speed internet that hinders content delivery (Baker, 2003). Even though high-speed internet is available in the major cities, many people, especially in rural areas, only have access to slow speed internet, which results in a decrease in student engagement; as they cannot download content due to slow internet speeds (Ali, 2004).

2.6.3 Virus Attack

An increasingly common issue is virus attacks. This problem can destroy data, which can make e-Learning challenging (PRAKASAM, 2013). Most viruses are spread through the internet, so unknowledgeable students, or students running older technology, are not keen in connecting to the internet; as students are concerned viruses may infect their computer which can cause

trouble and/or damage their devices. Accordingly, virus protection and/or development of trust issues that can impact the ongoing usage of e-learning (Qureshi, Ilyas, Yasmin & Whitty, 2012).

2.6.4 Faculty Effort

Many of the attempts to implement e-Learning systems have failed due to not accomplishing anticipated learning objectives (Surry, Ensminger & Jones, 2005). A key object, that is often disappointing, is the level of support and effort given by the teachers; i.e. the staff who deliver lectures via the Learning platform (Inglis, 2007). The role of faculty in e-Learning is very crucial, but most of the cases found in literature, students suffer from the lack of support from faculty members, which ends in the failure and/or existence of complex obstacles in e-learning (Teo, 2011; Surry, Ensminger & Jones, 2005).

2.6.5 Quality of Content

Quality of learning content varies significantly in normal cases. This variance in quality is largely due to a lack of expertise and for effort invested by the teachers, and administration, in the effective development of e-Learning content (Tricker, Rangecroft, Long & Gilroy, 2001; Andersson & Grönlund, 2009; Park, 2009). Lack of expertise and resource investment results in low interactivity and/or negative perception by students towards e-Learning (Veeramani, 2010).

2.6.6 Insufficient Computers

Lack of computer and software availability is an issue that is discussed by many authors (Zhang, Zhao, Zhou & Nunamaker Jr, 2004; Anstead, Ginzburg, Mike & Belloli, 2004; Shea, Pickett, & Li, 2005; Usun, 2006). Students, especially in developing countries, face issues with the limited number of computers within their homes, and number of computers available at institutes, compared to the number of students; making use of e-learning and/or blended learning a challenge (Pegrum, Oakley, & Faulkner, 2013; Tedre, Ngumbuke, & Kemppainen, 2010).

2.6.7 Inequality of Access to the internet

E-Learning allows learner flexibility of the time and space in obtaining an education (Zhang & Nunamaker, 2003; Koller, Harvey & Magnotta, 2008), but learner's inability to have access to the internet is becoming a major issue (Okine, Agbemenu, & Marfo, 2012). In developing

countries, the main hurdle that students face when using or trying to adopt e-learning is inequality to access the internet (Salawudeen, 2010); a facilitating condition. The number of computers, not driven by behavioural intention, with internet connectivity, are often limited in institutions, especially in developing countries, and not every student gets the opportunity to access the internet. Moreover, many students do not have access to the internet in their homes, which becomes a challenge. People who can afford to have computers and internet availability at home, therefore, sadly get more opportunities to access e-learning opportunities.

2.6.8 Computer Literacy

There is a significantly low level of computer literacy amongst people living in both developing and developed countries (Andersson & Grönlund, 2009; Sharma, 2003; Nor & Mohamad, 2013). Computer literacy is necessary to ensure the success of distance education; as users have to have enough computer literacy to use the technology being engaging in the use of e-learning tools (Kerka, 1999).

2.6.9 Student Motivation

The motivation of the student is one of the factors that directly impact the success of e-learning system in any education institute because students are the ultimate users of all learning systems and processes (Park, 2009; Macpherson, Elliot, Harris & Homan, 2004; Aldrich, 2003). It is been found that students who are more motivated perform well compared to those who are not highly motivated (Andersson & Grönlund, 2009; Hepworth & Duvigneau, 2013).

2.6.10 Administrative Support

E-Learning systems are not necessarily always designed to support students and teachers, e-learning tools also help administrative staff in enrolment, assessment, and access to course content (OECD, 2005). Inglis (2007) discussed that there is a need for administrative and technical issues to be considered carefully, whilst developing and/or planning any e-learning / learning-management system. To be successful, of an e-learning system requires that administrative support is provided to all teachers and/or to students.

2.6.11 Cost

In developing countries, students have to face cost the of internet connection and/or affordability issues (Andersson & Grönlund, 2009); as using technology information communication technology (ICT) can result in high infrastructure/overhead costs (Nor &

Mohamad, 2013). Another cost-related issue that institutions face in developing countries is the high cost of setting up the e-Learning system; often caused by an unavailability of low-cost alternatives (Tedre, Ngumbuke & Kemppainen, 2010).

2.6.12 Language Barrier

English is not the first language of most of the developing and/or Asian-countries; for example it is not the first language in Pakistan (Sue & Okazaki, 1990; Yen, 2015; Cenoz, 2015; Yeh, 2014; Bell, Dzombak, Sulewski & Mehta, 2012; Shukr & Roff, 2015). Lack of learning material and content in the local language can decrease the ability to ensure growth, interest, and adoption of developed e-Learning solutions (Sharma, 2003; 2012), especially as English generally is dominant on the internet and/or in academic e-learning system domains (Ali, 2004).

2.7 Discussion & Model Development

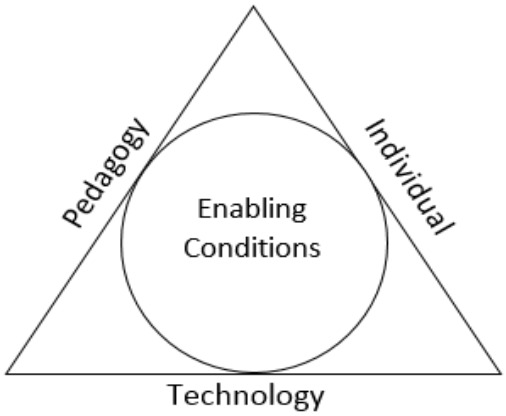
In section 2.6, we discussed some of the common e-learning issues. These are largely generic issues that are being faced by e-learning providers all over the world. Despite the possibility to be different, e-learning systems/development has evolved with a very traditional focused delivery of educational content, i.e. didactic lecture-based classroom style capture of material. E-learning, however, offers the potential to expand and/or evolve from this model due to its numerous benefits.

Evidence shows that e-Learning has higher a dropout rate compared to the traditional methods of teaching (Docebo, 2014). Therefore, to help practitioners to successfully deploy and deliver e-Learning, it is necessary to have a clear idea why e-learning systems are often rejected by users. There are a number of studies discussing issues of e-Learning (Ali, 2004; Kim, Liu, & Bonk, 2005; Kwofie & Henten, 2011; Qureshi, Ilyas, Yasmin, & Whitty, 2012). The most comprehensive are presented by Andersson & Grönlund (2009), who develop a framework that summaries e-Learning issues/problems (up to 2011). In their work Andersson and Grönlund (2009) considered 60 papers related to the area of e-learning issues/barriers and divided issues thematically into four main conceptual categories: Course-related issues, Individuals related issues, Technological issues and Context related issues (Andersson & Grönlund, 2009).

To better understand the recent research, and include consideration of factors that were seemingly ignored by Andersson & Grönlund, the author considered 250 literature papers; relating to e-learning systems implementation issues (dated 1990 – 2016).
Although many of our 250 papers fitted within the Andersson & Grönlund framework categories, we found, however, that numerous issues did not. An alternative framework structure was required to facilitate the structuring of the e-learning barrier/issue research.

In response, the Technology, Individual, Pedagogy, and Enabling Conditions (TIPEC) framework was proposed (Ali, Uppal & Gulliver; 2017), to cover the wide range of the barriers of e-Learning implementation on the basis of a literature review of 25 years. The TIPEC framework has four major categories Technology, Individual, Pedagogy and Enabling Conditions (see figure 2.1).

Figure 2.1: TIPEC Categories



The TIPEC framework, to the best of our knowledge, is the most comprehensive framework in literature covering the wide range of barriers impacting the implementation of e-Learning (to date). Tables 2.1, 2.2, 2.3 and 2.4 lists a total of 68 themed challenges/issues, covering the literature from 1990-2016, grouped in four major categories, i.e. Technology, Individual, Pedagogy and Enabling Conditions (Full paper attached as Appendix A).

Table 2.1: Issues/themes in literature related to E-learning: Technology issues

Barriers	AUTHOR	DESCRIPTION
1. Technology infrastructure	Davie & Wells, 1991; Soong, Chan, Chua, & Loh, 2001; Wild, Griggs, & Downing, 2002; Little, 2003; Vrasidas, 2004; Surry, Ensminger, & Jones, 2005; Voogt, 2009; Meyer & Barefield, 2010; Stansfield, et al., 2009; Goyal, Purohit, & Bhagat, 2010; Liu, Han, & Li, 2010; Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010; Shelton, 2011; Teo, 2011; Guy, 2012; Kipsoi, Chang'ach, & Sang, 2012; Parrish, Klem, & Brown, 2012; Qureshi, Ilyas, Yasmin, & Whitty, 2012; Reeves & Li, 2012; Alshwaier, Youssef, & Emam, 2012; Alsabawy, Cater-Steel, & Soar, 2013; Graham, Woodfield, & Harrison, 2013; Nwabufo, Umoru, & Olukotun, n.d.	Refers to the hardware, software, facilities, and network capabilities within the college/institution.
2. Technical support	Venkatesh, 2000; Pagram & Pagram, 2006; Sife, Lwoga, & Sanga, 2007; De Freitas & Oliver, 2005; Nwabufo, Umoru, & Olukotun, n.d.; Poon & Koo, 2010; Soong, Chan, Chua, & Loh, 2001	Unavailability of technical staff and lack of facilities to perform various activities (installation, operation, maintenance, network administration and security).
3.Bandwidth Issue and Connectivity	Ali A. , 2004; Poon & Koo, 2010; Mahanta & Ahmed, 2012; Homan & Macpherson, 2005; Reilly, Vandenhouten, Gallagher-Lepak, & Ralston-Berg, 2012; Nor & Mohamad, 2013	The slow speed of Internet and high internet traffic during e-learning experience.
4. Software and interface design	Andersson & Grönlund, 2009; Swan, 2004; Kwofie & Henten, 2011; Marzilli, et al., 2014	Less user-friendly software and interface design during e-learning experience.
5. Compatible technology	Koller, Harvey, & Magnotta, 2008; Gudanescu, 2010; Marzilli, et al., 2014	Incompatibility of content with a variety of learning management systems/technology.
6. Poor quality of computers	Reading, 2010	Low-quality computers that freeze frequently and outdated computer systems.
7. Virus attacks	Qureshi, Ilyas, Yasmin, & Whitty, 2012; Prakasam, 2013; Shonola & Joy, 2014; Nikoi & Edirisingha, 2008	Virus attacks e-learning systems during e-learning experience.

Table 2.2a: Issues/themes in literature related to E-learning: Pedagogy Issues

Barriers	AUTHOR	DESCRIPTION
8. Faculty effort	Black, 1992; Miller & Schlosberg, 1997; Surry, Ensminger, & Jones, 2005; Inglis, 2007; Meyer & Barefield, 2010; Teo, 2011; Pegrum, Oakley, & Faulkner, 2013; Teo & Wong, 2013; Bailey & Card, 2009	Lack of effort and support being put by faculty members in use of e-learning.
9. Faculty development	Willis, 1994; Higgs, 1997; Sife, Lwoga, & Sanga, 2007; Inglis, 2007; Lim, Chai, & Churchill, 2011; Reilly, Vandenhouten, Gallagher-Lepak, & Ralston-Berg, 2012; Yaakop, 2015; Collopy & Arnold, 2009; Kaleta, Skibba, & Joosten, 2007; Lareki, de Morentin, & Amenabar, 2010	Lack of training and development in faculty and limited change in teaching methodology of faculty in response to ICT developments.
10. Lack of ownership	Forman & Nyatanga, 2002; Ertmer, 2005; Mayo, Kajs, & Tanguma, 2005; Sife, Lwoga, & Sanga, 2007; Naismith, 2007; Omwenga, 2006; Chua, 2009; Masalela, 2011; Qureshi, Nawaz, & Khan, 2011; Duveskog, Sutinen, & Cronje, 2014	Faculty not taking ownership of successful implementation of e-learning technologies and lack of interest in meeting e-learning challenges.
11. Lack of feedback	Hiemstra, 1994; Andersson & Grönlund, 2009; Guy, 2012	Faculty putting a little effort in giving feedback, making students drop out or fail.
12. Quality Course Content	Tricker, Rangecroft, Long, & Gilroy, 2001; Drago, Peltier, & Sorensen, 2002; Saadé, 2003; Ali, 2004; De Freitas & Oliver, 2005; Stahl, Koschmann, & Suthers, 2006; Voogt, 2009; Veeramani, 2010; Meyer & Barefield, 2010; Masoumi, 2010; Picciano & Seaman, 2007; Rhode, 2009; Mtebe & Raisamo, 2014	Course content having less quality in terms of interactivity.
13. Engaging Students Online	Ali A., 2004; Lester & Perini, 2010; Guy, 2012	Faculty facing difficulty in engaging students online.
14. Pedagogical model	Burge & Lenksyj, 1990; Andersson, 2008; Kwofie & Henten, 2011; Bozkaya & Kumtepe, 2012; Ngimwa & Wilson, 2012; Parrish, Klem, & Brown, 2012; Pegrum, Oakley, & Faulkner, 2013	Use of instructor / learner centred approach in teaching.
15. Localisation of content	Pagram & Pagram, 2006; Hylén, 2006; Andersson, 2008	Lack of Customisation/Adaptability of course content according to local culture, language and religious beliefs.

Table 2.2b: Issues/themes in literature related to E-learning: Pedagogy Issues

Barriers	AUTHOR	DESCRIPTION
16. Flexibility in delivery mode	Gibson & Graff, 1992; Andersson, 2008	Lack of student empowerment concerning the decisions related to taking the exam, selection of medium of content delivery, etc.
17. Course content	Kelly, 1990; Saadé, 2003; Inglis, 2007; Kwofie & Henten, 2011; Lester & Perini, 2010; Ivergård & Hunt, 2005; Voogt, 2009	Lack of relevance, the accuracy of course content and misalignment of course content with future employers' need.
18. Faculty Training	Trippe, 2002; Kosak, et al., 2004; Keramidas, Ludlow, Collins, & Baird, 2007; Gulati, 2008; Eliason & Holmes, 2010; Ray, 2009; Muir-Herzig, 2004; Kipsoi, Chang'ach, & Sang, 2012	Lack of teaching material and courses for teachers in the fields of learning technology.
19. Lack of Credibility	Gudanescu, 2010; Kwofie & Henten, 2011	Less likely to hire someone with a TBL certificate unless provided by an accredited institution.
20. Additional time needed to communicate with students	Arabasz, Pirani, & Fawcett, 2003	Increased communication time principally on e-mail.
21. Insufficient computers	Mokhtar, 2005; Nim Park & Son, 2009; Radijeng, 2010; Tedre, Ngumbuke, & Kemppainen, 2010; Nagunwa & Lwoga, 2012; Nwabufo, Umoru, & Olukotun, n.d.; Qureshi, Ilyas, Yasmin, & Whitty, 2012	Few computers available as compared to the number of students.
22. IT skills of Faculty members	Levy S. , 2003; Darabi, Sikorski, & Harvey, 2006; Lopes, 2007; Iqbal & Ahmad, 2010; Radijeng, 2010; Nawaz & Khan, 2012; Webster & Hackley, 1997; Põldoja, Väljataga, Laanpere, & Tammets, 2014; Gulati, 2008	Weak IT skills of faculty members.
23.Hard to access digital libraries	Sana & Mariam, 2013; Berryman, 2004	Problems faced in having access to digital libraries.
24. Cost of multimedia learning materials	Attwell, 2004; Sambrook, 2003; Elloumi, 2004	Cost of producing high-quality multimedia learning materials.
25. Mode of delivery	Saadé, 2003; Gibson & Graff, 1992	Issues related to the mode of delivery selected for e-learning.

Table 2.2c: Issues/themes in literature related to E-learning: Pedagogy Issues

Barriers	AUTHOR	DESCRIPTION
26. Weak Learning Management System	Pratas & Marques, 2012; Timmerman & Kruepke, 2006	Learning management systems lack interactivity and have vague features.
27. Reliability of online measuring instrument	Arnold, 2014; Inglis, 2007; van't Hooft, 2008; Oh & Park, 2009	Lack of reliability of online assessment process.
28. Lack of top-level commitment	Tusubira & Mulira, 2004; Shaikh, 2009; Marshall, 2010; Ocak, 2011	Insufficient support from top-level management.
29. Material accessibility	Roy & Raymond, 2005	Reach of the student to the material.
30. Pre-course orientation	Ashby, 2004; Frank, Kurtz, & Levin, 2002	Lack of Pre-course orientation sessions by the instructor.
31. Tutor support counseling sessions	Ashby, 2004	Lack of support/counseling sessions conducted by the instructor.
32. Absence of real-time feedback	Davie & Wells, 1991; Arbaugh, 2002; Thurmond, Wambach, Connors, & Frey, 2002; Kim, Liu, & Bonk, 2005	Students lacking immediate/prompt response from instructors to get an answer of the query.
33. Less focus on technical requirements of Content	Kay, 2006; Alvan, Ranjdoust, & Talebi, 2013	Technical requirements of course content available online (e.g. size of web pages, font, colors, quality of images) are not met.
34. Faculty's acceptance of e-learning technologies	Weaver, Robbie, & Borland, 2008; Teo, 2011; Ocak, 2011; Parrish, Klem, & Brown, 2012	Teachers' lacking Technology Acceptance.
35. Level of knowledge of teacher	Sharma, 2003; van Leusen & Millard, 2013; Marzilli, et al., 2014; Dogan, 2015	Teachers lacking grip on course content while delivering an e-learning session.

Table 2.3a: Issues/themes in literature related to E-learning: Individual Issues

Barriers	AUTHOR	DESCRIPTION
36. Prior knowledge	Hölscher & Strube, 2000; Brusilovsky, 2003; Chen & Paul, 2003	A student having Background knowledge related to course.
37. Student Motivation	Bates, 1990; Ostwald, 1992; Pintrich & De Groot, 1990; Johns & Woolf, 2006; Mason & Weller, 2000; Alexander, 2001; Pagram & Pagram, 2006; Andersson & Grönlund, 2009; Lanzilotti, Montinaro, & Ardito, 2009; Blignaut & Els, 2010; Wu & Hiltz, 2004; Kwofie & Henten, 2011; Yoo, Han, & Huang, 2012; Bozkaya & Kumtepe, 2012; Miliszewska, 2011; Hepworth & Duvigneau, 2013; Alajmi, 2014; Nwabufo, Umoru, & Olukotun, n.d.	Students' Motivation on the basis of their skills, attitudes, interest, behaviour, and activity.
38. Technological difficulty	Schrum & Hong, 2002; Arbaugh, 2002; Thurmond, Wambach, Connors, & Frey, 2002; Ocak, 2011; Pituch & Lee, 2006	Students facing technological difficulty in using e-learning technologies.
39. Technology experience	Schrum & Hong, 2002	Students lacking technology experience in solving problems and accomplishing basic tasks.
40. Awareness and attitude towards ICT	Inglis, 2007; De Freitas & Oliver, 2005; Anwar & Niwaz, 2011; Bozkaya & Kumtepe, 2012; Nagunwa & Lwoga, 2012; Becking, et al., 2004; Alajmi, 2014; Nwabufo, Umoru & Olukotun, n.d.	Students lacking awareness of internet skills and the reluctance of students in taking responsibility for their own e-learning.
41. Computer literacy	Eisenberg & Johnson, 1996; Fyfe, 2000; Sharma, 2003; Andersson & Grönlund, 2009; Kwofie & Henten, 2011; Nor & Mohamad, 2013; Karaman, Kucuk, & Aydemir, 2014	Lack of computer literacy in students.
42. Perceived usefulness and ease of use perceptions	Venkatesh, 2000; Liao, Liu, Pi, & Chou, 2011; Wong, Nguyen, Chang, & Jayaratna, 2003; Cantoni, Cellario, & Porta, Perspectives and challenges in e-learning: towards natural interaction paradigms, 2004; Chen & Lu, 2007; Digión & Sosa, 2012; Tao, Cheng, & Sun, 2012	Students' intentions to carry on e-learning lifelong and his/her usage behaviour of ICTs)

Table 2.3b: Issues/themes in literature related to E-learning: Individual Issues

Barriers	AUTHOR	DESCRIPTION
43. Students Support	Galusha, 1998; Elango, Gudep, & Selvam, 2008; Lewis & Chen, 2009; Chen, 2009; Stansfield, et al., 2009; Yaghoubi, Malek Mohammadi, Iravani, & Attaran, 2008; Anohina-Naumeca & Grundspenkis, 2012	Support provided by students in the successful implementation of e-learning system.
44. Computer anxiety	Wiksten, Patterson, Antonio, De La Cruz, & Buxton, 1998; Venkatesh, 2000; Piccoli, Ahmad, & Ives, 2001; Sun, Tsai, Finger, Chen, & Yeh, 2008	Students' early misperceptions about the ease of use of an e-learning system.
45. Sense of isolation due less Face to Face Interaction	Bates A. W., 1990; Galusha, 1998; Daugherty & Funke, 1998; Campbell, Gibson, Hall, Richards, & Callery, 2000; Vonderwell, 2003; Sweeney, O'donoghue, & Whitehead, 2004; McInnerney & Roberts, 2004; De Freitas & Oliver, 2005; Jensen, Mondrup, Lippert, & Ringsted, 2009; Anwar & Niwaz, 2011; Chatzara, Karagiannidis, & Stamatis, 2012; Tham & Werner, 2005; Reynolds, Becker, & Fleming, 2013; Schott, Chernish, Dooley, & Lindner, 2003; Muhammad, Ahamd, & Shah, 2015	The absence of face to face/social interaction between the individual learner and instructor endorsing a sense of isolation.
46. Conflicting priorities	Andersson A., 2008; Andersson & Grönlund, 2009; Kwofie & Henten, 2011	Time devoted to e-learning makes individual's priorities conflict.
47. Social support	Andersson & Grönlund, 2009; Kwofie & Henten, 2011	Support from family and employers for e-learning, conducive environment and devoid of distraction during e-learning sessions.
48. Social loafing	Rutkowski, Vogel, Van Genuchten, Bemelmans, & Favier, 2002; Koller, Harvey, & Magnotta, 2008; Wheeler, Yeomans, & Wheeler, 2008; Gudanescu, 2010; Loh & Smyth, 2010; Ryu & Parsons, 2012	Students working less diligently because of the relative absence of instructor-learner and learner-learner interaction.
49. Student's economy	Andersson & Grönlund, 2009; Iqbal & Ahmad, 2010	The financial difficulty for taking up e-learning courses.
50. Academic confidence	Andersson, 2008; Andersson & Grönlund, 2009	Academic experience and qualification of student.
51. Cost of using technology	Sambrook, 2003; Andersson & Grönlund, 2009; Nor & Mohamad, 2013	Students facing the high cost of using technologies.

Table 2.3c: Issues/themes in literature related to E-learning: Individual Issues

Barriers	AUTHOR	DESCRIPTION
52. Self-efficacy	Joo, Bong, & Choi, 2000; Andersson & Grönlund, 2009; Liaw, 2008; Bozkaya & Kumtepe, 2012; Maki & Charalambous, 2014	Student's confidence in using e-learning technologies and believe in the completion of the e-learning course.
53. Lack of ICT skills	Carr, 1999; Oliver R., 2001; Jarvis & Szymczyk, 2010; Qureshi, Nawaz, & Khan, 2011; Qureshi, Ilyas, Yasmin, & Whitty, 2012; Nagunwa & Lwoga, 2012; Voyler & Lord, 2000	It includes training in multimedia related skills and Impact of technology on learning.
54. Family commitments	Schott, Chernish, Dooley, & Lindner, 2003	Family commitments taking up most time and resources of the e-learners
55. Work commitment	Schott, Chernish, Dooley, & Lindner, 2003	E-learners giving the excuse of their work commitments for skipping exams, assignments etc.
56. Student readiness	Ünal, Alır, & Soydal, 2013; Goyal, Purohit, & Bhagat, 2010; McCausland, 2005	Students possessing inconsistent e-learning readiness over time, among institutions or instruments.
57. Response to change	Jager & Lokman, 1999; Song & Keller, 2001	Students' slow response to changing e-learning.
58. Inequality in access to internet connectivity	Mackintosh, 2005; Salaway, Caruso, & Nelson, 2008; Gudanescu, 2010; Okine, Agbemenu, & Marfo, 2012; Farid, Ahmad, Niaz, Itmazi, & Asghar, 2014	Inequalities in access to the Internet & few people have an internet connection.
59. Inequality in Access to technology	Nwabufo, Umoru, & Olukotun, n.d.; Anderson, Annand, & Wark, 2005; Salaway, Caruso, & Nelson, 2008; Pegrum, 2009; Gudanescu, 2010; Kipsoi, Chang'ach, & Sang, 2012; Guy, 2012; Pegrum, Oakley, & Faulkner, 2013; Dudeney, Hockly, & Pegrum, 2013	Inequality of access to the technology itself by all the students.
60. Technophobia	Nwabufo, Umoru, & Olukotun, n.d.	Students' having afraid of operating e-learning systems/technologies.
61. Individual Culture	Pratt, 1991; Economides, 2008; Azer & El-Sherbini, 2011; Adeoye, 2012; Alavi & Leidner, 2001; Chroust, 2007; McCausland, 2005; Joy & Kolb, 2009; Kolb D. A., 2005	Student's individual culture impacts attitude towards distance learning.

Table 2.4a: Issues/themes in literature related to E-learning: Enabling Conditions

Barriers	AUTHOR	DESCRIPTION
62. Administrative support	Garrison & Kanuka, 2004; Sife, Lwoga, & Sanga, 2007; Boezerooij, Wende, & Huisman, 2007; Jara & Mellar, 2009; Czerniewicz & Brown, 2009; Cook, Holley, & Andrew, 2007; De Freitas & Oliver, 2005; Holt & Challis, 2007; Ocak, 2011; Mahmoodi-Shahrebabaki, 2014; Inglis, 2007; Weaver, Spratt, & Nair, 2008	Lack of Administrative support in crafting e-learning related policies, incentives, and resources. Institutional policy and organisational culture are crucial to the way e-learning is adopted or embedded in universities.
63. Setup Cost/Limited Funds	Andersson & Grönlund, 2009; Sun & Cheng, 2007; Gudanescu, 2010; Tedre, Ngumbuke, & Kemppainen, 2010; Selim, 2007; Liu, Liao, & Pratt, 2009; Timmerman & Kruepke, 2006; Kwofie & Henten, 2011; Kipsoi, Chang'ach, & Sang, 2012; Marzilli, et al., 2014; Sife, Lwoga, & Sanga, 2007; Dogan, 2015; Kukulska-Hulme, 2009	The high cost of setting up the e-learning system and unavailability of low-cost ICT alternatives.
64. Security	Brown & Snow, 1999; Cárdenas & Sánchez, 2005; Sharples, Taylor, & Vavoula, 2005; Aïmeur, Hage, & Onana, 2007; van't Hooft, 2008; Pachler, Bachmair, & Cook, 2009; Stahl, Rogerson, & Wakunuma, 2009; Ong, Lai, & Wang, 2004; Gudanescu, 2010; Traxler, Will Student Devices Deliver Innovation, Inclusion, and Transformation?, 2010; Veeramani, 2010; Mircea & Andreescu, 2011; Zamzuri, Manaf, Ahmad, & Yunus, 2011; Chen & Bryer, 2012; Levy, Ramim, & Hackney, Assessing ethical severity of e-learning systems security attacks, 2013; Saxena & Yadav, 2013; Yang, Fang, & Wang, 2013	Openness of e-learning systems challenging security of personal information of students/staff/faculty.
65. Language Barrier	Sharma, 2003; Ali A., 2004; McCausland, 2005; Qureshi, Ilyas, Yasmin, & Whitty, 2012	Lack of conversion of e-learning content in other languages.
66. Rules and regulation	Andersson & Grönlund, 2009; Kwofie & Henten, 2011; Selwyn, 2007; Valcke, 2004; Traina, Doctor, Bean, & Wooldridge, 2005	The surety that all relevant laws are taken into consideration while crafting policies related to e-learning to prevent government regulations. Limitations in national and institutional policies and management practices.

Table 2.4b: Issues/themes in literature related to E-learning: Enabling Conditions

Barriers	AUTHOR	DESCRIPTION
67. Load shedding of electricity	Pedrelli, 2001; Hussain, 2007; Sangi, 2008; Voogt, 2009; Nagunwa & Lwoga, 2012; Sana & Mariam, 2013; Nwabufo, Umoru, & Olukotun, n.d.	Problems related to Power cuts, power fluctuations, and Power distribution while having e-learning experiencing.
68. Ethical issues	Olt, 2002; Scanlon, 2003; Baruchson-Arbib & Yaari, 2004; Foulger, Ewbank, Kay, Popp, & Carter, 2009; Pachler, Bachmair, & Cook, 2009; Staats, Hupp, Wallace, & Gresley, 2009; Stahl, Rogerson, & Wakunuma, 2009; Bozkaya & Kumtepe, 2012; Esposito, 2012; Chen & Bryer, 2012; Sana & Mariam, 2013; Levy, Ramim, & Hackney, 2013; Pegrum, Oakley, & Faulkner, 2013; Egi, Ozawa, & Mori, 2014; Bhat & Shetty, 2015; Muhammad, Ahamd, & Shah, 2015	Lack of written permission from participants and absence of maintaining confidentiality by the e-learning services providers.

2.8 Our Research

The focus of this research is to select critical issues that are hindering the success of e-Learning, which has not been effectively assessed across service, information and system dimensions; all of which are critical to learning models. Out of all the 68 main issues identified in the literature (Ali et al, 2017), we identified seven issues related to technology, twenty-six related to individual and thirty-five issues related to pedagogy. In the following sections, we will look at each dimension in detail.

2.8.1 Technology Issues

Technology related issues include technology infrastructure, technical support, bandwidth and connectivity, software and interface design, compatible technology, poor quality of computers and virus attacks (see table 2.1).

Technology infrastructure is continuously improving and internet service providers are increasingly making high-speed internet available; not only in major cities but also in smaller cities across the countries. Multiple types of internet connectivity options are available. Customers increasingly have the choice to choose between DSL, ISDN, cable internet, satellite internet, 3G and 4G connectivity (even in developing countries). Increasingly ubiquitous access to the internet, not only making the internet more available but also providing higher speed

bandwidth, can be used for e-learning applications and services. Accordingly, technology related e-learning issues are being addressed by many hardware, software and telecom companies; as it serves their commercial ambitions. Technology/tools / systems will continue to evolve over time. Accordingly, faster and better hardware and software will continue to become available, since it is needed by wider industry; not only for education but also for general communication purposes.

At the start of this Ph.D. (i.e. in 2013), the researcher undertook an analysis of general IT provision (Lahore, Pakistan). The average internet speed available, i.e. the majority of the users managed with 512 KB (60% of the students had 512 KB or less internet connectivity). At the point of submission (i.e. in 2017), the average DSL speed, which most students have is 2 MB minimum, and speeds of 4 MB and 8 MB are commonly available.

It is evident that technical issues relating to the success of e-Learning implementation are being investigated by the wider community, and therefore such issues are being managed, and therefore it is not appropriate for such issues to be the focus of this study.

2.8.2 Individual Issues

The TIPEC framework (Ali et al. 2017) defines twenty-five issues related to the individual, i.e. teacher and learner (see table 2.3). These issues include prior knowledge, student motivation, technological difficulty, technology experience, awareness and attitude towards ICT, Computer literacy, Perceived usefulness and ease of use perceptions, Students Support, Computer anxiety, Sense of isolation due to limited Face to Face Interaction, Conflicting priorities, Social support, Social loafing, Student's economy, Academic confidence, Self-efficacy, Lack of ICT skills, Family commitments, Work commitment, Student readiness, Response to change, Inequality in access to internet connectivity, Inequality in Access to technology, Technophobia, Cost of using technology and Individual Culture.

These issues are related to the individuals, their attitudes, behaviour, motivation and skill levels. Individual issues are related to human psychology and are not going to be the focus of this research.

2.8.3 Pedagogy Issues – The Focus Area for Our Research

Pedagogy is defined as "the collaborative process between instructors and students to deliver knowledge" (Lewin, Somekh & Steadman, 2008). Pedagogy factors focus on enabling learning and intellectual growth of students in contrast to instruction that treats students as the object of curriculum implementation. Pedagogy is the largest category in the TIPEC framework, with thirty-five separate documented issues in literature, as shown in table 2.2. In summary, Pedagogy includes all the processes of delivering education from teachers to students. Pedagogy and its quality are indispensable for learning and/or the successful delivery of e-learning (Shohamy, 1999; Chin, Chang, Atkinson & Parker, 2007). E-learning can only be successful, and appropriate pedagogy can only be used if teachers understand how students learn; since the definition of pedagogy clearly states that it is the way in which knowledge is transferred from instructor to learner. In addition, teachers must have the ability and autonomy for planning/designing, implementation and assessment of educational activities, i.e. to meet the requirement of students individually (Teo, Chang, Gay, & Leng, 2006). In this thesis, the researcher will be focusing on the ways to overcome a number of barriers related to pedagogy to make e-Learning system implementation successful, since, in the literature, the largest number of unanswered issues/problems remain in the Pedagogy category.

Latest technology infrastructure is the need for the industry, educational sector as well as of the individual learner. Therefore, plenty of research is be being done to address the technical issues, as it has a bigger commercial market. Upgrading the communication infrastructure is the need for the telecommunication companies. Similarly, the development of computer and mobile hardware is the focus of hardware manufacturers, as their demand is ever growing. Increasingly, the technology infrastructure is becoming available rather quickly. However, the evolution of the teaching and learning strategies and models is comparatively slow. Research indicates that the delivery of the teaching and learning material using technology does not solve the problem. Quality of the learning and how best it meets the needs of individual learner are also important considerations when delivering learning material.

In many educational institutions, standard teaching material and books are used. The Same standardised reading material, case studies, and slide sets are provided to students online. However, all learners cannot benefit from such learning resources. Understanding of appropriate pedagogical strategies is needed to cater to individual learners. Therefore, research

on pedagogical aspects requires more focus and attention as this would be one of the most important factors in e-learning implementation.

The issues themed in the TIPEC framework include: faculty effort, faculty development, lack of ownership, lack of feedback, quality course content, engaging students online, pedagogical model, localisation of content, flexibility in delivery mode, course content, faculty training, lack of credibility, additional time needed to communicate with students, insufficient computers, it skills of faculty members, hard to access digital libraries, cost of multimedia learning materials, mode of delivery, weak learning management system, reliability of online measuring instrument, lack of top-level commitment, material accessibility, pre-course orientation, tutor support counselling sessions, absence of real-time feedback, less focus on technical requirements of content, faculty's acceptance of e-Learning technologies, level of knowledge of teacher, administrative support, setup cost/limited funds, security, language barrier, rules and regulation, load shedding of electricity and ethical issues.

When we look at the issues listed in the 'Pedagogy' dimension, the thirty-five issues can be further grouped into three major themes, i.e. faculty roles, administrative support, and learning content. The researcher decided to focus on understanding the right learning content: i.e. delivery of the right content, in the right mode/media, with the right amount of interactivity, and in the right language to maximise the student e-Learning experience. Accordingly, this research focuses on three issues of pedagogy, which are: i) delivery mode/media, ii) language and iii) interactivity. Interesting each of these issues has both tangible and non-tangible dimension, so we will need to measure 'service', 'information', and 'system' dimensions; i.e. to look at the effect on the perception of not only at what content is being delivered, by how it is being delivered.

Discussion

Looking at the literature relating to challenges, we can see there are multiple e-Learning challenges and similarly, by looking at the different learning theories, we can see that concepts from more than one theory can be applied in e-Learning. It is very important to use the multimedia learning principle in developing the instruction material. Similarly, the learners need to interact with the learning content as well as with the instructor and other learners to be able to construct their own knowledge.

2.9 Research questions

Based on the discussion above the key research question for this research is:

- Why are e-learning implementations hindered and what challenges exist in successful e-learning systems implementation?
- Why for measurement of e-learning quality, we must consider 'service', 'information' and 'system' dimensions?
- Why do selected e-learning challenges impact student perception of quality; ensuring consideration of 'service', 'information' and 'system' dimensions?

2.10 Aims and objectives

Aim: To investigate the impact of pedagogy issues i.e., the factors that hinder successful implementation of e-learning systems in higher education, on student perception of quality related to service, information and system dimensions. .

Objectives:

1. To identify, from literature, factors that hinder e-learning implementation.
2. Develop a framework, to support identification of key e-learning challenges, in context of the research aim.
3. Determine a measurement mechanism for e-learning quality, which support considerations of 'service', 'information' and 'system' dimensions.
4. To evaluate the effect of factors, i.e., delivery modes, Language, and interactivity on student perception e-learning quality.

2.11 Summary

This chapter focused on and discussed the relevant benefits, challenges, and theories from the literature regarding e-Learning. The main challenges of Pedagogy were identified. Once the researcher identified the Pedagogical issues as focused area for research, it soon became apparent that appropriate research and/or methodology was needed in or to i) develop a model to facilitate measurement of student perception of service, informational, and systems perception of quality; ii) undertake experiments to investigate the perceptual impact of e-learning delivery modes, language use, and level of interactivity.

Chapter 3
Research Design and Methodology

3.1 Chapter Introduction

Chapter 2 presented a detailed review of the existing literature relating to the key aspects of this research domain. From a thorough literature review (i.e. within the TIPEC framework), four major e-learning barrier/issue categories were identified: technology, individual, pedagogy, and enabling conditions. Whilst past research has considered technology as the main driver of e-learning, the researcher argues that issues related to pedagogy are of vital importance. The researcher also identified three dimensions of pedagogy (delivery modes, language, and interactivity) that need to be addressed if e-learning is to be successfully implemented.

The literature review indicates that whilst many researchers have talked about the role of different dimensions of pedagogy in e-learning, no researchers have looked at and/or empirically testing the relationship between these issues and student perception of quality. Furthermore, different aspects of pedagogy have not been investigated in sufficient detail to be of practical benefit for those developing e-learning solutions. This research aims to fill these gaps.

Research questions

Based on the discussion in chapter 2, the research questions for this research are:

- Why are e-learning implementations hindered and what challenges exist in successful e-learning systems implementation?
- Why for measurement of e-learning quality, we must consider ‘service’, ‘information’ and ‘system’ dimensions?
- Why do selected e-learning challenges impact student perception of quality; ensuring consideration of ‘service’, ‘information’ and ‘system’ dimensions?

Having identified what needs to be investigated, this chapter establishes the philosophical and methodological basis that facilitates our answering the research question by building the applicable research design. Therefore, the outcome of this chapter will be the evaluation of the

different research paradigms and the selection of the appropriate methodologies, methods, and techniques for assessing the perception of quality for e-learning.

The first and foremost issue, which the researcher needs to focus on, is the nature of the research questions, which will fundamentally impact the choice of research method. For this researcher could focus on the keywords in the research questions. This research aims to identify what is meant by 'quality' in context of e-learning. Then it aims to identify how different aspects of pedagogy impacts the perception of quality of e-learning. The focus is not so much on technological aspects, but rather the actors who actively engage in knowledge exchange in e-learning. For this research, the teachers and students were identified as the key participants in the data collection process.

Once the nature of research questions is identified, the researcher can plan data collection; taking availability and access to data into consideration (Leedy and Ormrod, 2010). The key consideration in research methodology is a selection of the research philosophy. It acts as a guiding tool for the selection of the rest of the research elements, such as research approach and strategy, as well as the data collection tools.

This chapter begins with a discussion of the research philosophy selected for this research. It provides, a detailed discussion on the possible research philosophies and their application in the context of this research. This will be then followed by a discussion of the research strategy. Finally, the data collection tools, and how they will be applied in this research are discussed.

3.2 Research Purpose

The aim of this research is to investigate the impact that different dimensions of pedagogy have on student quality perception of e-learning. This research undertakes explanatory research and aims to establish whether links exist between different dimensions of pedagogy and quality perception of e-learning. This study is essential because the researcher believes that current e-learning systems are limited in how they deliver value. Further investigation is required to understand if researcher's assumptions are true and what can be done to improve the different aspects of pedagogy and quality perception in e-learning systems.

Creswell (2009) specifies that research process consists of seven steps. The first step involves identifying the problem, which involves looking at what could be the potential areas of research. The researcher can use his/her knowledge and experience, backed by literature. The second step involves conducting a thorough literature review to identify gaps in the research. This ensures that the researcher enhances his/her knowledge, and at the same time ensures that the researcher does not waste his/her efforts in discovering what has already been discovered. After the literature review, the researcher can specify the purpose of the research. Researchers can look to fill an identified research gap, or achieve professional objectives; or a combination of both. This research aims to not only investigate the link between pedagogy and quality perception of e-learning but also aims to provide practical recommendations for improving the e-learning system as a whole. The fourth step involves developing a strategy to collect and analyse data. This involves considering what kind of data might be available and how to best access this data. For example, if the data is perceptual and not factual qualitative methods may be more useful and vice versa. Similarly, if the data is publicly available, then secondary data collection methods may be useful, however, if the researcher needs to learn from the experts' primary data collection methods, then use of interviews may be more useful. In the fifth step, actual data collection takes place, that is, implementation of the methods identified in the previous step. This is followed (sixth step) by analysis and interpretation of the collected data. Finally, the seventh step involves evaluating and reporting the findings, that is, answering the research questions based on the data.

Based on the different aspects of research designs provided by Creswell (2009), and Saunders et al. (2011), the following aspects of the research design (see table 3.1) have been established.

Table 3.1: Research design

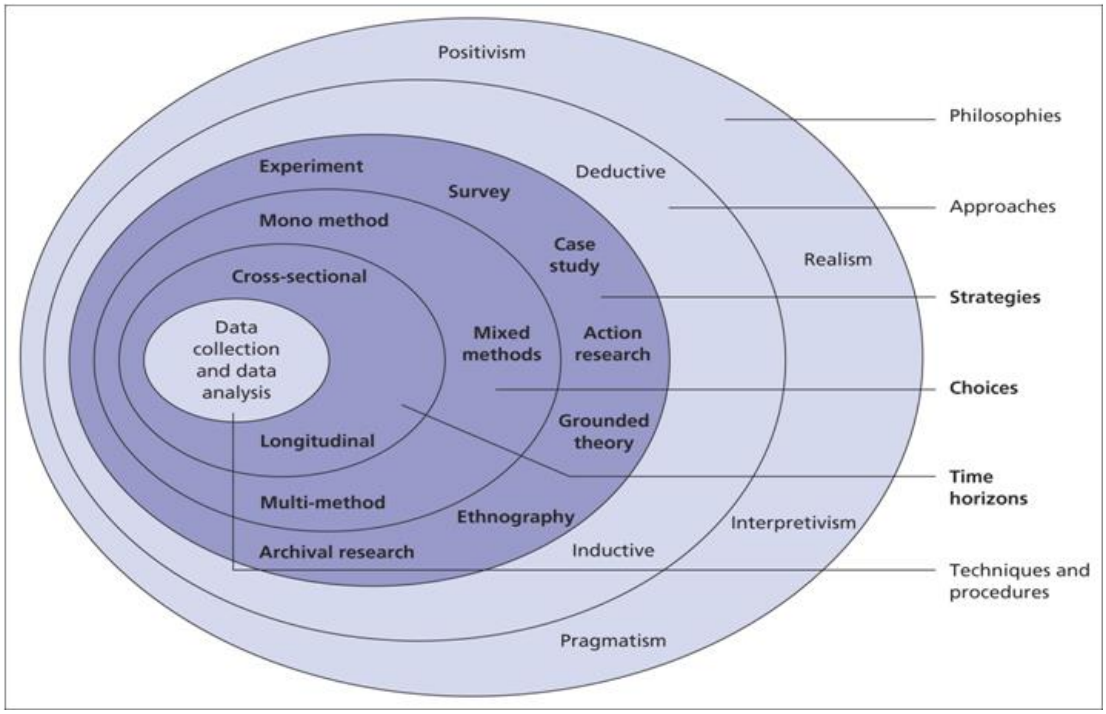
Research Level	**Detailed Description**
Type of research questions	Which aspects of pedagogy have a significant impact on the quality perception of e-learning?
Strategy	Quantitative
Paradigm	Pragmatism
Data collection method	Questionnaires
Participants	Higher education students in Pakistani universities
Type of results	Explanatory and quantitative

The research design process is strengthened by the very fact that its approach is very much rooted in the integration of varying components and backgrounds, such as philosophies, paradigms, approaches, strategies, methods, techniques, and procedures (Saunders et al., 2009). Research design can consist of qualitative, quantitative and even a mixed method approach (Creswell, 2009). Choosing between these methods involves a combination of related factors such as techniques and procedures. A philosophical standpoint takes both the research method and the research question into consideration.

Within this chapter, assisted by the research onion (see figure 3.1), the researcher will provide information concerning relevant research elements, in context of the problem. The research onion combines the elements of research design, such as Research philosophies, approaches, strategies, choices, time horizons, techniques and procedures (Saunders et al., 2009).

The elements of the research design were carefully selected in order to obtain and acquire the most relevant data for analysis. The elements found in bold font in figure 3.1, were chosen as the most appropriate methods to be applied to this thesis the reasoning for the selection, have been described in detail in this chapter.

Figure 3.1: Research Onion adapted from Saunders et al. (2009, p. 108)



3.3 Research Philosophies and Paradigms

Research philosophies and paradigms play an important role in bridging the gap between data and theory, these elements play an important part in the way they influence how the research is conducted. The research philosophies, consist of two elements: ontology and epistemology. Ontology is concerned with the reality or nature of the research; whereas epistemology focuses on the appropriate way to understand or construct knowledge from nature (Easterby-Smith et al., 2012). Ontology is defined as the core nature, whilst epistemology acts as the lens to understand the core. The methodology combines methods and techniques that are then used to collect the data (Easterby-Smith et al., 2012).

Capra (1996: 6) defined 'paradigm', based on several other definitions, as "a constellation of concepts, values, perceptions, and practices shared by a community, which forms a particular vision of reality that is the basis of the way a community organises itself." Broadly speaking a paradigm is a structure that the researcher uses to define, analyse and investigate an issue. The choice of paradigm depends largely, however, on researcher's view of the reality.

Paradigms are useful in that they lay the foundation for the research allowing the researcher to identify the best methods and approaches to achieve what research aims to achieve. Research a paradigm is a combination of research practices, which include rules, applications, and instruments, which is widely accepted within the scientific research community (Kuhn, 1996). In other words, the paradigm is an approach to develop better understanding and knowledge of the social phenomena (Saunders et al., 2009). The three main research paradigms are positivism, interpretivism, and pragmatism. Currently, these paradigms are the most influential, recognised and most recorded within literature (Creswell, 2009; Saunders et al., 2009; Cohen et al., 2011; Easterby-Smith et al., 2012).

3.4 Selecting Research Paradigm

Positivism is primarily based on the quantitative approach and tests the existing theories, whilst interpretivism tends to focus on qualitatively investigating of the social phenomena; furthering an understanding and explanation of the rationales behind social actions (Creswell, 2009; Saunders et al., 2009).

By reviewing all three of the major research paradigms stated in the previous section, Pragmatism is found to be most appropriate for this research study. Since pragmatism focuses on solving problems, using either quantitative or qualitative method as considered appropriate, Pragmatism was determined to be most ideal for this research.

Understanding pedagogy independent from the use of technology is essential, because new technology will be developed, and hence any findings situated in technological context will most likely become obsolete. The purpose of this research is to divert the attention of the efforts (to developing e-learning systems) into a direction that will allow us to achieve the full potential of e-learning, that is, developing a society comprised of independent and efficient learners.

Current e-learning systems are quite limited in interactivity and effectiveness of e-learning is one possible primary cause of their low adoption. E-learning research must thus focus on practical solutions to the problems, trying to make e-learning more effective than classroom learning. The current lack of research into pedagogy and effectiveness of e-learning requires a pluralist approach as supported by the Pragmatic philosophy. The main aim of this research was to analyse the most critical issue of Pedagogy that is hindering the success of e-learning in higher education institutions. This aim was broken into three objectives, according to the three aspects of pedagogy, i.e. 'delivery modes', 'language', and 'interactivity', as shown in Table 3.2.

Table 3.2: Chapter wise objectives

	Chapter	**Method**
Objective 1: To evaluate the effect of delivery modes on success of e-Learning		Quantitative
Activity 1.1: To identify different types of delivery modes used in e-learning from existing literature.	**2/5**	
Activity 1.2: To design an experiment to evaluate the effect of different delivery modes on the quality perception of e-learning.	**5**	
Activity 1.3: To conduct the experiment, and analyse the data using the suitable quantitative method.	**5**	
Objective 2: To evaluate the effect of language on the success of e-Learning		Quantitative
Activity 2.1: To identify different languages used in e-learning within existing literature.	**2/6**	
Activity 2.2: To design an experiment for evaluating the effect of language on the quality perception of e-learning.	**6**	
Activity 2.3: To conduct the experiment, and analyse the data using the suitable quantitative method.	**6**	
Objective 3: To evaluate the effect of interactivity on the success of e-Learning		

Activity 3.1: To identify different types of interactivity used in e-learning within existing literature. Activity 3.2: To design an experiment for evaluating the effect of interactivity on the quality perception of e-learning. Activity 3.3: To conduct the experiment, and analyse the data using the suitable quantitative method.	**2/7** **7** **7**	Quantitative

3.5 Research Approach

The research approach is chosen on the basis of whether the research is testing an existing theory/ model/ framework (deductive) or developing a new model/ theory/ framework (inductive). The differences between inductive and deductive research approach are listed in table 3.3.

Table 3.3: Deductive V/s Inductive Research Approach. Source: Saunders et al. (2011)

Deductive approach	Inductive approach
• Mainly used in scientific studies. • Tests existing theory/ model/ Framework. • Mainly tests causal relationships; The validity of data is critical. • The researcher is neutral to the process of collection and analysis of the data. • Data collection and analysis is done in a structured manner. • Researcher remains independent of the research. • Findings can be generalised across the population.	• Aimed at developing a new theory/model/framework. • Suitable for social science research looking at human perception and behaviour. • The research process is flexible. • The researcher is an active participant in the research process. • Quality of findings somewhat depends on the knowledge and skills of the researcher. • Research context is critical as findings are applied in context and are not generalised.

Inductive research is often used in social sciences research where the purpose is to understand the perceptions and behaviour of individuals. In this respect, this research conforms to inductive approach. Our work uses e-Learning Quality (ELQ) model (Uppal et al., 2017),

which was developed to assess e-learning quality perception; and is suitable for the inductive approach (Yin, 2009). In case of an inductive approach, the intention is to develop a new theory/model / framework (Saunders et al., 2011). However, as so often happens the findings are quite contextual in the inductive approach based research. Researchers can use a number of case studies or some other de-contextualisation approaches, in order to generalise the findings (Collis and Hussey, 2009).

The deductive approach, on the other hand, is about applying existing theory/framework/model to a new context in order to test its applicability (Saunders et al. 2011). However, considering the fact that quality perception is not measured using a generic existing model, e.g. SERVQUAL (Parasuraman et al, 1988), but a contextually specific approach is adopted to evaluate pedagogy. Accordingly, this research supports the abductive approach, which is essentially a combination of inductive and deductive approaches. This research utilises an existing model, SERVQUAL, to build a novel conceptual framework, i.e. the ELQ model (Uppal et al, 2017), which has been modified (see chapter 4) to cover the 'service', 'information' and 'system' aspects of e-learning quality. Pragmatist philosophy also supports the use of the abductive approach.

3.6 Data types

There are primarily two kinds of data types that the researcher can use- secondary and primary. This research will utilise both primary and secondary data.

3.6.1 Secondary data

Secondary data is existing data that can be used for the research with any modifications if required. Secondary data, quite useful that the researcher can make use of existing data, thus minimising his/her data collection efforts. Secondary data is quite commonly used in the medical field and in other studies where it is logically not possible for the researcher to collect the first-hand data. For example, every few years governments around the world carry out cohort studies surveying almost every household in the respective countries. This is a large scale data, publicly available, mostly for free. It is logistically and financially not possible for any researcher to collect such large-scale data for any research and in such cases, using this secondary data is extremely useful.

Interesting, however, it can be argued that almost all research uses secondary data to a certain extent in their research in the form of a literature review. Existing literature is a form of secondary data, as it provides insight into the subject domain under study; and forms the focus of most studies. This research utilises secondary data in forms of literature on subjects such as e-learning, challenges of e-learning, the role of technology, interactivity in e-learning, learning theories, service quality models etc. Existing literature on these subjects was collected and analysed in order to carry out an extensive literature review which informed the researcher of the key themes in the subject area. It was also used to identify the research gaps and corresponding research problem. The primary focus of this research is to study how delivery modes, language and interactivity effect the quality perception of e-learning. Extensive literature is available on these pedagogical aspects in e-learning as well on quality dimension. However, no research was found which empirically tested the link between pedagogy and quality perception of e-learning systems. This research gap was identified through an extensive review of the existing literature only. Based on the findings of the literature review, a conceptual framework was developed (Ali et al, 2017).

3.6.2 Sampling for secondary data

Secondary data was used for qualitative research in this research. In line with qualitative methods, a combination of theory-based, convenience, and purposeful sampling strategies were adopted (Miles and Huberman, 1994). The sampling involved the research articles with keywords “e-learning”, “challenges in e-learning,” “barrier of e-learning,” “effectiveness of e-learning”, “e-learning quality”, “service quality” and “e-learning content”. E-learning is about using the online material for learning and in this respect, this research is naturally aligned with the use of existing research for learning about different aspects of the research.

Reliability of sources was a concern. In order to overcome this, only high ranking journals were included. Using this approach allowed the researcher to find information from well referenced and well-renowned authors.

3.6.3 Primary data

Primary data is the data collected by the researcher himself for the purpose of the research. In this respect, the researcher has complete control over the data collection process. For example, the researcher can decide when and where to collect the data from, who will be the participant and how much data will be collected. Since the researcher is best aware of the data requirements of the research, his/ her control over the data collection process means that the data collected is high quality (Saunders *et al*., 2011). The researcher can use one or more data collection tools

from the range of data collection tools available including but not limited to questionnaire surveys, interviews, focus groups, observations, participation, etc. Since the data collected is specific to the research, it is more relevant to the context of the study. This research will use questionnaire surveys as primary data collection instruments. These are discussed in detail later in this chapter.

3.6.4 Quantitative and Qualitative Research Methods

Research methodology is the overall strategy used for the collection and analysis of data. It has a strong link with the research philosophy (Dainty, 2008). Research methodology involves developing a strategy for collection and analysis of data. It mainly derives from the philosophical paradigm: If the researcher believes in the existence of the truth/reality, the best approach is to use the quantitative methodology in order to establish the reality. If the author believes in multiple realities, then use of qualitative methodology is most suited to understand all the perspectives of reality (Fellows and Liu, 2008). When the researchers believe in single reality, but multiple perspectives of that reality, then mixed methods are used first to establish the reality using quantitative methods and then understanding the different perspectives of that reality using qualitative methods (Fellows and Liu, 2008).

Research methodology can be broadly categorised as being qualitative and quantitative but a third category, mixed methods, which is a combination of qualitative and quantitative methods also exists. Quantitative research is often deductive in that it begins with an existing theory /hypothesis which is tested in the context of the research (Creswell, 2009). On the other hand, qualitative research is often inductive in that they are generally not preceded by existing theory/framework (Creswell, 2009). In another definition of quantitative research, Creswell states that quantitative research is a term that examines phenomena by collecting numerical data that are analysed by the use of mathematical-based methods. This type of research, as Hittleman (2002) expand, is characterised by the use of statistical analysis.

Qualitative research is open-ended and offers the researcher the ability to explore without limitations, however, this can also lead to ambiguity and lack of clarity on what the data is trying to reveal. In such cases, the qualitative research can provide divergent results and may fail to answer the question (Kothari, 2008). For example, in interviews, different individuals may express completely contradictory views leading to the researcher having ambiguous

findings. On the positive side, a limited number of respondents may be sufficient to reveal rich insight into the phenomenon the researcher is trying to understand.

Quantitative methods are generally used when there is a large amount of data is available for statistical analysis. It helps in generalising the findings. One of the key benefits of quantitative data is ease of collection of data and analysis. Since the data is objective, it is easy to verify the data and even the findings, i.e. different researchers, using the same sample should arrive at similar findings. Quantitative research can lead to accurate findings, but the accuracy can depend on the sample size. However, quantitative research may not be suitable to explore phenomenon with little prior insight and is often limited in scope. Quantitative research is often used when generalisation of findings is required while qualitative research is often useful when the context of the study is important.

This research adopts a quantitative approach in part as quantitative methods are considered useful in e-learning research. One of the fundamental reasons for using quantitative methods is to determine whether members of a population share common characteristics. Use of quantitative approach can also inform elements of research that are used for general descriptions and statistical analysis. Quantitative research is appropriate for measuring both attitudes and behaviours and can be used to determine relationships between people and things (Chappell, 2000).

In this research, quantitate method is used to formulate an understanding of students' perceptions about e-learning quality in relation to 'service', 'system' and 'information' aspects delivered in an e-learning system.

3.7 Quantitative Method – Choosing use of Questionnaire survey

The primary data collection for this research began with questionnaire survey. The questionnaire survey was conducted with higher education students studying in public universities in Lahore, Pakistan and was designed to investigate their perception of how different aspects of pedagogy affects the perception of quality in e-learning. Questionnaire surveys are most commonly used data collection tools in quantitative research. There are primarily three kinds of questionnaire surveys: open, structured and semi-structured. Open-ended questionnaire surveys are partly like qualitative research where the respondents are free

to register whatever responses they have. Such questionnaires are insightful as they allow the respondents to provide detailed responses but at the same time, data obtained from such questionnaires are difficult to compile and analyse (Fisher, 2007). These are commonly used where the researcher wishes to collect detailed responses but cannot obtain access to the respondents for direct data collection. In structured questionnaire surveys, responses are pre-coded and the respondents have to select one of the given responses to each question. These are less time consuming and are less costly to administer. In addition, the data is easy to collect, compile, and analyse (Fisher, 2007). However, such surveys are less insightful and are primarily used for testing and/or developing frameworks. Semi-structured questionnaires area mix of the open and structured questionnaires. Here the respondents are given some pre-coded responses but have the option of entering a response different from those given. It provides the benefits of both insight as well as low level of effort required to compile and analyse the data.

The literature review chapter resulted in the initial conceptual framework designed to determine the effect of three different aspects of pedagogy on the quality perception of e-learning. The purpose of the quantitative part of this research is to test this conceptual framework in order to see the impact of pedagogy on the quality perception of e-learning. The purpose of questionnaire here is to generalise; meaning a large number of responses will be required. In this respect, it is essential to use closed/ structured questionnaire survey for this research.

Questionnaire surveys were considered useful in this research because of the following points:

- Quantitative questionnaires can increase the number of responses, allowing a meaningful statistical analysis.
- Researchers can adopt a randomised sampling method, allowing the researcher to collect data without any sample bias.
- Researchers can also use a self-administrated approach, i.e. where the researcher briefed a group of students about the purpose of the research and then distributed the questionnaires to them to fill. This approach helped in getting questionnaires filled quickly, and if there were any questions from the respondents, the researcher was able to clarify details.
- The researcher is assured of the reliability because self-administration of questionnaire survey ensures that they were filled by the university students, i.e. those who were supposed to be completing the questionnaire.

- Compiling of the data was easy. All the responses were transferred to SPSS software for statistical analysis.

3.7.1 Questionnaire Review and Development Process

A questionnaire will be designed to collect participant data. The questionnaire will be divided into two sections. The first part will consist of questions related to demographics, the second section will include questions relating to the five SERVQUAL service dimensions, i.e. reliability, assurance, tangibility, empathy and responsiveness; plus, additional dimensions of learning content, course website, and the output variable (i.e. quality perception) (as defined in Uppal et al, 2017). Demographic questions related to capturing of gender, type of schooling (private/public), current degree program, and current household income.

According to the literature, quality is an important factor for adoption of a service. Increasingly, since higher education is being seen as a service for which prospective customers (students) have to be satisfied, the significance of the understanding of quality and its delivery has become imperative. However, to achieve successful e-service delivery, further research is required in the field of e-services to explore and assess variables that influence e-service quality in the educational domain (Rowley, 2006).

There are a number of quality models which have been reported, however, Asubeonteng et al. (1996) reasoned that "until a superior and as straightforward model rises, SERVQUAL will prevail as a leading service quality instrument". SERVQUAL has an advantage over other quality models, that it has been used as a meaning tool in a range of domains, especially in the service industries like healthcare, financial services, banking and information systems service quality (Jiang, Klein, & Crampton, 2000; Kang & Bradley, 2002; Kettinger & Lee, 2005). Its unique methodology which can be used for identifying and plugging gaps in the service have been found to be very practical

E-learning primarily is a software system, which is a delivered using technology, information system models and technology acceptance models also play an important role in its development and implementation. From the review of Technology acceptance models, it is evident that consideration of quality, as a factor is missing in these models. Quality is an important factor, not only in service but also for system and information use. Delone and McLean (2002) also highlighted that consideration of service, information, and system quality

constructs were essential for user satisfaction while using the system. This form the basis for a need for a holistic quality model (ELQ) with due consideration for information and system dimensions, which is elaborated in chapter 4.

These constructs and relevant questions were formed on the basis of the knowledge gained through the extensive literature review. The different constructs used when designing the questionnaire are briefly discussed below:

Reliability: This construct investigated how important reliability was to the perception of quality of the e-learning system. So, for example with delivery modes, how important it is for students to receive the learning material in different formats and does it affect their perception of quality if the material was presented in text format verses the audio or audio/video format. Similarly, for language experiment, the questions in this construct will relate to how students perceive the quality of learning experience; for example, the material was presented in their local language versus the international language, i.e. English. For the interactivity experiment, questions were asked about how students would perceive the quality of e-learning if there were different levels of interactivity. These questionnaires for each experiment are attached in Appendix B.

Assurance: This construct which also is the part of the service dimension, included questions related to how assured students felt about the quality of the e-learning if it was delivered in different modes, i.e. text, audio and audio/video modes. Similarly, for the language experiment, how the delivery of e-learning in different language affected participant's perception of quality. In the experiment related to interactivity, this construct included questions related to how students felt about the quality of e-learning with different levels of interactivity.

Tangibility: This construct which also is the part of the service dimension, included questions related to how students perceive the quality of e-learning if the service was tangible of higher quality. In delivering, the e-learning in the text, audio, and audio/video formats, is one mode perceived to be of better quality than the other? Similarly, how would students perceive the quality or e-learning if it was presented in the local language versus English? Similarly, if e-learning content is more interactive, would it appear to be of higher quality?

Empathy: This construct, which is also part of the service dimension, included questions related to if students perceive empathy to be better if the language was local or English?

Similarly, this will include questions related to delivery modes of text, audio, and audio/video, and if these modes have any effect on how empathy is perceived by students. For the interactivity experiment, it would include questions relating to how empathy is perceived if the interactivity was increased. Would more interactivity with the service provider improve the perception of quality?

Responsiveness: This construct also part of the service dimension and will include questions related to how the responsiveness construct is effected if the e-learning is delivered in text, audio, and audio/video formats. Similarly, how responsiveness will be effected if the language was local or English. And, how will the responsiveness change in the minds of students if a different level of interactivity is provided.

Learning Content: This construct, which related to the information dimension, included questions about the perception of quality if the material was presented in different delivery formats. Similarly, for the language experiment, it will include questions about the local and English language, and how students perceive quality when learning content is delivered in different languages. And, for the interactivity experiment, this construct will include questions concerning how students would perceive quality if the learning material was more interactive.

Course Website: This construct, which related to the system dimension, will include questions about the student perception of quality if the website content was in different formats. Similarly, for the language experiment, how would they perceive the quality if the language of the system (website) was in local versus English language? In addition, for the interactivity experiment, it will include questions that ask students about their perception of quality, if the website was more interactive.

E-Learning Quality: This was the primary outcome variable in the questionnaire. This construct will include questions about what constitutes quality. For delivery modes experiment, how the student would perceive the quality. Similarly, for language and interactivity experiments, which elements would give a perception of quality to the learner?

3.7.2 Questionnaire structure

Three near identical questionnaires will be used across the three experiments, we propose that a typical questionnaire will contain 50 questions divided into eight sections as mentioned in table 3.4.

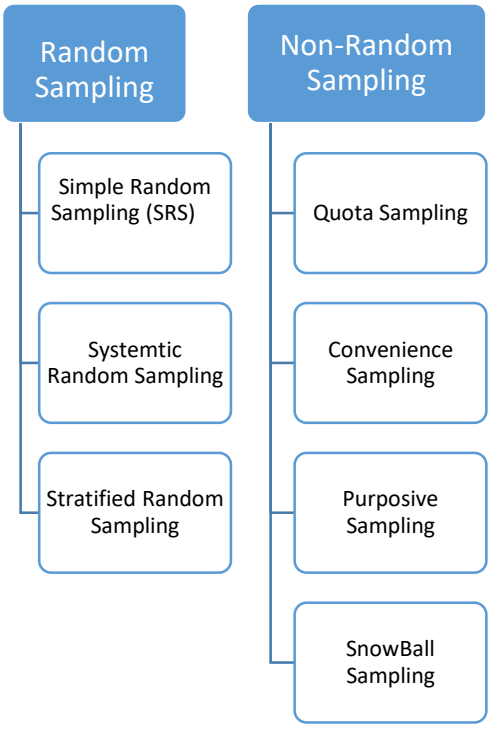
Table 3.4: Questionnaire construction

Construct	**Number of Questions**	**Nature of Questions**
Reliability	7	Importance of reliability on the perception of quality of the e-learning system.
Assurance	6	Importance of Assurance on the perception of quality of the e-learning system.
Tangibility	4	Importance of Tangibility on the perception of quality of the e-learning system.
Empathy	4	Importance of Empathy on the perception of quality of the e-learning system.
Responsiveness	5	Importance of Responsiveness on the perception of quality of the e-learning system.
Learning Content	8	Importance of Learning Content on the perception of quality of the e-learning system.
Course Website	8	Importance of Course Website on the perception of quality of the e-learning system.
E-Learning Quality	4	What constitutes quality in the mind of the student?

3.7.3 Sampling

Babbie (2010: 173) define sampling as “a method of selecting some part of a group to represent the entire population”. Strydom and Venter (2002: 198) refer to sampling as “taking a portion of that population or universe and considering it representative of that population or universe.”. Sampling is an essential aspect of any research because the researcher cannot collect data from the whole population. Effective sampling is thus essential for the researcher to identify a representative sample, which represents the whole population (Fisher 2007). Accurate sampling is required to ensure that there is no bias in the data and that the sample represents the whole population. Figure 3.2 shows the various types of sampling strategies that could be used in a research.

Figure 3.2: Types of Sampling



This research adopts a purposive sampling strategy. Purposive sampling strategy is a kind of non-probability sampling in which the researcher selects the sample based on certain criteria (Babbie, 2010). In this research, it was essential for the researcher to collect data from individuals who have had some experience of e-learning and was a student of a higher education institution in Pakistan. In order to increase the sample size, researcher included the individuals who had formally or informally experienced e-learning. Pakistan is a good place for such a sample, as it is a developing country will large population (roughly 200 million). There is a large number of students who potentially are looking for higher education, but the number of universities is limited.

At the same time, Pakistan has a growing technology infrastructure, with good speeds of cable internet, DSL and mobile connectivity of 3G and 4G widely available. Most of the students have access to laptops, smartphones, tablets and Wi-Fi connectivity. This makes Pakistan a very suitable country where e-learning can be very beneficial to increase access to higher education.

Another key consideration for the researcher was the sample size. It is essential that the researcher selects a sufficiently large sample in order to achieve the objective of generalisation

of findings. Fisher (2007: 190) estimates the minimum sample size for a research based on the margin of error of findings (see table 3.5).

Table 3.5: Estimating margin of error for sample survey results. Source: Fisher (2007)

	Margin of Error			
Population	**±5%**	**±3%**	**±2%**	**±1%**
Around 100,000	383	1,056	2,345	8,756
Around 200,000	383	1,056	2,345	8,756
Around 1,000,000	384	1,067	2,395	9,513

According to Pakistani government estimates, around 1.3 million students are currently studying at Pakistani universities. Considering this as the target population and considering a 5 percent margin of error it was estimated that the minimum sample size required would be 384.

3.7.4 Piloting

Pilot studies are considered to be one of the fundamental processes when testing a research methodology. Corbetta (2003) claims that a pilot study is a crucial element for any study before the main data collection takes place. Balnaves an Caputi (2001) also state that a pilot study constitutes a preliminary test of research instruments and helps to identify the problems and benefits associated with implementations. Furthermore, Sarantakos (2005) indicates that piloting in research acts as a pre-test to help researchers to solve any problems in their methodical design and thus can help to prevent similar problems that might arise in the main data collection. Therefore, it is very important to test the instrument by undertaking piloting.

Once the questionnaire was developed, it was shared with the supervisors and two other researchers who were experts in the field of e-learning. They were asked to assess five aspects of the questionnaire regarding its validity, as suggested by Betts (1998).

1. Clarity of directions and questions.
2. Appropriateness of variables that relate to Likert scale.
3. Continuity across section and questions.
4. Time required to complete the questionnaire.
5. Any further thoughts or variables related to the study or removal of some existing ones.

From the feedback from the supervisor and from the other two experts, some questions were re-written because of the difficult terminology, and two some questions were deleted, as they were redundant. Some questions were added according to suggestions to help improve the constructs.

To further test the questionnaires, we distributed about around 50 questionnaires for a pilot study for all three experiments and received responses. The average time taken to fill the questionnaire was between 10 to 15 minutes. On the basis of feedback from the pilot, some questions were re-worded as they were not clear to many students. Data from these pilot questionnaire was entered into SPSS, and scale reliability was found to be higher than the minimal reliability, i.e. (>0.7). Because reliability was good, the questionnaires were distributed to the total sample population for three different experiments.

3.7.5 Administering the Questionnaires

The researcher conducted the survey from two leading public universities in Lahore, Pakistan. Data was collected using self-administration, where groups of students were briefed about the purpose of the research and were asked to volunteer participation. Support from the administrative authorities in the universities was very positive. These universities were selected because they have a large student population in undergraduate, graduate and executive programs in business and in engineering disciplines. Upon completion of the survey, all the responses were entered into SPSS software for statistical analysis.

3.7.6 Quantitative Data Analysis

One benefit of quantitative data is the number of ways in which it can be analysed. There are various statistical tools available to analyse the quantitative data. However, quantitative data analysis involves more than statistical analysis. Firstly, the data has to be arranged so that it can be analysed statistically. Here the key consideration is what the research question is. The arrangement of the data should be so that it answers the research question. Then follows the statistical analysis, which is then followed by interpretation of the analysed data.

Data from the questionnaire survey was uploaded into the SPSS software. Following this, the responses were rearranged to eliminate any randomness that was used in the questionnaire survey, i.e. to ensure that the responses were valid and that the respondents had actually read the question. Following this, two tests were conducted to make the data ready for analysis.

Missing values: The first test was to identify missing values. In case any respondents had more than 10% missing responses (that is if the respondent failed to answer at least 90 percent of the questions) the whole response set for that respondent was dropped (Schlomer et al., 2010). In cases where missing responses were less than 10 percent of the total questions, the missing response was replaced by the average of the remaining responses to that particular question (Schlomer et al. 2010). There are other approaches for determining the best value to replace the missing value, yet in our work, the mean was considered the most suitable approach because the mean was easy to estimate and was considered a relatively simple and logical replacement.

Outliers: The second data preparation test conducted was the outliers test, which was conducted to ensure that there are no outliers in the responses. Outliers occur when the respondents have misunderstood the question, or when respondents have randomly answered the question without reading it. Either way, it is essential to sort out the outlier issues. Generally, in 5 point, likert type scales any response outside the limits of mean +2 is considered an outlier and in 7 points Likert type scale any response outside the limits of mean +3 is considered an outlier. 5 point Likert type scale criteria was used to identify the outliers in this research (Kreuter, 2013).

After identifying the outliers, a mean replacement approach was used. Although other alternative approaches such as maximum likelihood can also be used, the researcher believes that replacing with mean replacement approach value provides minimum distortion to respondents' responses. The number of responses with outliers was only thirteen, which would have had a minimal impact on the overall findings.

Once the data was sorted and arranged analysis was carried out to test the structural model. After obtaining the results, the findings were analysed. The analysis was carried out in view of the findings of the literature review.

3.8 Ethical Approval

To protect the identity of the participants, this study does not reveal the names of the universities and students. In order to obtain permission to undertake this study, a number of meetings with the head of the business departments were held to reach the final draft of the

questionnaire. After permission was obtained, a procedure was defined to guarantee that ethical issues involved in this research and legality would be adhered to.

Another ethical issue considered in this study was the principle of voluntary participation, which means that participants would participate in the research voluntarily (De Vaus, 2002). The participants in this study were advised on the consent forms relating to data collection that they had the right to withdraw from this research at any time with any penalty. The researcher distributed information sheet and consent forms giving participants guidelines about the subject under investigation, their right to participate or withdraw, their right to ask questions and their right to remain anonymous. Bryman (2008) identifies the advantage of such a form as giving participants a chance to be informed of the nature of the research and their rights during the study.

3.9 Data Analysis

This study was conducted using quantitative research methodologies. The study instruments include student questionnaires with closed-ended questions. The closed-ended questions were analysed using the Statistical Package for the Social Sciences (SPSS). The SPSS programme is known to be one of the most reliable statistical programme available for obtaining accurate answers, as many researchers have indicated (e.g. Pallant, 2005).

Questionnaires' analysis went through different stages, which started with creating a data file, then defining the variables. This was followed by entering data into the system, modifying the data, enhancing the quality of data by cleaning up erroneous data, and then selecting the appropriate statistical tests, which were thought to be appropriate to answer the research questions.

After data screening, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structure Equation Modeling (SEM) procedures were performed for three different tests related to pedagogy. Details of each test and data analysis are included chapters 5 through 7. Below are generic steps and justifications for using these procedures.

Exploratory Factor Analysis: Exploratory factor analysis helps us screen out the problematic items of the questionnaire. The measures to check the EFA are:

- First the value of Kaiser Meyer Olkin Measure (KMO) of sampling adequacy and Bartlett's Test for Sphericity.
- The second measure is Communalities, which are initially at 1 for every factor in consideration. If the extracted value of the communality for a certain variable is high (i.e. communality value is closer to 1), this implies that the extracted factors account for a large proportion of the variable's variance.
- The third measure is the cumulative variance explained, this means that the current extracted factors are explaining how much variance in the data. The closer the value is to 100%, the better the variance explained by the model.
- The fourth measure is the rotated component matrix/pattern matrix. This measure checks the loading and correlation of the items with each other.

Structure Equation Modeling: Structure equation modeling modelling (SEM) is a very popular method in the information sciences and it is used to confirm the theorised concepts. SEM is also known as the path analysis with latent variables, covariance analysis (Gefen, Straub, & Boudreau, 2000). SEM is defined "as a multivariate technique, which combines features of multiple regression and factor analysis in order to estimate a multiple of networking relationships simultaneously" (Hair, Black, Babin, & Anderson, 2010). SEM also checks whether data fits according to the hypothesis model.

The current study uses the SEM for the following reasons:

- SEM is very important to confirm the constructs of the model (CFA), which helps the researcher determine the construct validity and readability for both variable and item levels.
- Confirmatory factor analysis should be performed on the constructs extracted through exploratory factor analysis, otherwise, it cannot be used in the further analysis.
- The relation of independent and dependent variable is quite reliable in SEM technique.

3.10 Summary

The details of the research methodology adopted for this research is described in this chapter. The chapter began with an overview of what has been achieved in past chapters, and how this chapter adds to the sequence of steps required to achieve the objectives of this research.

After this, the purpose of the research was discussed, i.e. to describe the explanatory research investigating the impact of pedagogy on the effectiveness of e-learning. This was followed by

a discussion of the research philosophy. Four different kinds of philosophical standpoints were discussed along with the key differences and their applicability.

Although different aspects of pedagogy in e-learning have been widely discussed, there has been no research that empirically tests the relationship of different aspects of pedagogy and its effect on the perception of quality, leading to the effectiveness of e-learning. Technology is dynamic and hence underlying problems must be understood independent of technological barriers. Consequently, pragmatic philosophical standpoint is used as it allows the use of multiple methods, which are useful in order to investigate the problem from diverse perspectives. Current lack of research into pedagogy and effectiveness of e-learning requires a pluralist approach as supported by a pragmatic philosophy.

Following this, the choice of quantitative strategy is discussed. In the past e-learning, researchers have focused mainly on quantitative methodologies, due to its benefits such as generalisability, validity, reliability etc.

The data collection tools used for this research was then described. The reason for selection of questionnaire surveys is justified and details of their application in the data collection process are provided along with their limitations and benefits. The sampling strategy adopted is discussed, and the data analysis approach is discussed.

Chapter 4
Development of a Validation Model

4.1 Chapter Introduction

After identifying the most critical issues, i.e., Pedagogical issues, which are hindering the success of e-learning, we needed to find a theoretical model which we could use to base our experiments on. For this purpose, we looked at different technology acceptance models and system quality models. Since e-Learning is a phenomenon that uses computer and internet technology at its core, we looked at the technology acceptance and information system success models. Similarly, education is a service, therefore, we looked at service quality models as well. All these models are suitable for testing a particular dimension but none of these models could test all three dimensions, i.e. 'service', 'information' and 'system' quality. We needed a model or a system which could test the quality of all three aforementioned dimensions at the same time. Therefore, we developed a model, e-Learning Quality model (ELQ), which covers all these dimensions. The development of this model is important since this model will provide a structure that will allow as to consistently test the impact of factors on quality perception. Secondly, this model will be a contribution in this field, since no such model currently exists.

4.2 Technology Acceptance Theories and Models

A large number of theories/models have been designed to explore the acceptance and use of technologies. The theories/models that provide the basis for technology acceptance are briefly explained as follows:

Cognitive Dissonance Theory (CDT): CDT was formulated by Festinger (1957) to explain how dissonance between one's cognition and reality change the person's subsequent cognition and/or behaviour (Bhattacherjee 2001). CDT depicts a process model of individual behaviour where users form an initial pre-usage expectation (belief) about a technology, experience its usage overtime, and then form post-usage perceptions of the technology. The dissonance between users' original expectations and observed performance is captured in the disconfirmation construct (Bhattacherjee 2001).

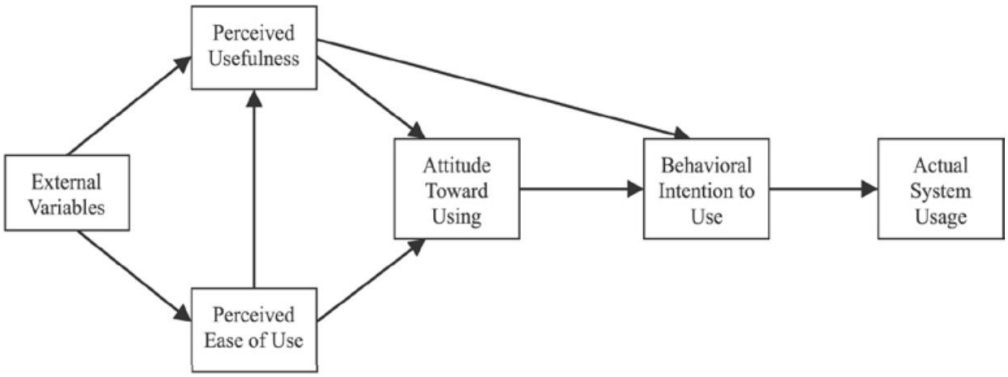
Theory of Reasoned Action (TRA): The first theoretical perspective to gain widespread acceptance, relating to technology acceptance, was the Theory of Reasoned Action (Fishbein and Ajzen 1975). This theory maintains that individuals would use computers if they could see that there would be positive benefits (outcomes) associated with using them.

Theory of Planned Behaviour (TPB): The Theory of Planned Behaviour (Ajzen 1985, 1991) is a successor of TRA and it introduced a third independent determinant of intention, perceived behaviour control (PBC). It is determined by the availability of skills, resources, and opportunities, as well as the perceived importance of those skills, resources, and opportunities to achieve outcomes (Kriponant 2007). As Kriponant (2007) emphasised, by changing these three predictors (attitude, subject norm, and perceived behaviour control), the chance of the desired action can be increased.

Social Cognitive Theory (SCT): Social Cognitive Theory (Bandura 1986) is based on the basis that environmental influences such as social pressures or unique situational characteristics, cognitive and other personal factors including personality as well as demographic characteristics are equally significant in determining behaviour.

Technology Acceptance Model (TAM): Technology Acceptance Model (Davis 1989) was the first model to mention psychological factors affecting technology acceptance and it was developed from Theory of Reasoned Action (TRA) by Davis (Davis 1989). Davis (1989) developed and validated better measures through TAM for predicting and explaining technology use.

Figure 4.1: TAM model – Source: Davis et al. (1989)



TAM posits that perceived usefulness and perceived ease of use determine an individual's intention to use a system with the intention to use serving as a mediator of actual system use. Perceived usefulness is also seen as being directly impacted by perceived ease of use (see figure 4.1). The underlying links between two key constructs and users' attitudes, intentions, and actual technology usage behaviour, were specified using the theoretical underpinning of the TRA. Attitude and perceived usefulness jointly determine the behavioural intention and attitude is determined by perceived usefulness and perceived ease of use.

Technology Acceptance Model (TAM2): The goal of TAM2 (Venkatesh and Davis 2000) was a theoretical extension of the TAM1. According to the study of Venkatesh and Davis (2000) both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influence user acceptance.

The Unified Theory of Acceptance and Use of Technology (UTAUT): Another important theoretical model was proposed as the Unified Theory of Accepttance and Use of Technology (UTAUT) (Venkatesh, Davis and Davis 2003) with four core determinants of intention and usage, and up to four moderators of key relationships. Four constructs, 1) performance expectancy 2) effort expectancy3) social influence and4) facilitating conditions, have been theorised in formulating UTAUT with the aim of determining user acceptance and usage behaviour on technology. Attitude toward using technology, self-efficacy, and anxiety are theorised not to be direct determinants of intention (Kriponant 2007). The key moderators in the model are gender, age, voluntariness, and experience. From a theoretical perspective, UTAUT (Venkatesh et al. 2003) provides a refined view of how the determinants of intention and behaviour evolve over time, and it is important to emphasize that most of the key relationships in the model are moderated (Kriponant 2007).

4.2.1 Comparison of Technology Acceptance Theories/Models

Comparison of technology acceptance theories/models, in general, is vital to provide an overall picture of underpinning concepts of theories/models which have been used in the technology acceptance environment. Generally, Technology Acceptance Model (TAM) specifies general determinants of individual technology acceptance and therefore has been applied to explain or predict individual behaviours across a broad range of end-user computing technologies and

user groups (Davis, Bagozzi and Warshaw 1989). However, use of the system is not a guarantee of quality.

Eight specific models (Theory of Reason Action, Theory of Planned Behaviour, Technology Acceptance Model, Motivational Model, Combine Theory of Planned Behaviour and Technology Acceptance Model, Model of PC Utilisation, Innovation Diffusion Theory and Social Cognitive Theory) have been identified and discussed to form the determinants of behavioural intention and usage behaviour of technology in constructing the UTAUT; The explanatory power of the UTAUT is higher.

The reviewed literature on technology acceptance theories/models confirmed that they have different premises and benefits. Bhattacherjee (2001) proposed the Information System Continuation Model (ISCM) based on the reasoning that the initial adoption of information systems by a user is not the same as the continued use of the system, which is when the system can be considered successful (Kang & Lee, 2010). ISCM is grounded in the consumer's behaviour theory of Expectation– Confirmation and the Technology Adoption Model (TAM). The model attempts to explain the users' intentions to continue to use information systems and is often referred to as the ''post-adoption model'' because it extends beyond the initial acceptance stage.

4.2.2 Rationalisation for an improved theory/model

This section further provides justification for the suggestion of the ELQ model, which is an improved theory/model for e-Learning quality perception. Looking at the above technology acceptance models, it can be argued that adoption of an information system does not mean the success of the system. Similarly, adoption does not automatically guarantee repeat use, which is vital for e-learning implementation success, since student drop-out has been highlighted in the literature as a major concern. For adoption of a service, quality is an important factor, which is considered in quality models, like SERVQUAL; and is missing in the technology acceptance models. Since education is primarily a service, service quality models are also relevant, and quality and an important factor, which cannot be omitted.

4.3 Education as a Service

The development of any nation is very much dependent on the quality of the education being provided to the people. Education is deemed as a vital element in the transformation of any society (Maglio, Srinivasan, Kreulen, & Spohrer, 2006). There are different levels of education, however for this particular study our focus is on the higher education, since higher education equips people with the essential expertise to develop, protect, and cherish their local culture, and helps by preparing the next generation to face the challenges of the modernised world (Rigney, 2001).

Increasingly, higher education is deemed as the service, and students are treated as prospect customers HEIs (Higher Educational Institution) (Butin, 2006). This has led to the upheaval in higher education, and universities are trying to adopt the customer-oriented approach in order to cope up with this rising demand of the education service (DeShields & Kaynak, 2005).

There are a number of definitions of services in the literature. According to Komoto and Tomiyama (2008) "Service is a set of activities that delivers service contents from service providers to service receivers in a service environment and generates values for service receivers". Whilst Bitner (1997) states that "service is an intangible real-time process that provides the user with some intangible goods". Accordingly, it is important that the service provider has to provide value to service recipients so that they are satisfied and will continue to use the service. It is also implied that users are more aware and expect better services.

There are a number of other definitions in the literature that clearly refer to education as a service. Piciga (1995) stated that "education service is the organised, planned and systematic transfer of knowledge and general civilization and cultural values". Higher education, as a service, contains all the qualities of the service, i.e. heterogeneous, intangible, ultimate consumption and meet the requirement of the receiver (Zafiropoulos & Vrana, 2008). Increasingly, the student is seen as the customer, which implies that satisfaction of student is the ultimate objective of the education service. In addition, the performance of the education service is determined by the attitude (positive/negative) exhibited by the student (Boshoff, 1997). If true, universities have to maintain students' positive perception of the level and type of education being provided. Therefore it is critical to our work that service quality should be formally assessed (Blustain, 1998).

4.4 Understanding Quality

Quality is a subjective term, which means different things to different stakeholders. Early literature defined quality as something being "fit for use" (Juran, 1981), or being in "conformance to requirements" (Crosby, 1979). Yang and Liu (2007) stated that in addition to a lack of deficiencies, 'quality' must consider, and must satisfy, both stated and implied needs. Ehlers (2004), when considering e-learning quality, defined 30 dimensions, which were subsequently categorised into seven concept fields: Tutor Support, Cooperation, Technology, Costs, Information Transparency, Course Structure, and Didactics. Ehlers (2004) emphasised the importance of course content ('Didactics' and 'Course structure'), and highlighted the importance of interaction ('tutor support', and 'cooperation'); thus supporting, in the context of e-learning, the generic claim of Yang and Liu (2007).

4.5 SERVQUAL Model

The concept and perception of quality are explained through SERVQUAL model suggested by Parasuraman, Zeithaml, and Berry (1988), which has Expectation Confirmation Theory (Oliver, 1980) in its base. SERVQUAL has turned out to be a reliable consumer driven scale, used to measure the service quality provided by different industries, from retail to consulting; and could be utilised to quantify and enhance the quality of delivery in e-learning. SERVQUAL objective is to measures the gap between consumer expectation and experience, i.e. a perception of satisfaction, concerning the services provided; and relies on the essential supposition that clients can assess service quality of an organisation's by contrasting their expectations and experiences. If a customer has experienced which was lower than expectation, then he/she will perceive the quality is low, on the other hand, if experienced meets and surpasses expectancy, then he/she will perceive it high. The initial model had 10 dimensions, however, by the early 1990s, the authors had refined the model to the useful acronym RATER, which refers to five constructs: Reliability, Assurance, Tangibles, Empathy and Responsiveness.

Table 4.1: Constructs of SERVQUAL

Constructs	**Description**
Reliability	Capacity to perform the guaranteed service constantly and precisely
Assurance	Knowledge and politeness of workers and their capacity to inspire trust and certainty.
Tangibles	The presence of physical offices, equipment, personnel and communication materials.
Empathy	Caring, individualised consideration the service firm gives to its clients.
Responsiveness	Readiness to help clients and give a timely service.

Within these five constructs, (i.e. Reliability, Assurance, Tangibility, Empathy, and Responsiveness) the service quality is measured by finding the difference between user expectation and user experience. Details of these constructs are listed in table 4.1. Within the SERVQUAL model, five potential organisations gaps (see figure 4.2) should be measured, monitored and/or filled, which are:

Gap 1: Management perception: the difference between the expectation of the customer and the management's perception of the expectation of the customer.

Gap 2: Quality specification: the difference between management perception and the actual specification of the customer experience.

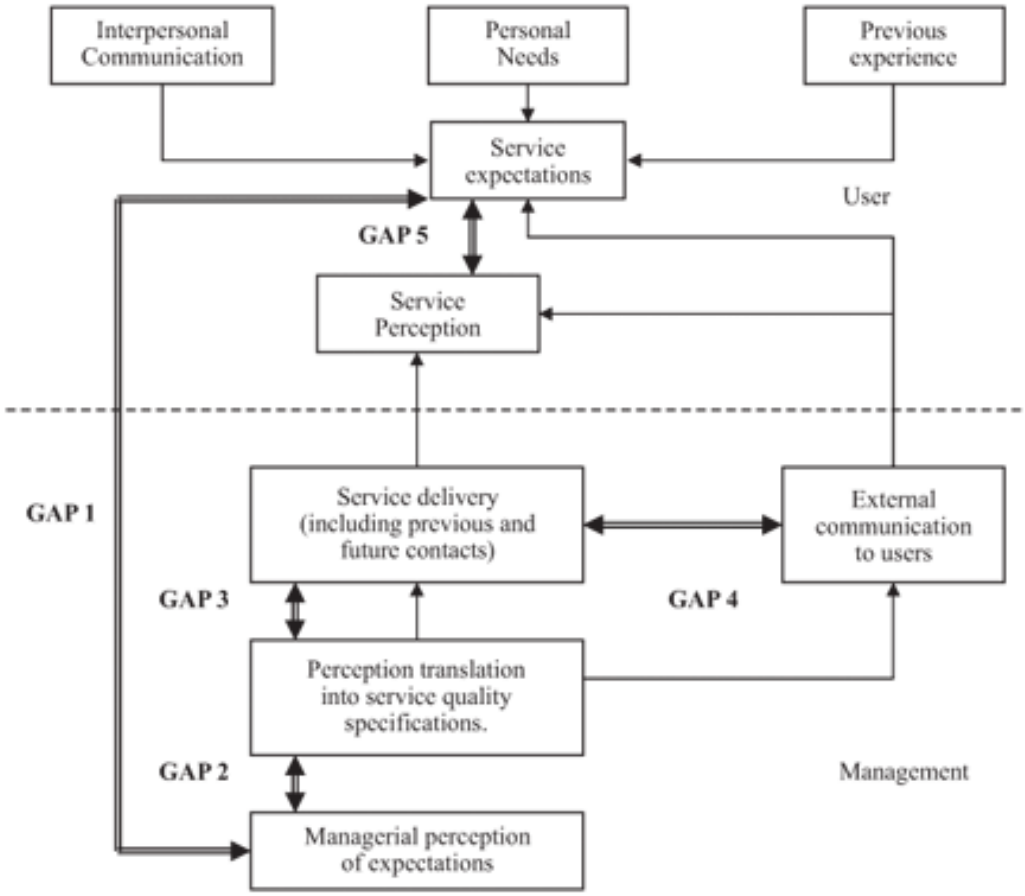
Gap 3 : Service delivery: the difference between customer-driven service design and standards and service delivery.

Gap 4 : Market communication: the difference between the delivery of the customer experience and what is communicated to customers.

Gap 5 : Perceived service quality: the difference between a customer's perception of the experience and the customer's expectation of the service.

Figure 4.2 – Service Quality GAP model (SERVQUAL)

Source: Zeithaml, Parasuraman & Aberry, 1990



The main benefit of SERVQUAL, as a measuring tool, is its application in a range of domains. SERVQUAL has been used to examine numerous service industries, such as healthcare, banking, financial services and information systems service quality (Jiang, Klein, & Crampton, 2000; Kang & Bradley, 2002; Kettinger & Lee, 2005). SERVQUAL stands out from other instruments, utilised to measure service quality, due to the distinctive methodologies that can be utilised for plugging gaps; i.e. SERVQUAL has been applied in both theoretical and operational domains (Buttle, 1996; Asubonteng, McCleary, & Swan, 1996). Asubeonteng et al. (1996) reasoned that "until a superior and as straightforward model rises, SERVQUAL will prevail as a leading service quality instrument".

Although SERVQUAL has been tried and tested as a reliable tool for assessing the quality of service in the hospitality, and other service industries, over the past 25 years, only relatively recently has it been used in the education sector (Petruzzellis, D'Uggento & Romanazzi, 2006). Rogers and Stodnick (2008) for instance, utilised this model when considering the idea of "total student experience" in the traditional classroom setting. Stodnick and Rogers (2008) utilised SERVQUAL to see how conventional students saw the quality in education. From the five SERVQUAL constructs, they discovered reliability, assurance, and empathy to be critical indicators, reporting that this instrument could be utilised for surveying students' perception of educational quality. We have used Stodnick and Rogers' instrument, with minor changes, within our research concerning e-learning service quality assessment, since SERVQUAL has been previously validated as a valid tool. It is, however, in the area of distance learning that use of SERVQUAL is contextually most applicable. In the context of distance learning, when delivering material via an online medium, it is important for the provider to ensure a high quality of delivery; as face-to-face feedback and interaction are not practically possible. To achieve successful e-service delivery, however, further research is required in the field of e-services to explore and assess variables that influence e-service quality in the educational domain (Rowley, 2006).

In Technology acceptance models, discussed in section 4.2, it is evident that consideration of quality, as a factor is missing. Quality is an important factor, not only in service but also for system and information use. Therefore, information system models needed consideration.

4.6 Considering Systems and Information Quality

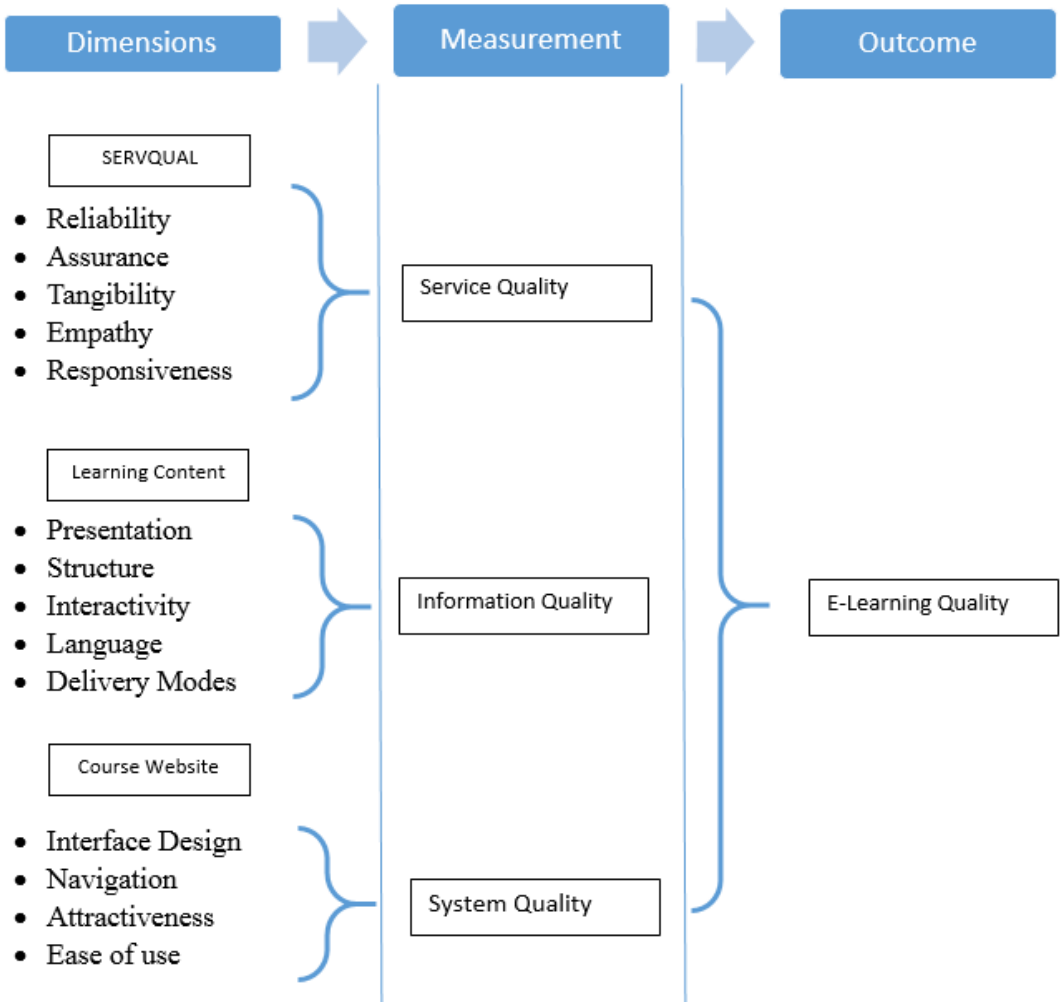
Delone and McLean (2002) highlighted that consideration of service, information, and system quality constructs were crucial to system use and user satisfaction. Learning content (i.e. information), via a website platform (i.e. system), is available to learners at any time and could be perceived as a non-temporal non-perishable product. Similarly, online e-learning providers provide students with an education (i.e. service). Although many have evaluated e-learning using TAM, existing model constructs (see Wannatawee et al., 2013) fail to support consideration of all service, information, and systems quality dimensions. Accordingly, within the proposed model, i.e. the e-Learning Quality (ELQ) model, all dimensions must be considered.

To extend service factors, we introduce ‘Learning content’ (information) and ‘Course website’ (system) constructs. In the current work, ‘Learning content’ refers to accessible and accurate learning material provided to students in a concise and timely fashion. ‘Learning content’ factors were taken from previous work, primarily Alla and Faryadi (2013) and Hein (2014). ‘Learning content’ quality factors identified in literature were thematically grouped, using hermeneutic analysis, into the following concept groups: presentation style (e.g. Schluep et al., 2003), content structure (e.g. Teo and Gay, 2006), level and type of interactivity (e.g. Siau et al., 2006), language and communication (e.g. Akinyemi 2002; Hollins & Foley, 2013), and delivery mode (e.g. Gulliver and Kent, 2013). In our research, ‘Course Website’ relates to the web technical systems used to present the information, and the inclusion of technical functions that affect student perception of web platform quality. Significant factors impacting perceived website quality were grouped as relating to interface design (e.g. Cho, et al., 2009), navigation (e.g. Volery and Lord, 2000), attractiveness (e.g. Lin, 2010) and ease of use (e.g. Selim, 2005). In 1992, DeLone and McLean developed the IS Success model, which considered System and Information quality dimensions, in order to understand system use (objective) and user satisfaction (subjective). Following validation, Delone and McLean (2002) revised the model incorporating SERVQUAL measurements, which added a third service quality dimension. Numerous quality models have been developed in literature either directly incorporating SERVQUAL (e.g. Stodnick and Rogers, 2008; Udo et al, 2011), or indirectly considering SERVQUAL, by developing the work of Delone and Mclean (e.g. Roca et al., 2006; Acton et al., 2009). Stodnick and Rogers (2008), for instance, utilised SERVQUAL to see how students perceive quality in the traditional classroom. Udo et al (2011), proposed a modified SERVQUAL instrument for assessing e-learning quality, which consists of five dimensions: Assurance, Empathy, Responsiveness, Reliability, and Website Content. Udo et al’s model considers the service dimension, yet fails to effectively consider both system and information quality dimensions.

4.7 E-Learning Quality Model (ELQ)

Figure 4.3 gives the graphical representation of the proposed ELQ model, which we propose to use when consistently assessing the impact of media content, language type, and interactivity level of student perception of e-Learning quality (see chapter 5-7 respectively).

Figure 4.3: Proposed E-Learning Quality (ELQ) Model



In this proposed ELQ model, we considered using three dimensions of "service", "information" and "system" to test their impact on the perception of quality. Therefore, we included Reliability, Assurance, Tangibility, Empathy and Responsiveness factors to cover "service quality" dimension, as used in the SERVQUAL model. Accordingly, questions considering presentation, structure, interactivity, language, and delivery modes, represent the "Information quality" dimension; and questions concerning interface design, navigation, attractiveness and ease of use were used to access the "system quality" dimension. These three dimensions are

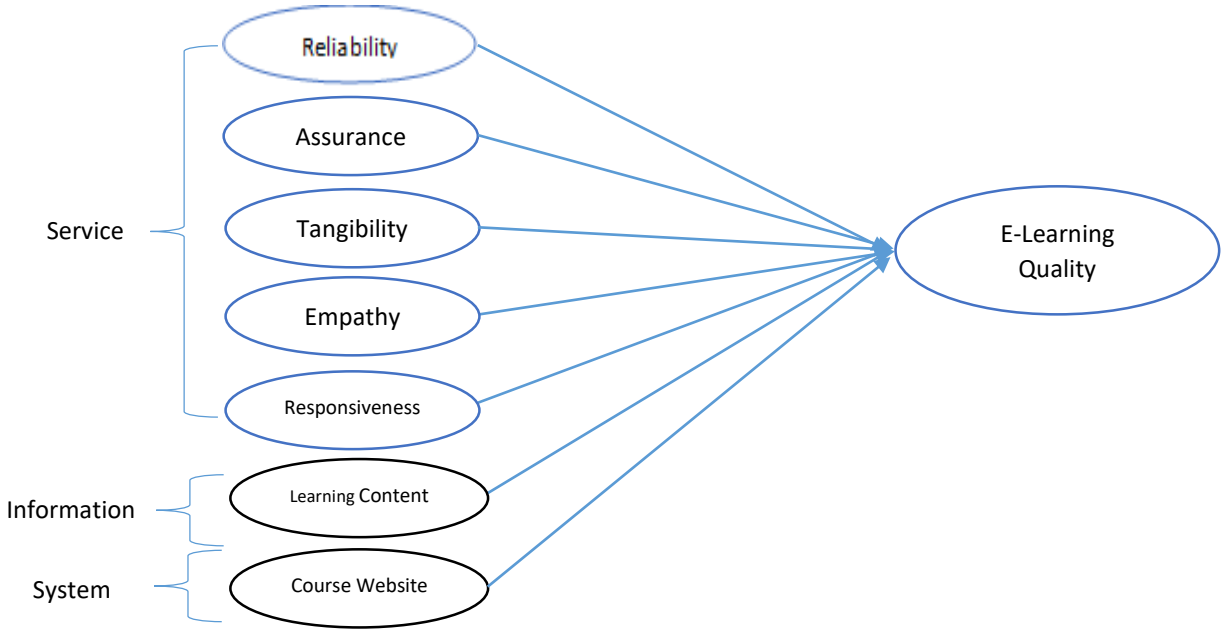
listed as the independent variables and e-Learning quality and are dependent variables (as shown in figure 4.4).

4.8 ELQ Model Validation

We aim to explore whether ELQ is a suitable model to assess e-learning quality. Accordingly, this research will determine:

1. Is the proposed ELQ (E-Learning Quality) model suitable to assess e-Learning quality?
2. Does inclusion of "Learning Content" or "Course Website" have a significant impact on the perception of e-learning quality?

Figure 4.4: E-Learning quality (ELQ) validation model



To consider the component aspects of quality, our research hypotheses state that, in context of e-learning:

H1: "Reliability" is positively associated with students' perception of e-learning quality.

H2: "Assurance" is positively associated with students' perception of e-learning quality.

H3: "Tangibility" is positively associated with students' perception of e-learning quality.

H4: "Empathy" is positively associated with students' perception of e-learning quality.

H5: "Responsiveness" is positively associated with students' perception of e-learning quality.

H6: "Learning Content" significantly impacts students' perception of e-learning quality.

H7: "Course Website" significantly impacts students' perception of e-learning quality.

4.9 Data Collection and Instrument Design

A questionnaire was developed to collect participant data, which consisted of two sections; a full questionnaire can be downloaded from www.gcuktp.info/research/elq-questionnaire.pdf. There were 51 questions in total, 5 questions relating to demographic factors (i.e. section one), and 46 questions relating to SERVQUAL and extended dimensions (i.e. section two) - see Appendix B. Demographic questions aimed to capture information related to gender, occurrence of schooling, type of schooling (private/public), current degree program, and current income.

In section two, where possible, we used previously validated survey questions. RATER and learning content questions, adapted form Udo and Marquis (2002), for use in the context of e-learning. The original instrument used to capture SERVQUAL factors comprised of 18 questions, and has been utilised widely in previous studies (e.g. Stodnick and Rogers, 2008). Questions were contextually altered to ensure suitability in the context of e-learning. Questions were adapted and added (i.e. AS_5 - AS-7; EM_4/5; RS_2-4; RA_4) to ensure consideration of the impact of online team teaching. Team teaching questions, previously intended for traditional classroom environments (e.g. Stodnick and Rogers, 2008), were adjusted to make the new questions appropriate to the e-learning environment. Questions were added to ensure consideration of lecture content (i.e. RA_2); i.e. capturing information relating to the quality of lecture content delivery.

"Learning Content" questions were taken from Cao and Zhang (2005), who constructed and tested a scale for measuring B2C (Business to Customer) website quality fulfilment, and Zhang & Prybutok (2005) who measured client reactions concerning design, sound/visual impact, precision, thoroughness of subject material, quality and suitability of learning material. Two questions were asked relating to general learning material quality (i.e. LC_1/LC_4). Five Questions were mapped to the five 'Learning Content' factors, defined in our ELQ model, i.e. Presentation (LC_8), Structure (LC_3), Interactivity (LC_4/5), Language (LC_7), and Delivery Modes (LC_2/10/11). Questions relating to course website were taken from Udo and Marquis (2002), measuring: general quality perception (CW_4/6); Interface design (CW_5); Navigation (CW_1); Attractiveness (CW_2); and Ease of Use (CW_3). E-Learning Quality was captured using general questions LQ_1-LQ-4. A small number of questions were repeated, e.g. RA-6 and CW_4, which was done to measure feedback concerning different factors. A five-point Likert scale was used for all questions in section two.

After conducting a short pilot test, to test the reliability of questions, the questionnaire was distributed to students in different classes at two leading public universities in Lahore, Pakistan. University students (undergraduates, postgraduates, and executives) are used in numerous studies covering quality perception (Van Iwaarden et al., 2004) and were relevant in the context of the research scope. These students were enrolled in either BSc Applied Management, BBA honors, MBA, EMBA, BSc Sciences and BSc Engineering courses. A total of 490 students participated in the survey, most of whom previously had exposure to a range of e-learning solutions (i.e. both computer-aided learning and computer-supported collaborative learning). A total of 421 questionnaires were considered usable (see Table 4.2).

Table 4.2: Respondent demographic data

Gender	Male	63.7% (268)
	Female	36.3% (153)
Program of Study	BSc/BBA Honors	63.5% (67)
	MBA	16.2% (68)
	EMBA	6.9% (29)
	BSc Engineering	8.6% (36)
	BSc Sciences	5% (21)
Household Income (Monthly)	Below Rs. 20,000	9.7% (41)
	Rs. 21,000 to Rs. 50,000	27.8% (117)
	Rs. 51,000 to Rs. 100,000	37.3% (157)
	Above Rs. 100,000	24.9% (106)
Schooling	Public	31.6% (133)
	Private	68.2% (288)

4.10 Data Analysis and Results

SPSSv19 and AMOS 22 were used to facilitate data analysis, with SPSS used for basic statistics, and AMOS supporting regression (i.e. Structural Equation Modelling) and model testing. Results are presented in the following three sub-sections relating respectively to: i) Scale Reliability, ii) Discriminant and convergent validity, iii) Exploratory Factor Analysis, and iv) Fitness of results.

Scale Reliability

To check the reliability of the construct scale we conducted Cronbach Alpha to measure internal consistency. The Cronbach Alpha for all questionnaire items is 0.879. The extracted factors' Cronbach alpha values for our quality factors are shown in table 4.3. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable.

Table 4.3: Scale Reliability values

Factor Label	Number of Items	Cronbach's alpha (α)
Assurance	6	0.799
Reliability	4	0.845
Responsiveness	4	0.824
Empathy	4	0.916
Tangibility	4	0.895
Learning Content	8	0.825
Learning Quality	4	0.865
Course Website	6	0.825

Discriminant and convergent validity

According to Hair et al. (2010), the minimum threshold value recommended for a sample size of 421, which is above the minimum sample size of 384, is 0.350. Table 4.4 presents Composite Reliability (CR), AVE (Average Variance Extracted), MSV (Maximum Shared Variance) and ASV (Average Shared Variance) values. Since CR values are greater than 0.7, AVE values are greater than 0.5, and MSV and ASV are less than AVE, we claim respectively reliability, convergent validity, and discriminant validity. All loaded values were above 0.50, which confirms that factors have sufficient discriminant validity, and no unexpected cross-loading to occur.

Table 4.4: Discriminant and convergent validity

Constructs	CR	AVE	MSV	ASV	LQ	ASU	EMP	REP	REL	LC	TAN	CW
Learning Quality (LQ)	0.991	0.964	0.102	0.049	**0.982**							
Assurance (ASU)	0.929	0.724	0.011	0.002	-0.025	**0.851**						
Empathy (EMP)	0.919	0.741	0.104	0.029	0.179	-0.005	**0.861**					
Responsiveness (REP)	0.794	0.542	0.104	0.050	0.320	-0.005	0.323	**0.737**				
Reliability (REL)	0.952	0.869	0.055	0.025	0.156	0.104	0.115	0.234	**0.932**			
Learning Content (LC)	0.953	0.837	0.095	0.045	0.309	-0.010	0.226	0.230	0.223	**0.915**		
Tangibles (TAN)	0.895	0.681	0.063	0.026	0.246	-0.014	0.065	0.189	0.137	0.250	**0.825**	
Course Website (CW)	0.912	0.638	0.030	0.006	0.173	0.012	-0.005	0.042	0.073	0.053	0.058	**0.799**

Table 4.5: Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalisation. Rotation converged in 6 iterations.

	Component							
	1	2	3	4	5	6	7	8
LQ1_Learnpercep	.950							
LQ2_Website	.980							
LQ3_InstMatClear	.981							
LQ4_uptodate	.984							
LC2_DiffFormats		.953						
LC3_VideoLec		.511						
LC5_Percept		.971						
LC6_Interesting		.915						
LC7_LecUrdu		.907						
EM1_Concerned			.842					
EM2_IndvNeeds			.924					
EM3_StudInterest			.895					
EM4_StudMotivation			.916					
TA1_ReqUni				.850				
TA2_ExpTeacher				.887				
TA3_PhyCampus				.876				
TA4_DegreeRecog				.865				
AS1_InstKnow					.890			
AS2_Fair					.865			
AS4_InstAns					.881			
AS6_TeamKnow					.866			
CW1_RelvInfo						.610		
CW3_ Easy						.789		
CW4_ Update						.841		
CW5_MM						.771		
CW6_HQ						.727		
RA1_ConsGood							.973	
RA3_CorrectsInfo							.953	
RA4_TeamHelp							.935	
RS1_QckResp								.674
RS2_TeamHelp								.906
RS3_TeamGuides								.683
RS4_InstSupp								.897

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, we conducted Exploratory Factor Analysis (EFA) using Principal Component Analysis with Promax rotation (see table 4.5). Promax was selected for two reasons: the sample size was adequately large, i.e. n=421; and Promax is suitable when multiple factors are correlated. Three questions were dropped, as they did not load well. Interestingly, when considering learning content questions, generic (i.e. LC_1/4), presentation (LC_8/9) and delivery mode questions - relating to technology /device (LC_10/11) - failed to load. It is believed that quality perception concerning presentation and device preference, is not explicitly related to learning content. This is because hardware keeps on changing and updating and a learner can use any device s(he) prefers for learning. Similarly, the quality of the learning material depends more on its content, rather than how it is presented.

Structure, Interactivity, language, and content delivery (i.e. audio, video, text, etc.) loaded reliably. When considering course website questions, only 'attractiveness' failed to load. We hypothesise that the attractiveness of the website is not perceived as essential to e-learning content delivery; interface design, navigation, ease of use, and information quality are all seen as critical. The eight factors that were extracted in the pattern matrix (table 4.5) were used for further analysis. The cumulative variance of the eight factors was 77.68%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high, i.e. all were above 0.300, and most were above 0.800. The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (see Table 4.6).

Table 4.6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.800
Bartlett's Test of Sphericity	Approx. Chi-Square	16011.022
	df	528
	Sig.	.000

Fitness of Results

The ELQ model, to the best of our knowledge, is the first to measure the perception of e-learning quality; including 'Learning Content' (information) and 'Course Website' (system) dimensions. The seven hypotheses, defined in section 4.8 were tested as independent variables. At the P <0.05 level, five factors were identified as being significant to the student's perception of quality, i.e. Assurance, Responsiveness, Tangibility, Course Website, Learning Content. Empathy and Reliability (see table 4.7).

Table 4.7: Regression Weights

			Estimate	S.E.	C.R.	P
LearningQuality	<---	Assurance	.156	.056	2.791	.005**
LearningQuality	<---	Empathy	.013	.049	.259	.795
LearningQuality	<---	Responsiveness	.225	.065	3.454	.001***
LearningQuality	<---	Reliability	.009	.064	.138	.891
LearningQuality	<---	LearningContent	.265	.058	4.609	.001***
LearningQuality	<---	Tangibles	.126	.049	2.583	.010*
LearningQuality	<---	CourseWebsite	.253	.066	3.817	.001***
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001						

This research confirms hypotheses H2, H3, H5, H6 and H7, i.e. Assurance, Responsiveness, Tangibility, Course Website and Learning Content, are positively associated with the perception of e-Learning quality (ELQ).

All fitness values are within acceptable criteria limits depending on the test, hence implying a good model fit (see table 4.8). Chi-square/df value is 2.89, where a value between 2.0 and 5.0 is considered acceptable (Hau, 2010). Our RMSEA value is 0.069, and our CFI and NFI values are 0.990 and 0.986, respectively; demonstrating the goodness of fit, thus supporting the results and validating the proposed model.

Table 4.8: Goodness of Fit Statistics

Index	Value	Criterion
Chi – Square /Df	2.89	2.0 – 5.0
RMSEA	0.067	0 – 0.1
CFI	0.990	0 ~ 1
NFI	0.986	0 ~ 1

4.11 Conclusion

This research proposes an extended SERVQUAL model, i.e. the E-Learning Quality (ELQ) model, for measuring e-learning quality, comprising of these three dimensions, i.e. service, information, and system. These are needed in order to effectively assess e-Learning quality. Results confirmed hypotheses H2, H3, H5, H6, and H7; i.e. that Assurance, Responsiveness, Tangibility, Course Website, and Learning Content have a positive correlation with the student perception of e-Learning quality. Accordingly, student's seemingly valued a stable, and easy to use e-learning environment. Our findings support existing literature (Yang and Liu, 2007) and highlight a growing need to understand, and explicitly consider both tangible and intangible education needs.

4.12 Using ELQ Model

Now that we have developed and tested a model which covers all three dimensions of e-Learning quality, i.e. service, information, and system, we will use this ELQ model to test our three dimensions of ‘delivery modes’, ‘language’ and ‘interactivity’, which we believe to be critical, from pedagogical perspective, for e-Learning quality perception. In chapters 5,6 and 7 will use this model to test quantitatively, how delivery modes, language and interactivity impact e-Learning quality.

During the development of the ELQ model experiment, some of the factors of ‘service’, i.e. reliability and empathy did not prove to be significant. However, in our experiments related to delivery modes, language, and interactivity, we will study the moderating effect on all the factors related to ‘service’. This would be helpful in exploring if other service factors, which were not significant in the ELQ study, become significant when moderated by delivery modes, language and/or interactivity.

Chapter 5
Delivery Modes

5.1 Introduction

This chapter starts by discussing how delivery modes/media type is important to the domain of e-learning, and why delivery modes are an important aspect of pedagogy. The discussion then moves towards theoretical underpinning of using different media types for learning. The researcher explains the media richness theory, the cognitive theory of multimedia learning, and considers how the extended SERVQUAL model (i.e. ELQ model) constructs relate to this research. The research model for this quantitative research is explained, and step wise data analysis is presented. Research, from a sample of 475 university students, reveals their preference for different delivery modes in line with different dimensions of the ELQ model.

5.2 Importance of Delivery Media

Online curriculum designers are always investigating ways and methods of designing effective online learning programs since demand for online education and training programs is considerably increasing. For an online learning program to be effective, the literature implies that choice of media is vital. Course designers tend to believe that richer media fetches better results, so they often use more audio and video-based content rather than plain text. Interestingly, there is limited research validating the assumption that richer medium guarantees better learning outcomes.

There are many studies which focus on the participants' experience about e-learning programs using Technology Acceptance Model (TAM) (Liu, Liao, & Pratt, 2009; Cheng, 2011). Factors related to individuals like internet self-efficacy, learning goal orientation, and cognitive absorptions have a positive correlation with perceived usefulness, ease of use along with factors related to interactivity, content quality, response and functionality have been reported in the literature (Cheng, 2011). In one study, Liu et al. (2009) further studied user concentration and technology acceptance of e-learning with respect to different media for e-learning program, namely text, audio, and video. Their study concluded that richness of the content positively influences user concentration but found mixed results for perceived usefulness. The mixed

outcomes suggest a possible interaction between media choice and other variables in influencing not only perceived usefulness but learning effectiveness of e-learning programs.

The emerging trend and extensive utilisation of e-learning and information communication technologies have highlighted the importance of e-learning methodology and media choice being used. 'Streaming' media is quite a new media for e-learning (Liu, Liao, & Pratt, 2009). Streaming media gives the user the liberty of playing video or audio instead of waiting for the download to complete then watching or hearing it, as a result, it helps in crafting a more collaborative learning experience and environment. In an e-learning system, one can use several combinations of video / audio / graphics / animation / text. Media selection is very crucial while planning to develop an e-learning system because of the cost of the non-textual material (Timmerman & Kruepke, 2006; Sun & Cheng, 2007); with literature implying the time and cost for the development of e-learning material being five times greater than that required to develop conventional lecture material (Weiser & Wilson, 1999).

Selection of multimedia presentation has an influence on the perceived usefulness as suggested in literature material (Liu, Liao & Pratt, 2009). Arbaugh (2005b) looked at student's perceived learning and satisfaction with e-learning, and investigated the notion of media variety on e-learning effectiveness and concluded, among other things, that using a variety of media positively influences learning effectiveness. It is, therefore, necessary to perform additional work to investigating types of media-presentation and its relationship with quality perception of users and ultimate student satisfaction. The current study aims to check users' quality perception when different media is used for e-learning delivery. The theoretical framework is proposed in the current study to determine user's satisfaction with web-based learning. It will help in looking from the perspective of both learner and e-learning system user. Acceptance of the web-based streaming media for e-learning is tested through use of SERVQUAL (Service quality model). SERVQUAL is extensively used and accepted by many researchers to measure user's satisfaction. The current research is motivated and directed to provide answers to the question, "Does the learner's e-learning satisfaction is influenced by the different ways in which e-learning material is presented?"

5.3 Theoretical background

The current study is established using two concepts from the literature media richness theory and conceptual framework of quality SERVQUAL model. In coming sections, detailed explanation with the hypothesis of each will be explained, which will integrate the foundations of the research using the model.

5.3.1 The Cognitive Theory of Multimedia Learning (CTML)

In (1997) Mayer proposed a concept called "Cognitive theory of multimedia learning", sometimes also known as ''multimedia principle'', stating that "using pictures with words can result in more profound learning instead of using only words". Following are fundamental supposals of this theory: (i) all human being have to hear and visual distinct channels to process information (Dual-Coding theory), (ii) there is a limited capability for each channel, and (iii) learning is a process in which prior knowledge is used to strain, organize, select, and incorporate information. It also underlines the importance and influence of visualisation being used for delivery of education on the human information processing and ultimate learning (Gress, Fior, Hadwin & Winne, 2010; Martinez et al., 2007). Visualisation can be exceptionally suitable for teaching a topic which is tough to teach otherwise image, like the neural networks, atomic structures or the solar system. Visualisation can also be used to describe the concept of look and feel of a website, where look refers fonts, colors, visual design, and shapes of site whereas feel refers as the familiar features that help when navigating through the hyperlinks, menus, tools and check boxes.

A study on the concept of credibility and aesthetics by Robins and Holmes (2008) stated that there is high judgments of credibility when there is high aesthetic treatment. A study by Chikasha et al. (2010), in context of African communities, is conducted exploring the critical issues related to the incorporation of multimedia on e-learning. It was concluded, in the findings, that use of audio with visuals improved the learning result, minimised cognitive load and increased satisfaction.

5.3.2 Media Richness Theory (MRT)

Daft and Lengel (1986) proposed a theory that "capacity to process rich information" can help improve user concentration. Media Richness Theory (MRT) aims to help in the selection of right technology to minimise obscurity in different business situations. MRT also states that,

for certain environments, lean media communicates effectively, but in case of uncertain environments richer media is required for effective communication (Daft & Lengel, 1986). Rapid developments, and more sophisticated technology available to users means it is required to assess media richness theory constantly. Some of the business studies testing media richness theory (Lim & Benbasat, 2000; Matarazzo & Sellen, 2000; Yeung & Lu, 2004; Otondo, Van Scotter, Allen & Palvia, 2008) integrate audio, video, or web technologies. Most of these supported media richness theory; results showed that while communicating tasks video (rich media) is more efficient than the text (lean media). The advantage of rich media is that it uses multiple channels, which more effectively helps in explaining complex tasks. Media choice is dependent on its communication capability (Yeung & Lu, 2004). MRT has also emphasised in a number of studies related to education (Kozma, 1991; Clark, 1991), which means that different types of learning material may be used with different types of media. So for reading a conceptual paper, written text may be the best. However, to be able to most effectively understand a case study a video clip may be most suitable.

Clark (1994), however, says learner's success is not inclined by media selection; instead the same achievement can get from differed media types. Which means depending on the preference of the learner, if the same material is presented in different media, i.e. text, audio or video, the same performance may be expected.

If the above argument is accepted, it can be said that the availability of choices for media is useful for supporting user satisfaction. This also infers that users may feel that they have choices when it comes to media selection and some users may have a preference for a certain type of media. Therefore, having learning material available in multiple media types seems useful.

The aim of almost all studies conducted so far concerning media richness theory relates to check the success of learning. Some recent studies added the concept of intent, used with MRT, to check learner satisfaction. Rich media can benefit learners, can, therefore, be used in courses having uncertain and confusing material; on the other hand, learners attain no substantial advantage in both satisfaction and scores in courses that have low numerical content (Sun & Cheng, 2007). Otondo et al. (2008) found that audio and video (rich media) are closely related to learner satisfaction, however, the leaner achievement related to the medium text.

Users select media based on their previous experience, and their perceived satisfaction with media, rather than the information processing capability of the media itself. Accordingly, different media combinations (presentation types) represent different levels of media richness, which could then be associated with the perceived satisfaction of the e-learning experience. Streaming media, the real-time playing of audio/video over the Internet, is common to e-learning. Advances in technology have enabled the incorporation of streamed audio and video into e-learning environments, and the subsequent study of the influence of that streaming media has been looked at by a number of researchers. This research is, however, the first to assess the influence of different media (herein referred to as delivery modes) on a user's quality perception of e-learning system; considering 'service', 'information' and 'system' dimensions. MRT has been widely used to investigate suitability among task and media characteristics and for describing issues effecting media richness like task satisfaction, decision quality and time (Rice, 1992; Mennecke, Valacich & Wheeler, 2000; Purdy, Nye & Balakrishnan, 2000; Kahai & Cooper, 2003), system design for organisations (Daft & Lengel, 1983; 1986), marketing, conflict management (Klein, 2003), and extrapolation and explanation of the media choice and usage in organizations (Daft, Lengel & Trevino, 1987; Markus, 1994; Whitfield, Lamont & Sambamurthy, 1996; Allen & Griffeth, 1997). In short, the media richness theory has been applied in a wide variety of issues with success in both theoretical analyses and empirical studies.

Prior research on media richness indicates that text as a presentation type might be primarily suitable for communication of factual information; whereas multimedia presentations could communicate both factual and abstract information. There are limited empirical studies investigating the influence of streaming media on learner performance and satisfaction. This research is designed to fill that gap. Hence, the following hypothesis was tested:

H1: Student perception of e-learning quality is influenced by the type of media in which the information is presented.

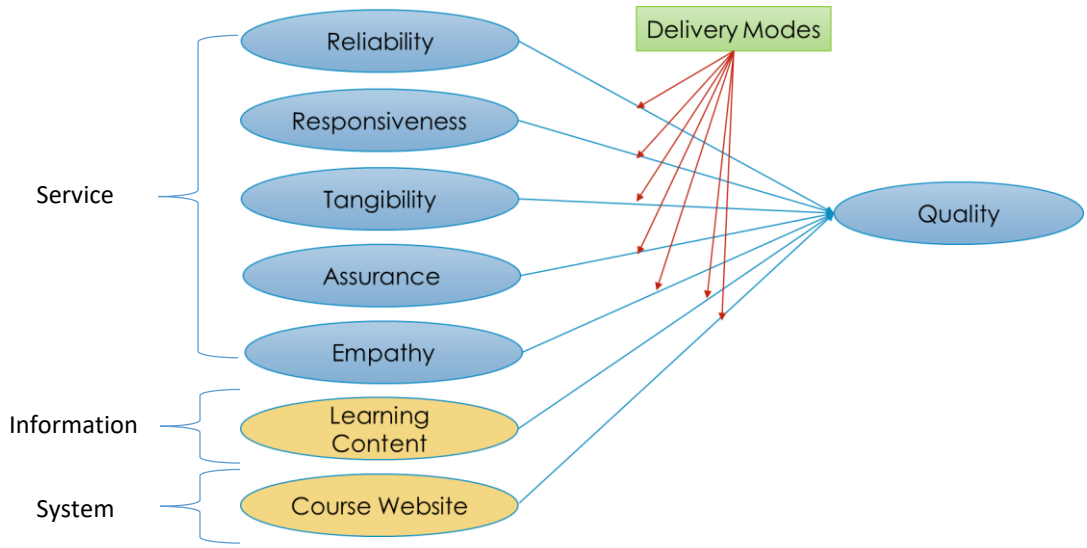
5.4 The Research Model

It is argued that the suitability of the representation of learning material has a direct effect on the learner's comprehension process, with learning being very much impacted by the individual's specific comprehension of the learning material (Burns, Clift, & Duncan, 1991).

From the perspective of media richness theory, the medium used when representing learning material has its own usage cost and transmission capacity for information, and thus needs to be selected carefully. An improper choice of media channel is not only unbeneficial to the student learning performance, but also can be costly; both in cost and time of generation, in terms of required bandwidth/technology required to deliver the learning content, but also in terms of cognitive load required to process and assimilate information. For example, it is expensive to use high richness media such as animation to present the learning material with a low level of uncertainty. Similarly, too much unnecessary multimedia elements in learning material will distract a learner's attention and have no significant positive effect on learning (Gillani & Relan, 1997; Bartsch & Cobern, 2003).

The current study has empirically tested the E-Learning Quality Model (ELQ) as the research model shown in Figure 5.1. The model includes the service quality model (SERVQUAL) at its base. This model, created by Uppal et al (2017), proposed an extension to the SERVQUAL, keeping in mind the e-learning system users. These users, assess e-learning systems on two aspects, i.e. information and system. Therefore, the success of e-learning is dependent on two factors; the way content is presented to the learner/user (information), and learner's/users' perceived usefulness of the system (course website).

Figure 5.1: ELQ - Research model – Adopted to consider effect of Delivery modes



To consider the component aspects of quality, our research hypotheses states that, when e-learning system delivers information using a range of different media (text and graphics/text, graphics and sound/text, graphics and video):

H1: “Reliability” is positively associated with students’ perception of e-learning quality.
H2: “Assurance” is positively associated with students’ perception of e-learning quality.
H3:“Tangibility” is positively associated with students’ perception of e-learning quality.
H4: “Empathy” is positively associated with students’ perception of e-learning quality.
H5:“Responsiveness” is positively associated with students’ perception of e-learning quality.
H6: “Learning Content” is positively associated with students’ perception of e-learning quality.
H7: “Course Website” is positively associated with students’ perception of e-learning quality.

The influence and importance of media on learning are considered by varying the media richness. Use of multiple and combination of media rather than single media is very common, so we suggest three distinctive modes of presenting e-learning: only text, text with audio, and video with associated audio. Streaming both audio and video at the same time can help in meeting and exceeding learner/user expectations of advanced system technology. We believe that user intention towards e-learning system is affected by the delivery modes/presentation in two ways. Primarily users’ perceived value and ultimate satisfaction towards e-learning system are effected thorough type of presentation used in the delivery of e-learning content. Secondly, a user is most likely to use the e-learning again if he/she is satisfied with the service, information and/or system.

5.5 Research Methodology

We carried out the empirical testing of the research model by designing an experiment, where we gave three types of learning material to the students for the duration of a semester, followed by data collection through a questionnaire. First, the students were given text-only material, secondly, they were given text material with audio and finally they were given learning material with text, audio, and video.

5.5.1 Research Study

We used a survey instrument to collect data on perceptions of quality and satisfaction from the learning material that is provided to students. This data is collected from a random sample of 475 undergraduate and graduate students in the business school of two universities in Lahore (Pakistan). This had a limitation, i.e. using perceptions of learning satisfaction rather than actual learning measures.

5.5.2 Sampling and Data collection

Our survey targeted a random sample of 475 students. After obtaining approval for this study and after making prior arrangement with instructors to deliver learning material to students in a planned manner. The undergraduate course 'Supply Chain Management' was used to run this experiment. For the first four weeks, learning material was made available to students through powerpoint slides, which were primarily text-based. For the next four weeks, students were provided slides with text and audio, and for the last four weeks, students were provided learning material in the form of video lectures where the instructor could be seen with the slides.

After the completion of the course in three and half months, we requested students to respond to our survey regarding their perception of quality for the delivered course. The purpose of our research and the different parts of the survey instrument were explained to the students. They were also informed that their participation was completely voluntary. On average, students took 20 min to complete our survey instrument. The survey instrument is attached in Appendix C.

5.5.3 Variables

Our independent variables are reliability, assurance, tangibility, empathy, responsiveness, website and learning content. The moderating variable of media choice was operationalised at three levels as follows:

- **Text, plus graphics**: This would include graphs, charts and still pictures in addition to text, equivalent to printed material or slides.
- **Text, Graphics, plus sound**: This would add sound/audio annotation to printed materials or slides.
- **Text, graphics, video (full-motion) or animation**: This would include full-motion or animated illustration of the contents of the learning program, as distinct from showing only the instructor.

Our dependent variable is the perception of quality. In the survey instrument, we asked each participant to read the questionnaire statements and provide feedback on each statement for each of the learning types. In the survey instrument, the following scale was used: 1=Very Important, 2=Important, 3= Neither Important nor Unimportant, 4= Unimportant and 5= Very Unimportant.

5.6 Analysis and Findings

5.6.1 Delivery through Text plus Graphics

Reliability and Validity

To check the reliability of the scale we conducted Cronbach Alpha (Cronbach, 1951; Nunnully, 1978) to measure internal consistency. The Cronbach Alpha for all questionnaire items is 0.879. The extracted factors' Cronbach alpha values for our quality factors are shown in Table 5.1. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable (Jarvis et al., 2003).

Table 5.1: Scale Reliability values

Factor Label	**Number of Items**	**Cronbach's alpha (α)**
Assurance	5	0.967
Reliability	5	0.914
Responsiveness	5	0.965
Empathy	5	0.961
Tangibility	4	0.940
Learning Content	9	0.984
Learning Quality	4	0.932
Course Website	6	0.925

Terms measuring the same construct exhibited high construct loadings, i.e. suggesting adequate convergent validity. According to Hair et al. (2010), the minimum threshold value recommended for a sample size of 475 is 0.350. Since all loaded values were above 0.50, it confirms that the factors had sufficient discriminant validity, and no unexpected cross-loading occurred (see Table 5.2).

After testing the scale reliability, convergent and divergent validity was tested. Convergent validity can be established if two indicators correspond to each other. Divergent validity is the degree to which two dissimilar constructs can be easily differentiated.

Table 5.2: Discriminant and convergent validity

CR	Constructs	LC	LQ	ASS	EMP	RESP	REL	TAN	CW
0.984	**Learning Content**	**0.935**							
0.922	**E-learning Quality**	0.461	**0.865**						
0.968	**Assurance**	0.302	0.362	**0.927**					
0.960	**Empathy**	0.255	0.230	0.203	0.910				
0.967	**Responsiveness**	0.225	0.259	0.518	0.241	**0.925**			
0.915	**Reliability**	0.450	0.415	0.425	0.284	0.386	**0.827**		
0.943	**Tangibles**	0.496	0.465	0.223	0.212	0.241	0.604	**0.897**	
0.924	**Course Website**	0.025	0.115	0.044	0.128	0.077	0.033	-0.007	**0.820**

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, i.e. met reliability and validity criteria, we conducted an EFA using Principal Component Analysis, with Promax rotation (see table 5.3).

We selected Promax for two reasons: firstly because our sample size was adequately large, i.e. n=475; secondly, since Promax is suitable when multiple factors are correlated. Some of the questions needed to be dropped, as they did not load well. The eight factors that were extracted in the pattern matrix (table 5.3) were, however, used for further analysis. The cumulative variance of the seven factors was 81.46%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high, i.e. all were above 0.300 with most being above 0.800.

Table 5.3: Pattern Matrix[a]

Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalisation. a. Rotation converged in 7 iterations.

	Factor							
	1	2	3	4	5	6	7	8
ASU Text 1	.943							
ASU Text 2	.838							
ASU Text 3	.821							
ASU Text 4	.970							
ASU Text 5	.975							
EMP Text 1		.919						
EMP Text 2		.877						
EMP Text 3		.884						
EMP Text 4		.949						
EMP Text 5		.934						
RSP Text 1			.880					
RSP Text 2			.882					
RSP Text 3			.962					
RSP Text 4			.932					
RSP Text 5			.950					
RAL Text 1				.816				
RAL Text 2				.743				
RAL Text 3				.793				
RAL Text 4				.834				
RAL Text 5				.870				
LC Text 1					.932			
LC Text 2					.905			
LC Text 3					.872			
LC Text 4					.958			
LC Text 5					.956			
LC Text 6					.929			
LC Text 7					.927			
LC Text 8					.956			
LC Text 9					.924			
TAN Text 1						.852		
TAN Text 2						.858		
TAN Text 3						.809		
TAN Text 4						.921		
ELQ Text 1							.899	
ELQ Text 2							.873	
ELQ Text 3							.880	
ELQ Text 4							.856	
CW Text 1								.661
CW Text 2								.675
CW Text 3								.886
CW Text 4								.823
CW Text 5								.895
CW Text 6								.956

The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (see table 5.4).

Table 5.4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.883
Bartlett's Test of Sphericity	Approx. Chi-Square	7287.190
	df	903
	Sig.	.000

Fitness of Results

The ELQ model, to the best of our knowledge, is the first that has been tested to measure the perception of e-learning quality, including the dimensions of 'Learning Content' and 'Course Website'. Seven hypotheses were tested as independent variables, i.e. the original five SERVQUAL dimensions, plus the additional dimensions - 'Learning Content' and 'Course Website'. At the P <0.05 level, three dimensions were identified to positively relate to student's perception of quality; i.e. Learning Content, Tangibility, and Assurance. Empathy, Reliability, Course Website and Responsiveness were not found to be significant. Regression weights are given in table 5.5. Our research accordingly confirms hypotheses H2, H3, and H6; proving Assurance, Tangibility and Learning Content using ELQ model, are positively associated with the perception of e-Learning quality.

Table 5.5: Regression Weights

			Estimate	**S.E.**	**C.R.**	**P**
E-Learning Quality	←	Learning Content	.179	.060	2.981	.003**
E-Learning Quality	←	Tangibility	.226	.079	2.852	.004**
E-Learning Quality	←	Reliability	-.023	.096	-.241	.809
E-Learning Quality	←	Responsiveness	-.006	.054	-.106	.916
E-Learning Quality	←	Assurance	.220	.069	3.207	.0001***
E-Learning Quality	←	Empathy	.001	.059	.009	.992
E-Learning Quality	←	Course Website	.072	.095	.753	.451
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001						

All fitness values are within acceptable criteria limits, depending on the test, hence implying a good model fit (see table 5.6). Chi-square/df equaled 1.775; where a value between 2.0 and 5.0 is considered acceptable (Hau 2010). Our RMSEA value is 0.075, and our CFI and NFI values are 0.989 and 0.977 respectively; demonstrating the goodness of fit, thus supporting the results and validating the proposed model.

Table 5.6: Goodness of Fit Statistics

Index	Value	Criterion
Chi – Square /Df	1.775	2.0 – 5.0
RMSEA	0.075	0 – 0.1
CFI	0.989	0 ~ 1
NFI	0.977	0 ~ 1

Our findings show that when it comes to the perception of quality for e-learning, if the e-learning system is provided in the text format, it has a correlation with learning content. This means students, associate the e-learning system quality with the media in which the learning content is provided. Secondly, use of text is perceived as being tangibly effective. This means if e-learning system is provided in the text format learning content quality, tangibility quality, and assurance the learners' is positively increased.

5.6.2 Delivery through Text, Graphics plus Sound

Reliability and Validity

To check the reliability of the scale we conducted Cronbach Alpha (Cronbach, 1951; Nunnully, 1978) to measure internal consistency. The Cronbach Alpha for all questionnaire items is 0.879. The extracted factors' Cronbach alpha values for our quality factors are shown in table 5.7. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable (Jarvis et al., 2003).

Table 5.7: Scale Reliability

Factor Label	Number of Items	Cronbach's alpha (α)
Assurance	5	0.970
Reliability	5	0.968
Responsiveness	5	0.972
Empathy	5	0.974
Tangibility	4	0.961
Learning Content	9	0.987
Learning Quality	4	0.947
Course Website	6	0.969

Terms measuring the same construct exhibited high construct loadings, i.e. suggesting adequate convergent validity. According to Hair et al. (2010), the minimum threshold value recommended for a sample size of 475 is 0.350. Since all loaded values were above 0.50, it confirms that the factors had sufficient discriminant validity, and no unexpected cross-loading occurred (Table 5.8). After testing the scale reliability, convergent and divergent validity was tested.

Table 5.8: Discriminant and convergent validity

CR	Constructs	ASU	LC	RES	REL	EMP	LQ	TAN	CW
0.965	**Assurance**	0.921							
0.985	**Learning Content**	0.103	0.950						
0.973	**Responsiveness**	0.140	0.213	0.937					
0.969	**Reliability**	0.236	0.381	0.354	0.928				
0.974	**Empathy**	0.269	0.349	0.535	0.561	0.940			
0.948	**E-learning Quality**	0.026	0.136	0.024	0.277	0.056	0.906		
0.962	**Tangibles**	0.014	0.232	0.350	0.327	0.341	0.169	0.929	
0.968	**Course Website**	0.057	-0.064	0.143	-0.072	0.034	-0.219	0.066	0.915

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, i.e. met reliability and validity criteria, we conducted an EFA using Principal Component Analysis, with Promax rotation (see table 5.9). We selected Promax for two reasons, first because our sample size was adequately large, i.e. n=475. Secondly, since Promax is suitable when multiple factors are correlated. The seven factors that were extracted in the pattern matrix (table 5.9) were, however, used for further analysis. The cumulative variance of the seven factors was 77.68%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high; i.e. all were above 0.300, with most being above 0.800.

Table 5.9: Pattern Matrix[a]

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalisation.
a. Rotation converged in 7 iterations.

	Factor							
	1	2	3	4	5	6	7	8
ASU Text 1	.962							
ASU Text 2	.850							
ASU Text 3	.965							
ASU Text 4	.906							
ASU Text 5	.965							
EMP Text 1		.919						
EMP Text 2		.877						
EMP Text 3		.884						
EMP Text 4		.949						
EMP Text 5		.934						
RSP Text 1			.880					
RSP Text 2			.882					
RSP Text 3			.962					
RSP Text 4			.932					
RSP Text 5			.950					
RAL Text 1				.816				
RAL Text 2				.743				
RAL Text 3				.793				
RAL Text 4				.834				
RAL Text 5				.870				
LC Text 1					.932			
LC Text 2					.905			
LC Text 3					.872			
LC Text 4					.958			
LC Text 5					.956			
LC Text 6					.929			
LC Text 7					.927			
LC Text 8					.956			
LC Text 9					.924			
TAN Text 1						.852		
TAN Text 2						.858		
TAN Text 3						.809		
TAN Text 4						.921		
ELQ Text 1							.899	
ELQ Text 2							.873	
ELQ Text 3							.880	
ELQ Text 4							.856	
CW Text 1								.661
CW Text 2								.675
CW Text 3								.886
CW Text 4								.823
CW Text 5								.895
CW Text 6								.956

The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (table 5.10).

Table 5.10: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.832
Bartlett's Test of Sphericity	Approx. Chi-Square	9421.616
	df	903
	Sig.	.000

Fitness of Results

The ELQ model, to the best of our knowledge, is the first that SERVQUAL has been tested to measure the perception of e-learning quality, including the additional dimensions of 'Learning Content' and 'Course Website'. Seven hypotheses were tested as independent variables, i.e. the original five SERVQUAL dimensions, plus the proposed dimensions - 'Learning Content' and 'Course Website'. At the P <0.05 level, two dimensions were identified as impacting student's perception of quality; i.e. Reliability and Course Website. Regression weights are given in table 5.11. Interestingly, however, results show that use of text and audio had a negative impact on quality perception of the course website. Our research accordingly confirms hypotheses H1, yet disproves H7; since the use of audio and text, measured using the e-Learning quality (ELQ) model, had a negative impact on student perception of quality.

Table 5.11: Regression Weights

			Estimate	**S.E.**	**C.R.**	**P**
E-Learning Quality	←	Learning Content	-0.011	0.075	-0.152	0.879
E-Learning Quality	←	Tangibility	0.108	0.065	1.656	0.098
E-Learning Quality	←	Reliability	0.259	0.077	3.349	.001***
E-Learning Quality	←	Responsiveness	-0.245	0.154	-1.594	0.111
E-Learning Quality	←	Assurance	-0.013	0.057	-0.223	0.823
E-Learning Quality	←	Empathy	-0.145	0.082	-1.775	0.076
E-Learning Quality	←	Course Website	-0.143	0.063	-2.257	.024*
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001						

All fitness values are within acceptable criteria limits, depending on the test, hence implying a good model fit (see table 5.12). Chi-square/df equaled 2.89; where a value between 2.0 and 5.0 is considered acceptable (Hau 2010). Our RMSEA value is 0.069, and our CFI and NFI values are 0.990 and 0.986 respectively; demonstrating the goodness of fit, thus supporting the results and validating the proposed model.

Table 5.12: Goodness of Fit Statistics

Index	**Value**	**Criterion**
Chi – Square /Df	1.170	2.0 – 5.0
RMSEA	0.035	0 – 0.1
CFI	1.170	0 ~ 1
NFI	0.990	0 ~ 1

Our findings show that when it comes to the perception of quality for e-learning if the e-learning system provides content via both text and audio format, it has a positive correlation on 'Reliability'; but has a negative correlation on the perception of the course website. This means that students perceive the reliability of service improves if the service is not only provided in the text but also in audio. This means if a service is required by a student and with an e-mail or text message if an audio message or call is also made, the reliability of the service would be perceived to have improved. The association with the 'Learning Content' is not significant in this case. This may be because if the text is given as learning material and audio is provided, there may be a disconnect between the audio and the text. If students cannot see who is providing the audio for the text, they do not see it as an important or significant aspect of the perception of quality. They do not think, in this format, the quality of the content improves. This means students, want to see the teacher when he/she is delivering the learning content.

5.6.3 Text, Graphics, and Video Analysis

Reliability and Validity

To check the reliability of the scale we conducted Cronbach Alpha (Cronbach, 1951; Nunnully, 1978) to measure internal consistency. The Cronbach Alpha for all questionnaire items is 0.879. The extracted factors' Cronbach alpha values for our quality factors are shown in table

5.13. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable (Jarvis et al., 2003).

Table 5.13: Scale Reliability

Factor Label	**Number of Items**	**Cronbach's alpha (α)**
Assurance	5	0.981
Reliability	5	0.969
Responsiveness	5	0.981
Empathy	5	0.982
Tangibility	4	0.969
Learning Content	9	0.988
Learning Quality	4	0.954
Course Website	6	0.978

Terms measuring the same construct exhibited high construct loadings, i.e. suggesting adequate convergent validity. According to Hair et al. (2010), the minimum threshold value recommended for a sample size of 475 is 0.350. Since all loaded values were above 0.50, it confirms that the factors had sufficient discriminant validity, and no unexpected cross-loading occurred (table 5.14).

Table 5.14: Discriminant and convergent validity.

CR	**Constructs**	**CW**	**ASR**	**EMP**	**RES**	**TAN**	**LQ**	**LC**	**REL**
0.980	**Course Website**	0.943							
0.980	**Assurance**	-0.045	0.952						
0.982	**Empathy**	-0.112	0.602	0.958					
0.981	**Responsiveness**	-0.126	0.589	0.672	0.954				
0.969	**Tangibles**	0.002	0.434	0.353	0.290	0.941			
0.958	**E-learning Quality**	-0.160	0.256	0.217	0.233	0.156	0.922		
0.987	**Learning Content**	0.052	0.216	0.149	0.102	0.207	0.201	0.946	
0.974	**Reliability**	-0.108	0.302	0.249	0.244	0.160	0.044	0.057	0.939

After testing the scale reliability, convergent and divergent validity was tested.

Table 5.15: Pattern Matrix[a]

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.
Rotation converged in 6 iterations.

	Factor							
	1	2	3	4	5	6	7	8
ASU Text 1	.962							
ASU Text 2	.940							
ASU Text 3	.886							
ASU Text 4	.993							
ASU Text 5	.953							
EMP Text 1		.982						
EMP Text 2		.913						
EMP Text 3		.884						
EMP Text 4		.971						
EMP Text 5		.975						
RSP Text 1			.945					
RSP Text 2			.926					
RSP Text 3			.958					
RSP Text 4			.991					
RSP Text 5			.926					
RAL Text 1				.992				
RAL Text 2				.927				
RAL Text 3				.912				
RAL Text 4				.934				
RAL Text 5				.987				
LC Text 1					.983			
LC Text 2					.935			
LC Text 3					.988			
LC Text 4					.989			
LC Text 5					.895			
LC Text 6					.967			
LC Text 7					.944			
LC Text 8					.945			
LC Text 9					.985			
TAN Text 1						.991		
TAN Text 2						.974		
TAN Text 3						.889		
TAN Text 4						.971		
ELQ Text 1							.985	
ELQ Text 2							.881	
ELQ Text 3							.927	
ELQ Text 4							.995	
CW Text 1								.955
CW Text 2								.934
CW Text 3								.932
CW Text 4								.947
CW Text 5								.978
CW Text 6								.977

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, i.e. met reliability and validity criteria, we conducted an EFA using Principal Component Analysis, with Promax rotation (see table 5.15). We selected Promax for two reasons, first because our sample size was adequately large, i.e. n=475. Secondly, Promax is suitable when multiple factors are correlated. The seven factors that were extracted in the pattern matrix (Table 5.15) were, however, used for further analysis. The cumulative variance of the eight factors was 90.398%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high; i.e. all were above 0.300, with most being above 0.800.

The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (Table 5.16).

Table 5.16: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.847
Bartlett's Test of Sphericity	Approx. Chi-Square	11518.113
	df	903
	Sig.	.000

Fitness of Results

The ELQ model, to the best of our knowledge, is the first that has been used to measure the perception of e-learning quality, including the additional dimensions of 'Learning Content' and 'Course Website'. Seven hypotheses were tested as independent variables, i.e. the original five SERVQUAL dimensions, plus the additional dimensions - 'Learning Content' and 'Course Website'. At the $P < 0.05$ level, three dimensions were identified to positively relate to student's perception of quality; i.e. Responsiveness, Learning Content and Course Website. Whereas other 4 variables were not found to be significant. Regression weights are given in table 5.17. Our research accordingly confirms hypotheses H5, H6, and H7; proving Responsiveness, Learning Content and Couse Website measured using ELQ model, are positively associated with the perception of e-Learning quality.

Table 5.17: Regression Weights

			Estimate	S.E.	C.R.	P
E-Learning Quality	←	Learning Content	0.393	0.126	3.108	.002**
E-Learning Quality	←	Tangibility	0.043	0.087	0.495	0.621
E-Learning Quality	←	Reliability	0.046	0.144	0.317	0.751
E-Learning Quality	←	Responsiveness	0.279	0.136	2.049	.040*
E-Learning Quality	←	Assurance	0.152	0.106	1.442	0.149
E-Learning Quality	←	Empathy	0.107	0.124	0.865	0.387
E-Learning Quality	←	Course Website	-0.197	0.09	-2.196	0.028*
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001						

All fitness values are within acceptable criteria limits, depending on the test, hence implying a good model fit (see table 5.18). Chi-square/df equalled 2.89; where a value between 2.0 and 5.0 is considered acceptable (Hau 2010). Our RMSEA value is 0.069, and our CFI and NFI values are 0.990 and 0.986 respectively; demonstrating the goodness of fit, thus supporting the results and validating the proposed model.

Table 5.18: Goodness of Fit Statistics

Index	Value	Criterion
Chi – Square /Df	.420	2.0 – 5.0
RMSEA	0.035	0 – 0.1
CFI	1.000	0 ~ 1
NFI	0.997	0 ~ 1

The findings reveal that when it comes to the perception of quality for e-learning, if the e-learning system in provided in the audio/video format, it has a positive correlation with responsiveness, learning content and course website. This means students, associate the e-learning system quality with the media format in which the learning content is provided. When the learning content is provided in full audio/video, they perceive it to be of better quality. This supports the 'multimedia principle' proposed by Mayer (1997). Secondly, if the course website components are available in multimedia, the perception of quality also improves. Similarly, one of the dimensions of SERVQUAL; responsiveness also seems to improve, if provided in multimedia. This means, if in an e-learning system, the responses to the learner are provided in multimedia, they perceive it to be of high quality. Like if instead of an e-mail message or a

text message, if a learner is called and spoken to, they perceive the quality of the service to be better.

Therefore, through chapter discussion and conducted experiments, to investigate different delivery media/modes, it has been found that different delivery media/modes have a different impact on student perception of quality. Therefore, when designing and developing e-learning system, educators and providers must consider these aspects for better system success.

Chapter 6
Local Language in Education

6.1 Chapter Introduction

This chapter starts by expanding the importance of language, from the point of view of education, and considers of use of the 'mother tongue' for learning. According to the English dictionary, the mother tongue is the first language that you learn when you are a baby, rather than a language learned at school or as an adult. We discuss literature in detail which highlights the importance of 'mother tongue' and its benefits for learning in the early ages. We proceed by describing the use of English, as an international language and explain why it is needed for higher education in the countries where teaching material is not developed and/or taught in the local languages.

6.2 Language in Education

In the educational context, language is important for comprehension and making use of knowledge. Vygotsky (1988) viewed language as a powerful development tool that helps in benefiting from instruction. In this sense, a language is a tool for learning and an aid to understanding. As such, language acts as a vehicle for educational development and is important for the acquisition of knowledge.

Over the past three decades, in elementary schools, there has been strong advocacy for conducting instruction in the local languages; assuming a higher level of literacy in their mother tongue than in any other second language (Tupas, 2015). The proponents of the use of mother tongue in education believe that the use of the local languages in school builds self-confidence in children, and it also provides them with opportunities to learn more as they grow.

6.3 Mother Tongue and Learning

When children start attending school, there are so many changes that they have to accustom themselves to. The classroom and the classmates are all strangers and so is the teacher who is the centre of instruction. Learning methods are different from how they learned at home, which means that children need to initially learn how to learn (Skutnabb-Kangas & Heugh, 2013). It is argued that bringing in an abrupt change to the child's language at this early stage

complicates the learning environment further. Accordingly, multiple types of research have highlighted the significance of promoting mother tongue education in primary schools (Lin, 2015). This is considered as an impeccable approach to promote native language in order to prepare children for their further educational path and training of life (Cummins, 2001).

The leading aim of learning, in the early years of one's education, is to develop basic literacy skills. These skills include reading, writing, and arithmetic, with the skills of reading and writing explicitly associated with the sounds of one's language, as well as the letters and symbols that are used to write them down. It is these skills that enhance interaction and/or a student's foundational abilities to both speak and effectively listen. When a learner is able to understand and speak the language that is being used to instruct them, they are able to develop their reading and writing skills much faster and in ways that are more meaningful. It is also prudent to note that the learners who are able to develop reading skills early have a head-start in their education compared to those who do not (Ball, 2010).

The impact of learning in the mother tongue has remained a hot topic of debate in pedagogical literature; with arguments both for and against the use of the mother tongue in early education (Nyika, 2015). Despite some critics, there are strong pedagogical arguments in favour of the use of the mother tongue in education. Studies, for example, highlight that children accomplish greater success in education when they study in their mother tongue, especially within the first years of their primary schooling (Bamgbose, 1976; Tupas, 2015). Moreover, students who obtain the opportunity to receive education in their mother tongue are more successful than those who are not presented with such a possibility (Cummins & Hornberger, 2008). Students who learn in their mother tongue acquire higher levels of self-confidence and academic success. According to Dolby (2012), the most important component of education is learning in the mother tongue. 'Language', in literature, is seen as an important tool in transferring cultural values to future generations since language is a form of expression within a society, which means that the teaching of language is important for all societies in enabling them to sustain their cultural dimension. The local language is a, therefore, a form of expression for the local society. It is an indispensable cultural value that enriches the social sphere and facilitates social expression from poetry to novels, from music to other kinds of art (Edwards, 2010).

6.4 Education in Mother Tongue Worldwide

When learners are taught in their mother tongue, there is a higher probability that they engage in the learning process. The interactive learner-centered technique that is recommended by most educationists also works best in environments where the learner is fully proficient in the language of instruction. This environment allows learners to come up with focused suggestions, ask relevant questions, gain clarifications, answer questions effectively, and communicate their newly acquired knowledge with enthusiasm and ease. Being taught in their native language, i.e. the language that they readily identify with makes it easy for learners to have confidence which assists learners to affirm their cultural identity. As a result, this has a positive effect on how learners perceive learning and/or the relevance it has into their lives.

Linguistic diversity is considered as a significant characteristic in some countries (Kjær & Adamo, 2016). Asian and African countries specifically are linguistically diverse, i.e. where language diversity is higher than the rest of the world (Lin, 2015). Since the 1960s, education systems have focused increasingly on multicultural perspectives, in terms of diversity, which has fostered challenges in diversified nations by hitting the systems of their education (Rhoads & Valadez, 2016). A number of countries have implemented this multicultural perspective by introducing a focus on using the mother tongue within their education systems.

A lot of research has highlighted that a strong identity can be formed as a result of receiving a mother tongue education (South & Lall, 2016). Moreover, researchers have shown that learning in the mother tongue up to six to eight years of age, is superior to use of a second or foreign language (Opoku-Amankwa, Edu-Buandoh & Brew-Hammond, 2015). In the Philippines for example, use of the mother tongue has been proven to enhance student cognitive ability, general language, educational skill, socio-cultural improvement and effortless ease when learning other languages (Analytical, 2015). Similarly, in South Africa, educationist favour, for the first three years of schooling, that education should be taught in their native language, after which they can switch to other foreign/international languages; i.e. to enhance a radical change in learning patterns (Brock-Utne, 2015).

By considering numerous examples across the world, it is evident that the mastery of one's mother tongue, before learning other various international languages, goes a long way to producing world-class students and dynamic human capital (Tupas, 2015). In order to ensure a

strong foundation for children, in literacy and numeracy, curriculum provided by schools should be in languages that can be easily understood by the children (Opoku-Amankwa, Edu-Buandoh & Brew-Hammond, 2015). Furthermore, mother tongue-based bilingual or multilingual educational policies should be fostered, in which the mother tongue should be given priority which in turn leads to improvement in second languages as well (Malone, 2016).

6.5 Understanding the Benefits of the Mother Tongue

The benefit of providing an education in the mother tongue is manifold. Providing education in the mother tongue aims to make the education system more equitable, and accessible (Gfeller, 1999; Darling-Hammond, 2015). There are plenty of pedagogical and ideological justifications, as teaching in the mother tongue results in strong pedagogical gains for both the children and learners. Teaching in the mother tongue ensures increased understanding and gives the child a better conceptual and social foundation for analysing information (Lin, 2015). Many types of research highlight ideological justifications that, at least within the initial level of primary education, children usually get greater success when they learn content in their own native languages (Liddicoat & Taylor-Leech, 2015). Arguments concerning advantages of using the mother tongue in education are not only limited to pedagogical aspects of education, as they are also associated with sociological and psychological advantages as well.

The use of mother tongue in primary schools lessens the burden on teachers, and the learning experience becomes more natural; as it reduces the stress for both parties. Owing to this, the teacher is able to get more creative and innovative when coming up with learning and teaching materials, which means the chance of a successful learning outcome is improved (Tupas, 2015).

6.5.1 Increasing the Scope of Understanding

A child's mastery of the mother tongue is a strong predictor of his/her potential in second language development. A solid foundation in one's own language usually helps students develop stronger concepts in other languages, resulting in better-defined literacy abilities. Thus, due to mother tongue vocabulary, a well-prepared child could master other languages in school, and throughout his/her educational life (Cummins, 2000; Opoku-Amankwa, Edu-Buandoh & Brew-Hammond, 2015).

6.5.2 Less Cognitive Load in Mother tongue

In primary education, use of instructions and concepts explained in the mother tongue, develop the mental ability of children, and lowers unnecessary cognitive load (Baker , 2014; Barac & Bialystok, 2012). In relation to difficulty in language, it is suggested that potential for information overload exists, evidenced by the fact that non-native speakers read at a slower speed than the native speakers read. (Chambers, 1994; Wang Inhoff & Cher, 1999).

6.5.3 Maintaining Quality of Education

In education, the significant factor is to acquire quality education. Literature implies that this can be supported by teaching academic content in the student's first language; as this significantly supports learner comprehension. According to previous literature, this argument is well established by numerous researchers, as minority groups prosper more after acquiring primary education in their mother tongue (Manan, DaviD & Dumanig, 2016).

There are numerous benefits of providing basic education in the mother tongue, however, the mother tongue is usually not deemed to be an international language; especially for many developing countries. Accordingly, most learners will have to learn another language to allow them to obtain higher education and/or increase employment opportunities.

6.6 Shift Of Trend Towards Bilingualism

Baker (2011), points out that bilingualism incorporates two languages; hence those people who use two languages in their routine life are bilinguals. Education delivered in more than one language is described as bilingual education (Kaya & Aydin, 2013). In the 21st century, a bilingual education system, which uses of an international / business language in secondary and further education, is increasingly considered the only practical way to ensure that essential transformations in children and adults occur; in order to facilitate learners within an international learning and business space (Yusupova, Podgorecki & Markova, 2015).

6.7 Education in the English Language

Literature implies the dominance of the English language as the medium of communication (Mirhosseini & Ghafar Samar, 2015), with English used internationally as the language of choice in teaching and research domains; i.e. the primary alternative to one's mother tongue (Flowerdew, 2015). The use of the learner's mother tongue at their start of school enables the

learner, and the teacher, to have a more intimate bond. The mainstreaming of internationalisation, however, aims to create a better quality of higher education and/or ensure a high level of competencies in both staff and students. The international dimension plays an increasingly central role in higher education (De Wit, 2015), and internationalisation is seen as a strong indicator of education quality (Beelen & Jones, 2015). For instance, in Europe, there has been an increase in a number of Master programs which are taught in English. In 2002, 560 Master programs were offered in English, whereas, in 2012 the number increased to 6,800 (Wiseman & Odell, 2014).

According to a private research, carried out by the British Council, students have acknowledged that education in the English language improves their proficiency as well as enhances their grasp of the content (Wiseman & Odell, 2014). Multiple researchers have identified that internationalisation and globalisation are impacting the language learning. Mother tongue has been learned at home, but the use of an international language is increasingly important for getting jobs, i.e. to acquire more opportunities in MNC's (Multi-National Companies) (Hudley & Mallinson, 2015). Therefore, we argue that learning should be done with a blend of both native and international language; because most of the books and written contents are not available in the local language, and formal examination systems are normally in English. Accordingly, learning bilingualism is important (Opoku-Amankwa, Edu-Buandoh & Brew-Hammond, 2015).

English cannot be fully eliminated from the educational system in most countries, because English is considered synonymous with a high quality/standard of learning, ultimately leading towards international connection. Developing countries especially those with scarce resources and/or with very little attention on the educational quality will impact a perception of lower standards s if they teach all content in native languages. Owing to this, an intellectual strategy would include the incorporation of mother tongue in early childhood education (i.e. primary schooling) but in higher education, and / or practical / business life, international language usage in parallel with the use of the mother tongue is of immense significance.

6.8 Discussion

There is a number of benefits that are associated with the use of local/native language for learning in the literature. The goal of education, especially as part of e-Learning, is to impart

learning in the form and language that is most convenient and easy for the learner to understand. Currently, the majority of the e-Learning resources are available only in English. Such content is challenging for learners who do not speak English as their first language, accordingly, we formulated the hypothesis.

Our research hypotheses state; when moderated by language (local/international),
H1: "Reliability" is positively associated with students' perception of e-learning quality.
H2: "Assurance" is positively associated with students' perception of e-learning quality.
H3: "Tangibility" is positively associated with students' perception of e-learning quality.
H4: "Empathy" is positively associated with students' perception of e-learning quality.
H5: "Responsiveness" is positively associated with students' perception of e-learning quality.
H6: "Learning Content" is positively associated with students' perception of e-learning quality.
H7: "Course Website" is positively associated with students' perception of e-learning quality.

To validate this hypothesis, we will incorporate the e-Learning Quality (ELQ) (Uppal et al., 2017), yet consider the moderating impact of language on each (see figure 6.1). By assessing quality in terms of language user, we are able to see: i) the total impact of language use on quality perception; ii) whether language use impacts perception of all quality dimensions, i.e. service, information and system quality.

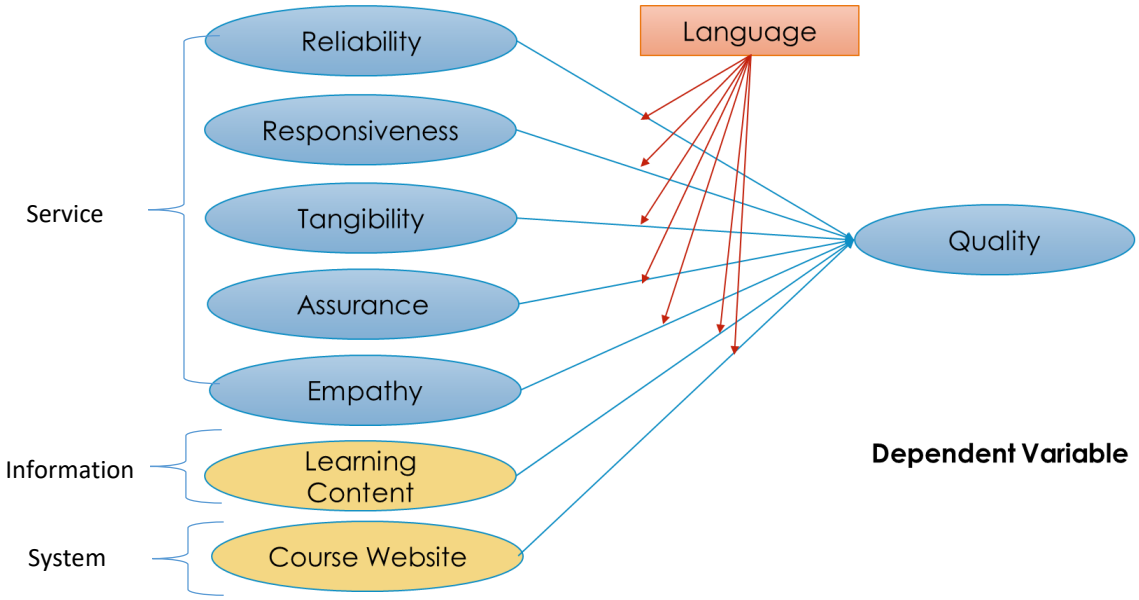
6.9 The Experiment

To validate the model, we collected data from 528 students from two local universities, in Lahore (Pakistan). Demographics detail of respondents can be seen in table 6.1. We split the sample size into two equal halves. We asked half the students about their perception of e-learning if the material was presented in the English language. Similarly, we asked the other half about their perception of e-learning experience, if it was presented in the local language (Urdu).

Table 6.1: Demographics details of all respondents

Gender	Male	51.1% (270)
	Female	48.9% (258)
Program of Study	BSc/BBA Honors	14.4% (76)
	MBA	17.8% (94)
	EMBA	30.7% (162)
	BSc Engineering	36.8% (192)
	BSc Sciences	0.8% (4)
Household Income (Monthly)	Below Rs. 20,000	10.2% (54)
	Rs. 21,000 to Rs. 50,000	22.0% (116)
	Rs. 51,000 to Rs. 100,000	42.0% (222)
	Above Rs. 100,000	25.8% (136)

Figure 6.1: Research model to test language moderation



6.10 Data Collection – Urdu Language Content

Respondents Profile

A questionnaire was used to collect participant data, which consisted of two sections. The first part had questions related to demographic data. In the second section, questions related to the dimensions of service, information and system were asked. A five-point Likert scale was used for all questions in section two. The questionnaire was distributed to students in different classes at two leading public universities in Lahore, Pakistan. University student (undergraduates, postgraduates, and executives) were used to collect data. These students were

enrolled in BSc Applied Management, BBA honours, MBA, EMBA, BSc Sciences and BSc Engineering programs. A total of 264 students, most of whom had previously had exposure to e-'Learning Content', participated in the survey.

Reliability and Validity

To check the reliability of the scale we conducted Cronbach Alpha (Cronbach, 1951; Nunnully, 1978) to measure internal consistency. The extracted factors' Cronbach alpha values for our quality factors are shown in table 6.2. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable (Jarvis et al., 2003).

Table 6.2: Scale Reliability

Factor Label	**Number of Items**	**Cronbach's alpha (α)**
Assurance	4	0.838
Reliability	5	0.927
Responsiveness	4	0.916
Empathy	4	0.913
Tangibility	4	0.869
'Learning Content'	6	0.839
Learning Quality	3	0.988
Course Website	4	0.881

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, i.e. met reliability and validity criteria, we conducted an EFA using Principal Component Analysis, with Promax rotation (see table 6.4). We selected Promax for two reasons, first because our sample size was adequately large, i.e. n=264. Secondly, Promax is suitable when multiple factors are correlated. The cumulative variance of the eight factors was 75.646%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high, i.e. all were above 0.300 - with most being above 0.700. The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (Table 6.3).

Table 6.3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.735
Bartlett's Test of Sphericity	Approx. Chi-Square	8052.90
	Df	595
	Sig.	.000

Two questions of ‘‘Learning Content’’ needed to be dropped, as one of them, was cross loading and had loading values below 0.5 (Hair, Black, Babin, & Anderson, 2010). The seven factors, which were extracted in the pattern matrix (see Table 6.4), however, used for further analysis. Terms measuring the same construct exhibited high construct loadings, i.e. suggesting adequate convergent validity. According to Hair et al. (2010), the minimum threshold value recommended for a sample size of approximately 255 (n=264) is 0.350. Since all loaded values were above 0.50, it confirms that the factors had sufficient discriminant validity, and no unexpected cross-loading occurred (Table 6.4).

After exploratory factor analysis, we used SEM to prove the convergent and discriminant validity of the extracted constructs. Accordingly, confirmatory factor analysis was performed using AMOS.

Table 6.4: Pattern Matrix

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization

	Component							
	1	2	3	4	5	6	7	8
Reliability Q4	.909							
Reliability Q1	.906							
Reliability Q3	.900							
Reliability Q5	.883							
Reliability Q2	.790							
'Learning Content' Q6		.927						
'Learning Content' Q3		.873						
'Learning Content' Q4		.873						
'Learning Content' Q1		.654						
'Learning Content' Q7		.595						
'Learning Content' Q5		.561						
Responsiveness Q1			.909					
Responsiveness Q4			.906					
Responsiveness Q3			.893					
Responsiveness Q2			.865					
Empathy Q2				.944				
Empathy Q3				.929				
Empathy Q4				.908				
Empathy Q1				.788				
Tangibles Q1					.869			
Tangibles Q2					.859			
Tangibles Q4					.836			
Tangibles Q3					.816			
Course website Q1						.916		
Course website Q4						.877		
Course website Q3						.827		
Course website Q2						.807		
E-learning quality Q3							.992	
E-learning quality Q2							.988	
E-learning quality Q1							.976	
Assurance Q3								.867
Assurance Q1								.846
Assurance Q2								.824
Assurance Q4								.752

Confirmatory Factor Analysis (CFA)

After testing the scale reliability, convergent and divergent validity was tested. Convergent validity can be established if two indicators correspond to each other. Divergent validity is the degree to which two dissimilar constructs can be easily differentiated. Construct reliability is the measure used to check the reliability of the extracted constructs, the threshold value is 0.7, yet in our case CR for all eight extracted factors is above 0.90 (see table 6.5).

Table 6.5: Discriminant and convergent validity

CR	Constructs	LQ	ASR	EMP	RES	REL	TAN	CW	LC
0.989	**E-learning Quality**	**0.983**							
0.835	**Assurance**	0.018	**0.748**						
0.919	**Empathy**	0.124	0.017	**0.861**					
0.917	**Responsiveness**	0.020	-0.004	0.070	**0.856**				
0.929	**Reliability**	-0.077	0.050	-0.024	0.007	**0.851**			
0.871	**Tangibles**	-0.007	-0.106	-0.015	0.166	0.109	**0.793**		
0.846	**Course Website**	0.055	0.099	-0.004	0.062	0.307	0.117	**0.764**	
0.857	**'Learning Content'**	0.359	0.022	0.209	-0.069	-0.049	0.072	0.004	**0.722**

All fitness values are within acceptable criteria limits, depending on the test, hence implying a good model fit (see table 6.6). A Chi-square/df value between 2.0 and 5.0 was considered acceptable (Hau 2010). In our research, the chi-square/df value was equal to 2.434. Our RMSEA value is 0.074, and our CFI and NFI values are 0.908 and 0.854 respectively; demonstrating a good model of fit, thus supporting the results and validating the proposed ELQ model.

Table 6.6: Goodness of Fit Statistics

Index	Value	Criterion
Chi – Square /Df	2.430	2.0 – 5.0
RMSEA	0.074	0 – 0.1
CFI	0.906	0 ~ 1
NFI	0.851	0 ~ 1

Results

The ELQ model, see chapter 4, has been tested to measure the perception of e-learning quality – when used with content in the Urdu language. Table 6.7 gives the model summary, where R is the multiple correlation coefficients that signifies the correlation between the dependent (DV) and independent variables (IV) (i.e. R=0.410, see table 6.7). R Square is the amount of variance in the dependent variable, i.e. e-learning Quality that is explained by the independent variables (reliability, assurance, tangibility, empathy, responsiveness, learning content and course website), which is .168 or 16.8%. This means the seven independent variables explain 17% of the variance in e-learning quality. Sig i.e. 0.00 denotes that the variance explained is statistically significant.

Table 6.7: Model Summary

Model	R	R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
1	.410	.168	.80639	.168	7.373	7	256	.000

a. Predictors: (Constant), ASR, EMP, LC_Eng, TAN, CW, REL, RSP

Table 6.8 gives the estimates and the significance level of the IV and DV. In the case of Urdu, language use only impacts the 'Learning Content', variable with $\beta = .390$, $t = 6.635$ and $P < 0.001$. Relationship with rest of the other six independent variables was found not to be significant.

Table 6.8: Regression Weights

			Estimate	**T**	**P**
E-Learning Quality	←	'Learning Content'	.390	6.634	.000****
E-Learning Quality	←	Tangibility	-.020	-.342	.732
E-Learning Quality	←	Reliability	-.068	-1.159	.247
E-Learning Quality	←	Responsiveness	.036	.631	.528
E-Learning Quality	←	Assurance	.007	.126	.900
E-Learning Quality	←	Empathy	.035	.600	.549
E-Learning Quality	←	Course Website	.065	1.118	.264
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001					

The results indicate that the quality perception of e-Learning has a positive correlation with the language in which 'Learning Content is provided. Students perceive the e-Learning content to be of better quality, if the 'Learning Content' is provided in their local language; which in this case was Urdu. This can be explained on the basis of how well they understand the 'Learning

Content'. If students are able to understand the 'Learning Content' more easily, they tend to perform better in their subjects and get better grades. This is attributable to the quality of learning material that is provided to them to support learning. Also, if the 'Learning Content' is provided to them in the local language, they are able to read the material for a longer time, as the reading in the local language does not inflict as much cognitive load. As a result, they are able to understand the learning material better and that helps them in performing better in their courses.

However, since other factors have not proved to be significant, students perceive that the other dimensions do not need not to be provided in the local language. 'Course Website' is usually available in English, accordingly, as this has not been shown to be significant, we can claim students feel more comfortable navigating and using the 'Course Website' in English. Similarly, RATER scale variables, and service as a whole is not found to be significantly affected if provided in the local language.

6.11 Data Collection – English Language Content

The second part of the data collection was done to get student responses regarding e-Learning experience i.e. if it was presented in English. A questionnaire was used to collect participant data, which consisted of two sections. Section 1 questions collected demographic information about the participants. Section two allowed us to assess student perception of e-Learning when taught using the English language. A five-point Likert scale was used for all questions in section two. The questionnaire was distributed to students in different classes at two leading public universities in Lahore (Pakistan). University student (undergraduates, postgraduates, and executives) are used in numerous studies covering perceptions of quality. These students were enrolled in BSc Applied Management, BBA honors, MBA, EMBA, BSc Sciences and BSc Engineering programs. A total of 264 students, most of whom had previously had exposure to e-'Learning Content', participated in the survey. Detail of the demographic of respondents is mentioned in Table 6.1.

Reliability and Validity

To check the reliability of the scale we conducted Cronbach Alpha (Cronbach, 1951; Nunnully, 1978) to measure internal consistency. The extracted Cronbach alpha values for our quality

factors are shown in table 6.9. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable (Jarvis et al., 2003).

Table 6.9: Scale Reliability values

Factor Label	**Number of Items**	**Cronbach's alpha (α)**
Assurance	4	0.847
Reliability	5	0.950
Responsiveness	4	0.951
Empathy	4	0.913
Tangibility	4	0.918
'Learning Content'	8	0.963
Learning Quality	3	0.838
Course Website	4	0.884

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, i.e. met reliability and validity criteria, we conducted an EFA using Principal Component Analysis, with Promax rotation (see table 6.11). We selected Promax for two reasons, first because our sample size was adequately large, i.e. n=264. Secondly, since Promax is suitable when multiple factors are correlated. The cumulative variance of the eight factors was 80.41%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high; i.e. all were above 0.300, with most being above 0.700. The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (table 6.10).

Table 6.10: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.841
Bartlett's Test of Sphericity	Approx. Chi-Square	8924.962
	df	630
	Sig.	.000

The constructs observed should have loaded to the respective factor greater or equal to 0.5, and it should be loaded into the respective factor otherwise it cannot be used for further analysis

Table 6.11: Pattern Matrix[a]

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalisation.
a. Rotation converged in 6 iterations

	Factor							
	1	2	3	4	5	6	7	8
Learning Content' Q7	.958							
Learning Content' Q3	.926							
Learning Content' Q8	.923							
Learning Content' Q5	.906							
Learning Content' Q2	.867							
Learning Content' Q1	.806							
Learning Content' Q4	.790							
Learning Content' Q6	.789							
Reliability Q1		.941						
Reliability Q4		.909						
Reliability Q5		.878						
Reliability Q2		.869						
Reliability Q3		.859						
Responsiveness Q1			.975					
Responsiveness Q4			.918					
Responsiveness Q2			.893					
Responsiveness Q3			.863					
Empathy Q2				.969				
Empathy Q3				.910				
Empathy Q4				.870				
Empathy Q1				.674				
Tangibles Q3					.898			
Tangibles Q2					.861			
Tangibles Q1					.850			
Tangibles Q4					.834			
Course website Q2						.914		
Course website Q3						.855		
Course website Q4						.780		
Course website Q1						.720		
Assurance Q3							.856	
Assurance Q1							.810	
Assurance Q2							.774	
Assurance Q4							.634	
E-learning quality Q3								.931
E-learning quality Q1								.772
E-learning quality Q2								.619

(Hair, Black, Babin, & Anderson, 2010). In our case, all the factors were extracted in a respective factor, see the pattern matrix (Table 6.11), used for further analysis. Terms measuring the same construct exhibited high construct loadings, i.e. suggesting adequate convergent validity. According to Hair et al. (2010), the minimum threshold value recommended for a sample size of 264 is 0.350. Since all loaded values were above 0.50, it confirms that the factors had sufficient discriminant validity, and no unexpected cross-loading occurred.

After exploratory factor analysis, SEM was used to prove the convergent and discriminant validity of extracted construct, accordingly, confirmatory factor analysis was performed using AMOS.

Confirmatory Factor Analysis (CFA)

After testing the scale reliability, convergent and divergent validity was tested. Convergent validity can be established if two indicators correspond to each other. Divergent validity is the degree to which two dissimilar constructs can be easily differentiated. Construct reliability is the measure used to check the reliability of the extracted constructs, the threshold value is 0.7 in our case CR for all eight extracted factors, is above 0.90 (see table 6.12).

Table 6.12: Discriminant and convergent validity

CR	Constructs	LQ	ASR	REL	RES	REL	TAN	CW	LC
0.845	**E-learning Quality**	**0.805**							
0.854	**Assurance**	-0.020	**0.772**						
0.919	**Empathy**	-0.027	0.006	**0.862**					
0.945	**Responsiveness**	0.368	-0.031	-0.019	**0.900**				
0.951	**Reliability**	0.235	-0.105	-0.029	0.416	**0.891**			
0.918	**Tangibles**	-0.033	-0.033	0.067	-0.060	0.000	**0.859**		
0.878	**Course Website**	0.418	-0.105	-0.030	0.327	0.200	-0.099	**0.804**	
0.964	**Learning Content**	0.520	0.018	0.003	0.541	0.442	-0.037	0.291	**0.877**

All fitness values are within the acceptable criteria limits, depending on the test, hence a good model fit can be assumed (see table 6.13). Values between 2.0 and 5.0 are considered acceptable (Hau 2010). In our research, the chi-square/df value was equal to 2.434. Our RMSEA value is 0.074, and our CFI and NFI values are 0.908 and 0.854 respectively; thus demonstrating good model fit and supporting the validation of the proposed model.

Table 6.13: Goodness of Fit Statistics

Index	Value	Criterion
Chi – Square /Df	2.434	2.0 – 5.0
RMSEA	0.074	0 – 0.1
CFI	0.908	0 ~ 1
NFI	0.854	0 ~ 1

Results

Again the ELQ model was tested as the independent variables, i.e. the original five SERVQUAL dimensions, plus the proposed dimensions - ‘‘Learning Content’’ and ‘Course Website’. The language was tested to see whether it had a moderating effect on independent variables.

Table 6.14 gives the model summary, where R is the multiple correlation coefficients, signifying the correlation between the dependent and independent variables. R Square shows the amount of variance in the dependent variable (DV), i.e. how E-learning Quality that is explained by the independent variable (IV). In our results R^2 =.410, which means that the seven independent variables explain 41% of the variance in E-learning quality. Significant (0.000) denotes that the variance explained is statistically significant.

Table 6.14: Model Summary - English

Model	R	R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df 1	df2	Sig. F Change
1	.640[a]	.410	.66035	.410	25.366	7	256	.000

a. Predictors: (Constant), ASR, EMP, LC_Eng, TAN, CW, REL, RSP

Table 6.15 gives you the estimates and the significance level of the independent and dependent variable. In the case of course content in English Language two variables are significant, i.e. ‘‘Learning Content’’ β = .453, t = 7.368 and P = 0.000; and ‘Course website’ β = .312, t =

5.953 and P = 0.000. Whereas relationship with the other five independent variables were not found to be significant to use the perception of quality.

Table 6.15: Regression Weights

			Estimate	**t**	**P**
E-Learning Quality	←	Learning Content	.453	7.368	.000****
E-Learning Quality	←	Tangibility	.019	.395	.693
E-Learning Quality	←	Reliability	-.043	-.765	.445
E-Learning Quality	←	Responsiveness	.057	.939	.349
E-Learning Quality	←	Assurance	.003	.062	.951
E-Learning Quality	←	Empathy	-.022	-.462	.644
E-Learning Quality	←	Course Website	.312	5.953	.000****
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001					

From table 6.15, we can see that the "Learning Content" and "Course Website" quality perception are significant. This means these two factors are significantly impacted by the use of English as the language of study. Student expects the 'Learning Content' to be in the right language for them to understand, i.e. to minimise the cognitive load required to interpret meaning from the content. Similarly, if the 'Course Website' is using the language that the student is familiar with, then the student gain a positive perception of quality about the system. Students prefer the 'Learning Content' to be in English since in higher education, they are expected to use the material in English, i.e. all study books are in English, the exams and class discussions are in English. Therefore, it is easier for them to read the 'Learning Content' in English.

We have looked into the results of both languages, native language i.e. Urdu and international language i.e. English. "Course website" is significant in the international language English, which can be explained by the fact that almost all the e-Learning technologies use the English language, and students are comfortable with "System" interface being in English, i.e. "Course Website" in English. Interesting, looking at the regression results of both models, moderating in Urdu and English, 'Learning Content' is significant in both; preventing us draw instant conclusions. For both languages we have tested that constructs of 'Learning Content' are reliable and discriminant, also the regression of both models signifies a positive change in e-learning quality due to 'Learning Content'. In order to differentiate both models we need to

check the difference in the mean and standard deviation of the 'Learning Content' category scores for both languages.

6.12 Paired Sample T-test

A paired sample t-test was conducted to determine how means of 'Learning Content' in English are different from of the means of those in Urdu. As we collected data on 5 points Likert scale; 5 being very unimportant and 1 being very important, lower value of mean for the variable means that students prefer 'Learning Content' in that language. Table 6.16 clearly shows that mean of 'Learning Content' in Urdu (LEC_Ur) is higher i.e. 4.08 than mean of 'Learning Content' in English (LEC_Eng), i.e. 1.97.

Table 6.16: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	LEC_Ur	4.0878	264	.72450	.04459
	LEC_Eng	1.9703	264	.95754	.05893

From table 6.16, it is clear that there is a difference in the means of both languages. Table 6.14 shows the Sig (2-tailed) i.e. < 0.001, which signifies that above-mentioned means are statistically significant from one another. Therefore, we can conclude that for 'Learning Content' student prefer it to be in the English language.

6.13 English Text, Urdu Video

Although learning in the local language is considered to be beneficial and has cognitive advantages, research conducted by 528 university students reveal that they prefer to use the learning material in English.

From our experiment, it has been found that students in the universities in Pakistan perceive the quality of e-Learning experience to be better, if the learning is provided in English, especially the written text. This is understandable, as these are the students who have always studied in the English language, i.e. from grade 1. They have not learned the English language as a second language specifically for use in higher education, but have always studied subjects like science, mathematics, history, physics, chemistry, and business in the English language.

All the books used in Pakistani high schools are in English, and students always have to take their exams in English. Another important aspect is that there are no authentic technical books available in Urdu, even if students wanted to read content in Urdu. Universities do not expect students to read books in Urdu, as the learning content has not be developed in the local language at this level. Therefore, students are accustomed to reading in English and writing in English.

An interesting exception is questionnaire item 8 of the 'Learning Content' dimension. After analysing the 'Learning Content' items in detail, we found that most of the students have preferred this item as compared to the other seven items. This question asked, 'how important is the availability of video lectures are in the Urdu language?' Most of the students marked this option as "Important" or "Very Important". This implies that students like listening to the lectures in their local language. When it comes to reading and writing, they are more comfortable in English, as this is how they are trained. However, when it comes to listening and watching leaning content, they mostly prefer the local language. Therefore, it is evident from the results that students would prefer the overall e-Learning experience to be in the English language, but would prefer audio/video lectures in Urdu, as it becomes easier for them to understand.

From this experiment, it is evident that, for learners at the university level, it is better to design and provide written e-Learning content, and systems interface, in the English language. However, live lectures and recorded lectures may also be provided in the local language, as it would suit most students and help their understanding.

Chapter 7
Interactivity

7.1 Chapter Introduction

This chapter reviews existing literature on e-learning and interactivity. It starts with the definitions of interactivity, then moves to considerations of its benefits, from the point of view of both teacher and learner. Social cognitive theory and its relationship with interactivity and e-learning are also explored. Supporting literature for different types of interactivity is discussed in this chapter for e-learning, i.e. interactivity with the system, with the service provider, and with the information. Based on these three dimensions, quantitative research was conducted to test the effect of interactivity on the perception of e-learning quality. The E-Learning Quality (ELQ) model was used to study different dimensions of quality, i.e. service, information, and system. The findings of this research, conducted by collecting data from 430 university students, revealed how students perceive the quality of e-learning is effected with interactivity, and which dimensions of interactivity is more important.

7.2 Definitions of Interactivity

Interaction is extensively discussed in the literature due to its association with pedagogy. Rochester and Pradel (2008) explain that learner's perception of quality and the ultimate satisfaction is highly correlated with interactivity. Interaction is also mentioned as the student level of engagement (Rhode, 2009). The Oxford English Dictionary defines "interaction" as "the reciprocal action, or influence of a person or thing on each other". At an operational level, interactivity has been defined as the function of input required by the user; whilst responding to the computer and the nature of the system's response to the input action (Sims, 1995). Another author regards interactivity as the degree to which users of a medium can influence the form or content of the mediated environment (Steuer, 1992). Barker considers interactivity in learning as "a necessary and fundamental mechanism for knowledge acquisition and the development of both cognitive and physical skills" (Sims, 1995; Barker, 1994).

Bannan-Ritland (2002) classified the definitions of interactivity into five categories: 1) interactivity can be defined as active involvement of learners; 2) interactivity has been defined based on the patterns of communication among learners/instructors; 3) interactivity is defined

as instructor–learner communication; 4) interactivity is considered as social, cooperative, or collaborative exchanges; and 5) interactivity can be viewed as a range of instructional activities and technologies.

7.3 Literature Review

Online learning in higher education has become a major instructional modality in today's technology-focused world. At the same time, attrition rates in online courses remain high (Carr-Chellman & Duchastel, 2000; Jun 2005; Rochester & Pradel, 2008). Findings highlighted in this online learning literature review suggest that interactivity in online courses, particularly between student–instructor, can play an important role both in student satisfaction (Espasa & Meneses, 2010; Liu, Magjuka, Bonk & Lee, 2007; Mahle, 2011; Park & Choi, 2009); (Thurmond, Wambach, Connors & Frey, 2002) and user persistence (Morris, Finnegan, & Wu, 2005; Rovai, 2003; Tello, 2007). Further, research data suggest that preferences for types of online interactivity vary according to level and type of learner; (Hollenbeck, Mason, & Song, 2011; Offir, Belazel & Barth, 2007; Tello, 2007; Tu & McIsaac, 2002). Accordingly, colleges and universities should take great care to create satisfying learning environments that provide opportunities for rich and meaningful interactions with students, instructors, and content.

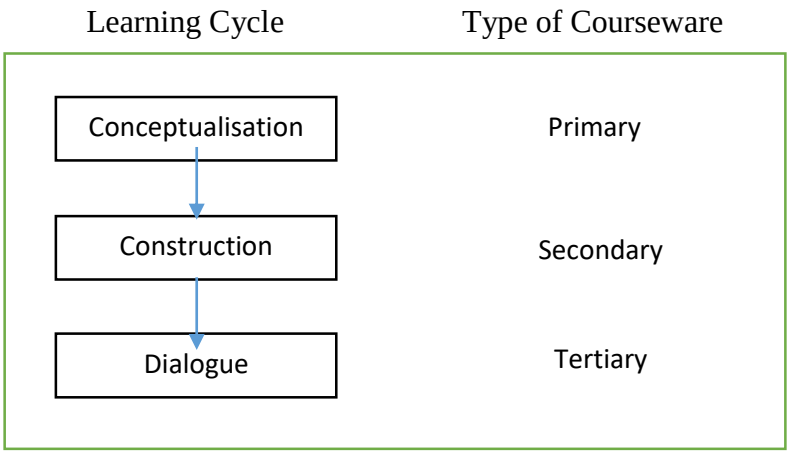
A crucial factor that affects the student learning and satisfaction is related to interactivity (Anderson, 2003). Online course interactivity can occur either as a formal interaction that is built into the overall course design or informal interaction that exists outside of the online course (Rhode, 2007). Primary forms of formal interactivity include student–student, student–instructor, and student–content (Moore, 1989). Research data suggest that online courses with high levels of interactivity lead to higher levels of student motivation, improved learning outcomes, and satisfaction over less interactive learning environments (Mahle, 2011; Espasa & Meneses, 2010; Park & Choi, 2009; Liu et al., 2007; Thurmond et al., 2002). Park and Choi assessed 147 adult learners who either completed or dropped out of online courses offered at a large university. Park and Choi found that online learners easily lose motivation and feel less satisfaction if courses do not stimulate their active participation and/or interaction. In support of these findings, the results from three separate studies (Liu et al., 2007; Mahle, 2011; Offir et al., 2008) noted significant, positive relationships between interactivity and perceived engagement, learning, confidence, relevance, and student satisfaction. In a separate study, Espasa and Meneses electronically surveyed 186 online graduate students in their last week of

online learning courses. The results of their study showed a statistically significant relationship between instructor feedback received and learning as measured by student satisfaction and final grades. Building the right blend of student-student and student–instructor interactivity into online course design has been suggested to not only improve student satisfaction and achievement but motivation as well (Liu et al., 2007; Offir et al., 2008; Park & Choi, 2009; Mahle, 2011).

From a social cognitive perspective, knowledge is constructed when individuals are engaged in activities, receive feedback, and participate in other forms of human interaction in public, social contexts (Bandura, 2001). Because cognition is not considered an individual process, learning and knowledge are shaped by the kinds of interactions a student has with others and the context within which these interactions occur (Bandura, 2001). In the online learning context, some students anticipate a lack of interaction and perceive that this is an expected trade-off of online learning experiences (Liu et al., 2007). According to the tenets of social cognitive theory, however, a well-designed online course should not sacrifice interaction, but instead provide an active-learning environment, where students are highly engaged in the learning process through interactions with peers, instructors, and content. Active learning involves students in doing things and thinking about things they are doing, and include activities such as discussions, cooperative learning, debates, role playing, problem-based learning, and simulations (Braxton, Milem & Shaw Sullivan, 2000; Schunk, 2012).

According to Mayes and Fowler (1999), there are three stages of learning, and they can be supported by three kinds of courseware, involving conceptualisation, construction, and dialogue (see Figure 7.1). At the conceptualisation phase, learner views resources online, e.g. like lecture slides or notes. In the construction phase, learners apply the knowledge to the tasks being performed on the computer-based assignments and tests. Finally, on the dialogue stage, actual active learning takes place.

Figure 7.1: Mayer's Learning Style



‘Mayer’s learning style’ implies that different types of interactivity are required at different stages of learning. At the conceptualisation stage, interactivity with learning material is useful. At the knowledge construction stage, interactivity with the system may be beneficial and at the dialogue level, interactivity with the teacher and/or peers may be beneficial. Since interactivity has been defined from different perspectives, let’s look at what are the different types of interactivity considering the e-learning experience.

7.4 Types of Interactivity

Moore and Kearsley (1989) define the three levels of interaction as being ‘student-content, ‘student-teacher’, and ‘student-student’. “Student-content” interaction refers to how interactively the student can access the content presented, “student-teacher” interaction refers to how interactively the teacher delivers the content, and the skills required for the student to access the content independently. “Student-student” interaction refers to the extent to which the students interact with peers; in order to exchange information and knowledge through social communication.

7.4.1 Content Interactivity

In traditional distance education models, student content is the only and only content is the source of learning and/or interaction in the education. This passive unidirectional interaction model is still being followed in many developing countries. The content is transferred to the students in the form of hard copies or digital disks, this completely ignores the concept of interaction with a teacher, and students have no sources to rely on other than the course material. In contrast to distance learning, e-learning, however, emphasises more on the potential for interaction. Moore (1989) explains the importance of the course in e-learning by giving an example of a movie. In order for a movie to convey its meaning to the viewer every one of the actors’ actions, reactions and words should be prewritten, and thoroughly analysed according to the script. Similarly, with distance course content, in order to convey a consistent message through content (in spite of the difference in the perspectives of learners), it needs to be carefully developed and structured; in part explaining the increased cost of developing distance learning teaching resources.

Students can interact with teaching materials via text, images, sound, video or combination of these media. Also, streams with the advent of instant messaging and video calling, distance

interaction with teachers and peers are much easier. They can also engage in self-paced learning, taking control over both the process and the content of their learning (Trombley & Lee, 2002; Zhang, 2003). Numerous empirical studies have also indicated that information quality is important in determining users' level of satisfaction with the system, which in turn leads to system utilisation (DeLone & McLean, 1992; Katerattanakul & Siau, 1999).

With the advances in multimedia technology, more multimedia-based e-learning systems are becoming available. These systems facilitate the presentation and integration of learning materials in a range of diverse media; such as text, image, sound, and video. However, some of the multimedia-based systems suffer from insufficient learner-content interactivity and flexibility because of their passive and, unstructured way of presenting instructional content. Under such a system, learners have relatively little control over the knowledge structure and the learning process to meet individual needs. For example, it may be ineffective and time-consuming to locate a particular segment or to skip a portion of a three-hour instructional video delivered via the Internet, making interactive learning difficult (Zhang, Zhao, Zhou & Nunamaker, 2004).

If the information (learning content) is carefully developed, keeping in mind the aspects of interactivity, students not only engage with the material more but also find the learning experience more satisfying as well. If students do not get enough opportunities to interact formally and informally in online courses, their learning and satisfaction may be compromised. Of the three types of interactivity that can occur online, student–content interaction has been found to be the strongest predictor of student satisfaction in online courses (Chejlyk, 2006; Keeler, 2006; Kuo, Walker, Schroder & Belland, 2014).

Boud, Cohen, and Walker (1993) mention that interaction of students with information (course content) is important; however, information alone is not enough to achieve learning success. Bond et al. state interaction as equally necessary as interaction with information (course content). If students like the subject, they are more likely to engage. If they engage, they do better.

7.4.2 System Interactivity

Technology has an important role in delivering learning outcomes because learners interact more in e-learning environments than with traditional face to face instruction (Webster &

Hackley, 1997). System design facilitates formative interactions, controls organisational activities, and provides correct and sufficient information to reduce uncertainty (Daft & Lengel, 1986). System quality relates to a learner's belief about e-learning performance characteristics (Chiu et al., 2007) and is measured by functionality, ease of use, reliability, flexibility, data quality, portability, integration, and importance (Delone & McLean, 2003). System quality has a strong positive effect on learners' satisfaction (Ozkan & Koseler, 2009) and directly affects user beliefs. Results from Hara & Kling (2001), measuring the quality assessment of an e-learning experience, showed that students faced technical issues in the e-learning system while the instructor was competent (Hara & Kling, 2001). Factors that are relevant for infrastructure and system quality include internet quality, facilitating conditions, reliability, ease of use, system functionality, system interactivity, system response, and equipment accessibility (Wu, Tennyson & Hsia, 2010; Sun, Tsai, Finger, Chen & Yeh, 2008).

A study by Pituch and Lee (2006) concerning student use of e-learning system stated in their findings that interactivity in distance education has the strongest direct effect on student's use of the e-learning system. Pituch and Lee concluded that systems that allow more interaction amongst teachers and students are more helpful in the learning process. Accordingly, a major issue in the pedagogy in an e-learning environment is the absence of interactive system.

7.4.3 Interactivity with Service Provider

In an e-Learning system, the service is provided by the developer of the learning course, which is the teacher; with system support provided by administrators. The interaction between the service provider and support provider is very important as the learners expect quick and reliable service and support.

According to Moore (2011) interaction of teacher with students in the classroom is a crucial component of learning. This interaction with teacher and student is defined as the interpersonal communication, which can be in and outside the context of learning, e.g. counselling advice, and career guidance. Although e-learning is largely independently driven, independence does not mean leaving the student in complete isolation as this can lead to problems (Moore & Thompson, 1990). Morris, Mitchell, and Bell (1999) mention that in spite of the highest degree of structured content, the role of the teacher as a contact point cannot be replaced by any means. Accordingly, student-teacher interaction is one of the most significant types of interaction in

e-learning (Zhao, Lei, Yan, Lai & Tan, 2005). The success of e-learning is directly dependent on the interaction with peers and most importantly with teachers (Magjuka, Shi & Bonk, 2005).

Shih, Martinez-Molina, and Muñoz (2008) provided more in-depth study on the role played by teachers in e-learning and concluded that teachers can improve the effectiveness of e-learning by providing constructive and prompt feedback to the students. Teachers can also support the students in learning how to use the system because different individuals can have different perceived IT self- efficacy. In this manner, the teachers can lift the level of performance of the students and help reduce the rate of withdrawal, which is, unfortunately, quite high in e-learning courses. In addition, by considering the design of the interaction during course, teachers can promote learner to learner interaction, which considering the role of social interaction in human performance, is likely to help the students both personally and professionally (Abulibdeh and Hassan, 2011).

Student-teacher interaction is different from student-content interaction in that student-content interaction is more about how the course is structured, whilst student-teacher interaction is more about how the two interact. Interactivity among students and teachers in the classroom may of the critical success factor of learning (Chou, 2003; Fulford & Zhang, 1993), also Ozkan and Koseler (2009), however, mentions that interactivity also plays a vital role in achieving e-learning objectives of making student, independent and lifelong learners. More interactive classroom environment will lead to more effectiveness and ultimate success of learner (Evans & Sabry, 2003). Online course interactivity, particularly between student and instructor, plays an important role in a student's choice to persist in an online course. Consequently, in university-wide efforts to retain students, online instructors must take care to design courses that provide students the opportunity to interact both with each other and with the instructor in both meaningful and supportive ways.

Taught content is largely independent of the teacher, i.e. a teacher can teach content developed by someone else. Student-teacher interaction includes the direct and verbal communication and/or engagement between the two stakeholders. This is interpersonal communication that occurs between the teacher and learner in, and outside, the context of the study. For example, teachers often act as mentors for students helping them learn beyond the limits of the subjects. Teachers also feel empathy for students if they are struggling with the learning, and/or have other issues which affect student success. Students also develop a sense of dependency on

teachers, allowing them to ask teachers for help and advice, not only about the courses, yet about other personal issues; as students see teachers as a reliable source from where they can get authentic and valuable advice.

Moore and Thompson (1990) argue that teacher's feedback is critical to the learning of the student. While some researchers have argued in support for more interaction between the students and the teachers. However, critics argue that more is not always better when it comes to student-teacher interaction in e-learning, e.g. Mazzolini and Madison (2003) observed that increased efforts of interaction by the teacher, through an increased number of messages, does not result in increased interaction from the students.

Zhao et al. (2005) concluded that, of all the available forms of interaction in e-learning, the most significant one is the student-teacher interaction. This was supported by Magjuka, et al. (2005) who concluded that e-learning success depends most significantly on the interaction between human participants, i.e. either learner to learner interaction and learner to teacher interaction. Therefore, our work, draws attention towards interactivity, as an important factor in successful implementation of e-learning system.

7.5 Discussion

By looking at the literature, there appears to be a number of benefits associated with appropriate use of interactivity for learning. We can see that there are three dominant aspects, or dimensions, of interactivity with respect to e-Learning, which are content interactivity, system interactivity, and service interactivity. Interactivity is vital in the case of e-Learning as face to face interaction with the content provider is not always possible. Interactivity is not only important for the learning content but also is equally important for the system through which the e-Learning is being provided. This includes the website or software through which the e-Learning is being delivered. Similarly, the interaction with the service and support providers is also key to the success of e-Learning systems. In this experiment, will test the effect of interactivity from the point of 'service', 'information' and 'system' dimensions, using ELQ model (Uppal et al., 2017).

Our research hypotheses state; when moderated by interactivity,

H1: “Reliability” is positively associated with students’ perception of e-learning quality.

H2: “Assurance” is positively associated with students’ perception of e-learning quality.

H3: “Tangibility” is positively associated with students’ perception of e-learning quality.

H4: “Empathy” is positively associated with students’ perception of e-learning quality.

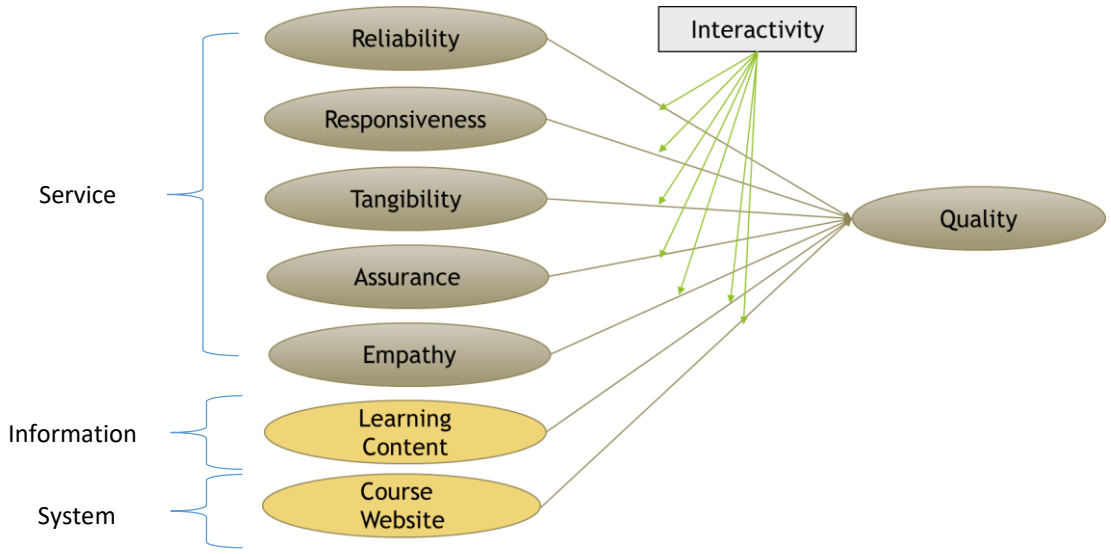
H5: “Responsiveness” is positively associated with students’ perception of e-learning quality.

H6: “Learning Content” is positively associated with students’ perception of e-learning quality.

H7: “Course Website” is positively associated with students’ perception of e-learning quality.

To test these hypotheses, we used e-Learning Quality (ELQ) model (see Figure 7.2).

Figure 7.2: Research model to test interactivity moderation



7.6 Experiment

We collected data from around 430 students from two universities in Lahore, Pakistan. We asked the students about their perception of quality of their e-learning experience if the material was presented in an interactive manner, as compared to the learning material that is not interactive. Similarly, we asked their perception regarding interactivity of the course website and interactivity of the e-learning services provided.

Respondents Profile

A questionnaire was used to collect participant data, which consisted of two sections. The first part included the questions related to demographic data. A five-point Likert scale was used for

all questions in section two. The questionnaire was distributed to students in different classes at two leading public universities in Lahore, Pakistan. University student (undergraduates, postgraduates, and executives) were used to collect data. These students were enrolled in BSc Applied Management, BBA honours, MBA, EMBA, BSc Sciences and BSc Engineering programs. Data were collected from a total of 430 students, most of whom had previously had exposure to e-learning content. After careful screening, 384 responses were found to be valid. Details of the demographics of respondents are shown in the Tables 7.1, 7.2 and 7.3.

Table 7.1: Demographics data - Gender

		Frequency	Percentage
Valid	Male	186	48.4
	Female	198	51.6
	Total	384	100.0

Table 7.2: Demographics data – Education level

		Frequency	Percentage
Valid	BSc Honors	113	29.4
	MBA	235	61.2
	Engineering	6	1.6
	BSc Sciences	30	7.8
	Total	384	100.0

Table 7.3: Demographics data – Household income

		Frequency	Percentage
Valid	Below Rs. 20,000	27	7.0
	Rs. 21,000 to Rs. 50,000	80	20.8
	Rs. 51,000 to Rs. 100,000	112	29.2
	Above Rs. 100,000	165	43.0
	Total	384	100.0

Reliability and Validity

To check the reliability of scale, we conducted Cronbach Alpha (Cronbach, 1951; Nunnully, 1978) to measure internal consistency. The extracted Cronbach alpha values for our quality factors are shown in Table 7.4. All alpha (α) values are greater than (>) 0.70, which implies factors are highly correlated and interchangeable (Jarvis et al., 2003).

Table 7.4: Scale Reliability values

Factor Label	Number of Items	Cronbach's alpha (α)
Assurance	6	0.949
Reliability	7	0.964
Responsiveness	5	0.951
Empathy	4	0.903
Tangibility	4	0.884
Learning Content	8	0.964
Learning Quality	4	0.943
Course Website	8	0.968

Exploratory Factor Analysis (EFA)

To see if the observed variables adequately correlated, i.e. met reliability and validity criteria, we conducted an EFA using Principal Component Analysis, with Varimax rotation (see Table 7.5). The cumulative variance of the eight factors was 75.64%, and all extracted factors had eigenvalues above 1.0. All the commonalities for each variable were significantly high; i.e. all were above 0.300, with most being above 0.700.

Two questions of 'Learning Content' needed to be dropped. One question was cross loading and one had a loading value below 0.5 (Hair, Black, Babin & Anderson, 2010). The seven factors that were extracted in the pattern matrix (see Table 7.5) were, however, used for further analysis. Terms measuring the same construct exhibited high construct loadings, i.e. suggesting adequate convergent validity. According to Hair et al. (2010), the minimum threshold value recommended for a sample size of 384 is 0.350. Since all loaded values were above 0.50, it confirms that the factors had sufficient discriminant validity, and no unexpected cross-loading occurred (see Table 7.5).

Table 7.5: Rotated Pattern Matrix[a]

Extraction Method: Maximum Likelihood.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

	Factor							
	1	2	3	4	5	6	7	8
CW_4	.920							
CW_1	.899							
CW_3	.891							
CW_2	.889							
CW_5	.888							
CW_6	.867							
CW_7	.822							
CW_8	.817							
LC_1		.895						
LC_2		.892						
LC_3		.889						
LC_4		.887						
LC_6		.878						
LC_5		.868						
LC_7		.832						
LC_8		.814						
RA_1			.925					
RA_3			.908					
RA_2			.901					
RA_4			.874					
RA_6			.870					
RA_7			.865					
RA_5			.855					
AS_1				.911				
AS_4				.861				
AS_5				.855				
AS_3				.853				
AS_2				.842				
AS_6				.839				
RS_1					.918			
RS_3					.896			
RS_4					.878			
RS_2					.848			
RS_5					.842			
LQ_2						.927		
LQ_4						.893		
LQ_3						.868		
LQ_1						.803		
EM_3							.852	
EM_4							.841	
EM_2							.797	
EM_1							.764	
TA_3								.833
TA_1								.816
TA_2								.786
TA_4								.712

The Kaiser-Meyer-Olkin and Bartlett's test for sampling adequacy was significant, showing that the chosen variables were sufficiently correlated (see Table 7.6).

Table 7.6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	19598.090
	df	1035
	Sig.	.000

After exploratory factor analysis we used SEM to prove the convergent and discriminant validity of extracted construct; accordingly, Confirmatory factor analysis was performed using AMOS.

Confirmatory Factor Analysis (CFA)

After testing the scale reliability, convergent and divergent validity was tested. Convergent validity can be established if two indicators correspond to each other. Divergent validity is the degree to which two dissimilar constructs can be easily differentiated. Construct reliability is the measure used to check the reliability of the extracted constructs, the threshold value is 0.7 in our case, composite reliability (CR) for all eight extracted factors is above 0.90 (see Table 7.7).

Table 7.7: Discriminant and convergent validity

	CR	AVE	MSV	ASV	CW	AS	EM	RS	RA	TA	LQ	LC
Course Website(CW)	0.967	0.784	0.052	0.029	**0.886**							
Assurance (AS)	0.949	0.758	0.052	0.018	0.150	**0.870**						
Empathy(EM)	0.904	0.702	0.122	0.035	0.022	0.118	**0.838**					
Responsiveness (RS)	0.952	0.798	0.077	0.027	0.161	0.228	0.277	**0.893**				
Reliability (RA)	0.959	0.795	0.031	0.008	0.177	0.064	-0.052	0.053	**0.892**			
Tangibility (TA)	0.890	0.670	0.122	0.042	0.157	0.165	0.349	0.042	0.082	**0.818**		
Learning Quality (LQ)	0.944	0.807	0.080	0.033	0.217	0.089	0.167	0.132	0.011	0.282	**0.899**	
Learning Content (LC)	0.965	0.773	0.052	0.023	0.229	0.030	0.062	0.099	0.103	0.180	0.222	**0.879**

All fitness values are within acceptable criteria limits, depending on the test, hence implying a good model fit (see Table 7.8). The Chi-square/df value equalled 2.83; where a value between 2.0 and 5.0 is considered acceptable (Hau, 2010). Our RMSEA value is 0.069, and our CFI and NFI values are 0.91 and 0.868 respectively; demonstrating a good model of fit, thus supporting the results and validating the proposed model.

Table 7.8: Goodness of Fit Statistics

Index	Value	Criterion
Chi – Square /Df	2.83	2.0 – 5.0
RMSEA	0.069	0 – 0.1
CFI	0.91	0 ~ 1
NFI	0.868	0 ~ 1

Results

The ELQ model has been used to measure the perception of e-learning quality, ensuring consideration of 'service', 'information' and 'system' dimensions. Seven hypotheses were tested as independent variables, i.e. the original five SERVQUAL dimensions, plus the proposed dimensions - 'Learning Content' and 'Course Website' (see Table 7.9).

Table 7.9: Regression Weights

			Estimate	S.E.	C.R.	P
E-Learning Quality	←	Learning Content	0.153	0.053	3.008	.003***
E-Learning Quality	←	Tangibility	0.216	0.071	4.017	.001***
E-Learning Quality	←	Reliability	-0.046	0.051	-0.895	0.371
E-Learning Quality	←	Responsiveness	0.072	0.053	1.41	0.158
E-Learning Quality	←	Assurance	0.013	0.059	0.247	0.805
E-Learning Quality	←	Empathy	0.070	0.065	1.334	0.182
E-Learning Quality	←	Course Website	0.144	0.043	2.825	.005***
* P≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001, **** P ≤ 0.0001						

7.7 Conclusion

From Table 7.9 we can see that "Learning Content", "Tangibility" and "Course Website" are significant. This means that students perceive the e-learning material to be of higher quality, if that material is more interactive, as compared to if there is little or no interactivity. This is in line with the literature which states that the interactivity improves the perception of quality of the learning material. Research data suggest that online courses with high levels of interactivity lead to higher levels of student motivation, improved learning outcomes, and satisfaction over less interactive learning environments (Espasa & Meneses, 2010; X. Liu et al., 2007; Mahle, 2011; Park & Choi, 2009; Thurmond et al., 2002).

Chapter 8
Conclusion, Contributions, and Future Work

8.1 Chapter Overview

This chapter concludes the research conducted and reported in chapters 5 to 7. We evaluate and summarise the Ph.D. research as a whole and present the reader with a clear summary of the work undertaken critical consideration of the research contributions, and consideration of recommended future work.

This conclusion summarises how we investigated pedagogical challenges and their relation to the perception of quality in e-learning systems. The research aim and objectives were set out in chapter one, and the problem scope was justified, in context of a review of relevant literature, in chapter two. The research methodology was discussed in chapter three. In chapter 4, development of validation model is presented, as to the best of our knowledge, no existing model had been specifically developed to test the 'service', 'information' and 'system' dimensions of an e-learning system. We proposed and quantitatively validated the E-learning Quality (ELQ) model. In our first study, chapter 5, we qualitatively tested the effect of different delivery modes on the quality perception of e-learning. In the second study, chapter 6, we quantitatively investigated and evaluated the effect of language on the quality perception of e-learning. In our final experiment, presented in chapter 7, the effect of different levels of interactivity on the quality perception of e-learning is investigated. In this chapter, we summarise the research and highlight the key research contributions. Finally, also in this chapter, we discuss possible areas of future work.

8.2 Summary and Key Findings

This thesis is presented in seven chapters. The first chapter provides an overview of the research problem. It provides the reasoning why it is essential to investigate e-learning challenges and the contribution of the research was discussed. It was identified that most of the past research has provided a limited insight into the challenges of e-learning with respect to pedagogy. This thesis looks at how a number of pedagogical challenges, i.e. delivery modes, language, and interactivity, affect the effectiveness of e-learning for higher education students. Chapter 1 also contained the aim and objectives of this research along with the research questions that this research aims to answer.

Chapter 2 presented a thorough literature review of e-learning challenges, and how these challenges hinder the effectiveness and success of e-learning. This chapter discussed the different theories of learning, and how they relate to e-learning. Competing theories are discussed and reasoning is provided for why constructivism is the most suitable model for e-learning, along with discussion concerning Cognitive Theory of Multimedia Learning (CTML) by Mayer (2003), which is also applicable from the point of view of using interactive learning material. Looking at different e-learning challenges, TIPEC framework developed by Ali et al, 2017, which grouped 68 e-learning challenges, found in the literature, in four categories, i.e. 'technology', 'individual', 'pedagogy', and 'enabling conditions' was used to identify major challenges. For this research, we choose to focus on pedagogical challenges, as these were the most frequently reported challenges in the literature. Out of 35 pedagogical challenges, we decided to investigate 'delivery modes', 'language', and 'interactivity', based on their importance and scope of e-learning. At the end of the chapter, research question and aim of the research is stated.

Chapter 3 presents an overview of the research methodology and data collection procedures adopted. This research was completed in three stages. The first stage began with an extensive literature review which helped the researcher in identifying research gaps and in developing the conceptual framework. The second stage of the research involved a self-administered structured questionnaire survey. The survey was designed to test the conceptual framework in the context of higher education institutions; and investigated the relationship and effectiveness of different aspects of pedagogy, i.e. 'delivery modes', 'language', and 'interactivity' on e-learning effectiveness. This chapter outlines the questionnaire development and administration process. It discusses why questionnaire survey was preferred method of data collection for this study. The findings of the questionnaire survey and limitations of survey method are discussed in detail. In addition, validity and reliability of the data collection methods adopted in this research are discussed. The findings of the questionnaire survey analysis were used to test the conceptual framework. This chapter discusses the benefits of using pragmatist philosophy and quantitative methods for this research.

Chapter 4 describes the development of a validation model that is used to test and validate experiments in this research. For this purpose, we looked at different technology acceptance models and system quality models. Since e-Learning is a phenomenon that uses computer and internet technology at its core, we looked at the technology acceptance and information system

success models. Similarly, education is a service, therefore, we looked at service quality models as well. All these models are suitable for testing a particular dimension, but none of these models could test all three dimensions, i.e. 'service', 'information' and 'system'. Accordingly, we developed a model, e-Learning Quality model (ELQ) that covers all these dimensions. The development of this model was important since this model provided a structure that allowed us to consistently test the impact of pedagogical factors, i.e. 'delivery modes', 'language', and 'interactivity' on the quality perception of e-learning. Secondly, this model is a contribution in this field, since no such model currently exists.

In chapter five, we discussed the importance of delivery modes/media to the domain of e-learning. The theoretical underpinning of using different media types in e-learning is discussed in detail covering Media Richness Theory (MRT), cognitive theory of multimedia learning (CTML), and SERVQUAL model. The research model for the quantitative study is then presented with stepwise data analysis from a sample of 475 university students. In this experiment, students were given learning material in the text format only in the first month of the course. This included case study readings, book sections, and slides. In the second month, they were exposed to learning material which was available in the text with audio option. In this month, in addition to text material, the slides also had a voice-over. Then in the last month, they were able to access material with text and full audio/video lectures. Data was then collected through a questionnaire (see Appendix C). In the first part of the experiment, seven hypotheses were tested as independent variables, i.e. the original five SERVQUAL dimensions, plus the additional dimensions - 'Learning Content' and 'Course Website'. Our dependent variable is 'e-learning quality'. At the $P < 0.05$ level, three dimensions were identified as positively impacting student's perception of quality; i.e. 'Learning Content', 'Tangibility' and 'Assurance'. Our research accordingly confirmed hypotheses H2, H3, and H6; showing that 'Assurance', 'Tangibility' and 'Learning Content', using the ELQ model, are positively associated with the perception of e-Learning quality when using text and graphics as the delivery mode.

Findings in Table 5.9 show that when it comes to the perception of quality for e-learning, if the e-learning system is provided in the text format, it has a correlation with 'Learning Content'. This means students, associate the e-learning system quality with the media in which the learning content is provided. Secondly, it also has a significant correlation with 'Tangibility'. This means if e-learning system is provided in text format, it affects the learners' perception

positively. Properly documented learning material and the delivery system give the impression of high quality. Similarly, when service is provided in text format, e.g. if a student needs support and he is given the response to his query in an e-mail, it gives assurance to the learner of the quality of service. Another example of text providing assurance of service is through frequently asked questions (FAQs), which are made available to the students. If they face problems, they can search answers from FAQ section.

In the second analysis, where we tested the results of learning material provided in the text with audio, at the P <0.05 level, two dimensions were identified as positively impacting student's perception of quality, i.e. 'Reliability' and 'Course Website'. Our research accordingly confirms hypotheses H1 and H7. The values from Table 8.1 show that when it comes to the perception of quality for e-learning if the e-learning system is provided in the text and audio format, 'Reliability' has a positive correlation with 'quality'. This means that students perception concerning the reliability of the service improves if the service is not only provided in the text but also in audio. This means if a service is required by a student and with an e-mail or text message if an audio message or call is also made, the reliability of the service would be perceived to be better. The association with the 'Learning Content' is not significant in this case. This may be because if the text is given as learning material and audio is provided, there may be a disconnect between the audio and the text. If students cannot see who is providing the audio for the text, they do not see it as an important or significant aspect of the perception of quality. They do not think, in this format, the quality of the content improves. This means students, want to see the teacher when he/she is delivering the learning content. 'Course Website' is seen to have a significant association with the perception of quality, if it has audio in addition to text. This may be because students feel if the e-learning 'system' has audio included, they, it will be easier and more user-friendly to use.

In the third part of the analysis for the delivery modes, we looked at the results of text, audio/video data. At the P <0.05 level, three dimensions were identified as positively impacting student's perception of quality; i.e. 'Responsiveness', 'Learning Content' and 'Course Website'. Our research accordingly confirms hypotheses H5, H6, and H7; proving Responsiveness, Learning Content and Couse Website measured using ELQ model, are positively associated with the perception of e-Learning quality.

The findings reveal that when it comes to the perception of quality for e-learning, if the e-learning system is provided in the audio/video format, it has a positive correlation with

Responsiveness, Learning Content and Course website. This means students, associate the e-learning system quality with the media format in which the learning content is provided. When the learning content is provided in full audio/video, they perceive it to be of better quality. This supports the 'multimedia principle' proposed by Mayer (1997). Secondly, if the course website components are available in multimedia, the perception of quality also improves. If the help provided on the e-learning website about using different features of the website are provided in audio/video, it makes the website more user-friendly. Similarly, one of the dimensions of SERVQUAL, 'Responsiveness' also seem to improve, if provided in multimedia. This means, if in an e-learning system, the timely responses to the learner are provided in multimedia, they perceive it to be of high quality. Like if instead of an e-mail message or a text message, if a learner is called and spoken to, promptly, they perceive the quality of the service to be better.

Table 8.1: Effect of Delivery modes/media on ELQ dimensions – Cross-comparison

	Types of Delivery mode/media		
Dimensions	**Text & Graphics**	**Text, Graphics & Audio**	**Text, Graphics & Audio/Video**
Reliability		**X**	
Assurance	**X**		
Tangibility	**X**		
Empathy			
Responsiveness			**X**
Learning Content	**X**		**X**
Course Website		**X**	**X**

X = Significant

The experiments conducted for different delivery media/modes, it has been found that different delivery media/modes have different perceptions of quality for learners. Therefore, when designing and developing e-learning system, educators and providers must consider these aspects for better system success.

Chapter six covered the importance of language, from the point of view of education, and use of student's 'mother tongue' for learning. We discussed literature in detail which highlighted the importance of 'mother tongue' and its benefits for learning in the early ages. We proceeded by describing the use of English, as an international language and explained why it is needed for higher education in the countries where teaching material is not developed and/or taught in local languages.

In this experiment, we collected data from 460 students from two local universities, in Lahore (Pakistan). We tested the results using the ELQ model, to see the impact of language on the different dimensions of the ELQ model, i.e. 'service', 'information' and 'system'. We split the sample size into two equal halves. We asked half the students about their perception e-learning if the material was presented in the English language. Similarly, we asked the other half of the students about their perception of quality of their e-learning experience, if it was presented in the local language (Urdu).

In the first part of the analysis, where the data about local language (Urdu) was analyzed, it was found that only 'Learning Content' has a positive correlation with the perception of quality. Students perceive the e-Learning experience to be of better quality, if the 'Learning Content' is provided in their local language; which in this case was Urdu. This can be explained on the basis of how well students understand the 'Learning Content'. If students are able to understand the 'Learning Content' more easily, they tend to perform better in their subjects and get better grades. This is attributable to the quality of learning material that is provided to them to support learning. Also, if the 'Learning Content' is provided to them in the local language, students are able to read the material for a longer time, as reading in the local language does not inflict as much cognitive load. As a result, students are able to understand the learning material better and that helps them in performing better in their courses.

However, since other factors have not proved to be significant, students perceive that the other dimensions do not need not to be provided in the local language. 'Course Website' is usually available in English, accordingly, as this has not been shown to be significant, we can claim students feel more comfortable navigating and using the 'Course Website' in English. Similarly, RATER scale variables, and service as a whole is are not found to be significantly affected if provided in the local language.

In the second part of the analysis, where we analysed the data about the English language. From the table 8.2, we can see that the "Learning Content" and "Course Website" quality perception are significant. This means these two factors are significantly impacted by the use of English as the language of study. Student expects the 'Learning Content' to be in the right language for them to understand, i.e. to minimise the cognitive load required to interpret meaning from content. Similarly, if the 'Course Website' is using the language that the student is familiar with, then the student gain a positive perception of quality about the system. Students prefer

the ‘Learning Content’ to be in English since, in higher education, they are expected to use the material in English. All the books are in English, the exams and class discussions are in English. Therefore, it is easier for students to read the ‘Learning Content’ in English. “Course website” is significant in the international language English, which can be explained by the fact that almost all the e-Learning technologies which are being used are in the English language and students are more comfortable with “Systems”, by which we mean the software i.e. “Course Website”, in the English language.

Table 8.2: Effect of Language on ELQ dimensions - Cross-comparison

	Language	
Dimensions	**Urdu**	**English**
Reliability		
Assurance		
Tangibility		
Empathy		
Responsiveness		
Learning Content	**X**	**X**
Course Website		**X**

X = Significant

However looking at regression results of both models ‘Learning Content’ is significant in both which did not help us draw conclusions. Therefore, we decided to compare means. A paired sample t-test was conducted to determine how means of ‘Learning Content’ in English are different from of the means of those in Urdu. As we collected data on an ordinal 5 point Likert scale; 5 being very unimportant and 1 being very important, lower value of mean for the variable means that students prefer ‘Learning Content’ in that language. Table 6.5 shows that mean of ‘Learning Content’ in Urdu (LEC_Ur) is higher i.e. 4.08 than mean of ‘Learning Content’ in English (LEC_Eng) i.e. 1.97. From the table 6.5, it is clear that there is a difference in the means of both languages. Table 6.6 shows the Sig (2-tailed) i.e. 0.00 which signifies that above-mentioned means are statistically significant from one another. Therefore, we can conclude that for ‘Learning Content’ student prefer it to be in the English language.

Although learning in the local language is considered to be beneficial and has cognitive advantages, still research conducted from 400 plus university students reveal that they prefer to use the learning material in English.

From our experiment, it was found that students in the universities in Pakistan perceive the quality of e-Learning experience to be better, if the learning is provided in English, especially the written text. This is understandable, as these are the students who have always studied in the English language from grade 1. They have not learned the English language as a second language specifically for use in higher education, but have always read subjects like science, mathematics, history, physics, chemistry, and business in the English language. All the books used Pakistani high schools are in English and they always have to take their exams in English. Another important aspect is that there are no authentic technical books available in Urdu, even if students wanted to read content in Urdu. Universities do not expect students to read books in Urdu, as the learning content has not be developed in the local language at this level. Therefore, students are accustomed to reading in English and writing in English.

An interesting exception was item 8 of the 'Learning Content' dimension in the questionnaire. This question asked, how important availability of video lectures are in the Urdu language. Most of the students chose this option marking it "Important" or "Very Important". This implies that students like listening to the lectures in their local language. When it comes to reading and writing, they are more comfortable in English, as this is how they are trained. However, when it comes to listening and watching learning content, they mostly prefer the local language. Therefore, it is evident from the results that students would prefer the overall e-Learning experience to be in the English language, but would prefer audio/video lectures in Urdu, as it becomes easier for them to understand.

In Chapter seven, we reviewed existing literature on e-learning and interactivity. We start by providing definitions of interactivity, then moved to considerations of its benefits, from the point of view of both teacher and learner. Social cognitive theory and its relationship with interactivity and e-learning were also explored. Supporting literature for different types of interactivity is discussed in this chapter for e-learning, i.e. interactivity with the system, with the service provider, and with the information. Based on these three dimensions, quantitative research was conducted to test the effect of interactivity on the perception of e-learning quality. The E-Learning Quality (ELQ) model was used to study different dimensions of quality, i.e. service, information, and system.

The findings of this research, conducted by collecting data from 430 university students, revealed how students perceive the quality of e-learning is effected with interactivity, and for which dimensions interactivity is more important.

Table 8.3: Effect of Interactivity on ELQ dimensions

Dimensions	Interactivity
Reliability	
Assurance	
Tangibility	X
Empathy	
Responsiveness	
Learning Content	X
Course Website	X

X = Significant

From the table 8.3, we can see that the "Tangibility", "Learning Content", and "Course Website" are significant. This means that students perceive the e-learning material to be of higher quality if that material is more interactive. This is in line with the literature which states that the interactivity improves the perception of quality of the learning material. Research data suggest that online courses with high levels of interactivity lead to higher levels of student motivation, improved learning outcomes, and satisfaction over less interactive learning environments (Espasa & Meneses, 2010; X. Liu et al., 2007; Mahle, 2011; Park & Choi, 2009; Thurmond et al., 2002).

8.3 Research Conclusion

The first research question was: What kind of challenges/barriers exist in e-Learning environment that hinders successful e-Learning systems implementation? A thorough review of literature helped to identify a number of challenges. However, not all the challenges reported in the literature were included in one model or framework. To overcome this limitation, in this area, the Technology, Individual, Pedagogy and Enabling Conditions (TIPEC) framework, proposed by Ali et al., 2017, was developed to cover the wide range of the barriers of e-Learning implementation on the basis of a literature review of past 25 years. TIPEC framework, to the best of our knowledge, is the most comprehensive framework in literature covering the wide range of barriers impacting the implementation of e-Learning (to date). The TIPEC framework has 4 major categories Technology, Individual, Pedagogy and Enabling Conditions (see Figure 2.6), covering a total of 68 barriers and covers the literature from 1999-2016.

Through this research, we were able to identify and understand major challenges from a different perspective. Identification of the challenges of e-learning in a framework raises the awareness for e-learning implementers that they need to address challenges in all these categories. If the issues of technology and pedagogy are addressed, but the individual issues are not, the overall system may not be successful. Similarly, if enabling conditions are not there, for any category, again the implementation in that category would be a major challenge.

The second questions was: How can the success of e-learning be improved by overcoming pedagogical challenges. We looked at pedagogical challenges in detail, in the TIPEC framework (Ali et. al, 2017) and identified three challenges which were addressed most frequently in the literature, i.e. delivery mode/media, language, and interactivity. To test these three aspects of interactivity empirically, we used the ELQ model (Uppal et al, 2017). Research studies for all these challenges in chapters 5 – 7 explain how these challenges affect the perception of e-learning quality, which leads to satisfaction and adoption. According to our findings, different delivery modes/medial affect student perception of quality for different dimensions of ELQ model, i.e. 'service', 'information' and 'system'. The results reveal that e-learning provided with text and full audio/video affects the quality perception significantly for " Responsiveness", "Learning content", and "Course website". This means when the e-learning is provided in this mode, all three dimensions of 'service', 'information', and 'system' are effected. This means if the services provided to students are in the text, and in full audio/video, they perceive services to be of better quality. Similarly, students perceive the learning content to be of better quality, when it is provided, in audio/video format, e.g. video lectures. The course website is also expected to have audio/video functions, in addition to text components, to have better quality perception.

From the experiments related to language, it was found that students would prefer the e-learning system to be provided primarily in the English language, as this is the language they are more comfortable in for higher education studies. They read all their learning material in English and take all exams in English, so it is easier for them to use the system in English. Only for the video lecture, and/or synchronous lectures, they are more comfortable in their local language. This is because, listening to learning material or lectures in the local language does not put the substantial cognitive load, as this is the language most students have grown up listening to.

The third aspect of pedagogy, i.e. interactivity, was also found to have a significant impact on the perception of e-learning quality. From the experiments, we found that interactivity has a positive correlation with "Tangibility", "Learning content" and "Course website". This means, if e-learning system has interactivity, it would appear to be of higher quality, due to tangibility. Accordingly, students perceive the learning content to be of better quality if it has interactive element built into it. Similarly, according to our results, course website is also perceived to be of better quality, if it has interactivity built into it. According to this research, improving interactivity will impact the effectiveness of e-learning in multiple ways. The most significant impact of improving interactivity will be that students will more likely become active learners, which will help us maximise the benefits of e-learning.

From these experiments and findings, we conclude that pedagogical aspects of delivery modes, language and interactivity have a significant impact on the perception of e-learning quality. Therefore, when designing e-learning systems, these aspects have to be considered, in addition to addressing the technological and individual challenges.

8.4 Research Contributions

Research contributions are academic, practical and methodological in nature. This thesis, as a whole, provides a significant contribution to the existing e-learning quality literature by publishing the ELQ model (Uppal et. al, 2017) which provides a holistic quality approach for assessing e-learning quality on 'service', 'information' and 'system' dimensions.

8.4.1 Academic Contribution

In terms of an academic contribution, the research provides a debate concerning the e-learning challenges related to pedagogy, focusing on delivery modes, language, and interactivity aspects, as they affect the perception of quality for e-learning systems. The ELQ model emphasises the focus on the 'service', 'information', and 'system' dimensions for assessing e-learning quality.

8.4.2 Practical and Methodological Contributions

In terms of practical contribution, practitioners can apply the developed TIPEC framework (Ali et. al, 2017) to identify and address the e-learning challenges/barriers. Similarly, ELQ model (Uppal et al, 2017) can be used to design e-learning systems which address the 'service',

‘information’, and ‘system’ dimensions, to ensure system success. The practical contribution, from this thesis, is that learning institutions can fundamentally apply the ELQ model for analysis of their current e-learning systems, and identify deficiencies and changes that must be implemented to improve the quality perception of their e-learning systems, which leads to user satisfaction and adoption.

8.5 Limitations and Future Work

Although this research provides academic, practical, and methodological contributions, there are some limitations, which were identified from this research. However, these limitations can be considered as opportunities for future work.

This study has some limitations and addressing these limitations can lead to interesting opportunities for further research. Firstly, this research looked at the quality perception of e-learning only from the perspective of the students. It would be interesting to include the perspective of the teachers who are also key players in the e-learning systems.

This research included questionnaire survey data from both current and former e-learners but the majority of the sample comprised of current e-learners. Students who may have not yet experienced e-learning could also provide some interesting insights into how they perceive quality in e-learning systems. The sample was also collected from two public universities; a bit more diversified sample in this regard could give different results. However, there were several limitations in accessing a wider sample especially regarding the permission from the institutions. Despite this shortcoming, the researcher believes that the findings of this research is quite accurate given that all of the respondents who have responded to the survey had experience of using e-learning and have the now how to comment on the effectiveness and quality perception of e-learning.

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Appendix A

A1 TIPEC Framework – Journal Paper

Attached as pdf file

Appendix B

B1 Research Questionnaire – ELQ

Please take a few minutes to complete this survey. The purpose of this survey is to determine the quality of service you receive from your e-learning experience in your current/recent online course. Please note that this is not a student evaluation of the instructor, but an attempt to understand which elements are most important for students when they take e-learning courses, which leads to student satisfaction.

For each statement, please tick (✓) the appropriate choice to show the extent to which you believe it is important for your e-learning experience.

This survey is anonymous and the information will be used only for research purposes. Thank you in advance for participating in the survey.

D_1. Your Gender ___ Male ___Female

D_2. What degree program are you enrolled in?

a. ____ BSc Honors
b. ____ MBA
c. ____ EMBA
d. ____ Engineering
e. ____ BSc Sciences
f. ____ Other _____

D_3. What is your monthly household income?

a. ____ Below Rs. 20,000
b. ____ Rs. 21,000 to Rs. 50,000
c. ____ Rs. 51,000 to Rs. 100,000
____ Above Rs. 100,000

D_4. You had your schooling from _____ A public school _____ A private school

	Assurance	Very Important	Important	Neither Important Nor Unimportant	Unimportant	Very Unimportant
		1	2	3	4	5
AS_1.	The instructor is knowledgeable in his/her field.					
AS_2.	The instructor is fair in grading.					
AS_3.	I get my queries answered very quickly.					
AS_4.	The instructor answers the course related questions himself/herself.					
AS_5.	The course team answers the course related questions.					
AS_6.	The whole course team is knowledgeable and competent.					

AS_7.	The course is graded by the instructor himself/herself.					
	Empathy					
EM_1.	The instructor is genuinely concerned about the student.					
EM_2.	The instructor knows each student individually.					
EM_3.	The instructor has the students' best interest in mind.					
EM_4.	The course team supports the students.					
EM_5.	The course team is concerned about students' success.					
	Responsiveness					
RS_1.	The instructor quickly responds to students' needs.					
RS_2.	The course team is willing to go out of their way to help students.					
RS-3.	The course team quickly provides information when needed.					
RS_4.	The course team guides the students properly.					
RS_5.	The instructor provides support to students when needed.					
	Reliability					
RA_1.	The instructor consistently delivers good lectures.					
RA_2.	The lecture material is always of high quality.					
RA_3.	The instructor follows the course outline.					
RA_4.	The course team follows the university rules.					
RA_5.	The course website is always functional.					

RA_6.	The material on the course website is regularly updated.					
RA_7.	Grading criteria is communicated to every student.					
RA_8.	Students can ask the instructor for help at any time.					
RA_9.	Students can ask the course team for help at any time.					
	Learning Content					
LC_1.	The learning material used in the course is of high quality.					
LC_2.	The learning material is available in different formats. (Audio, video, text, etc.)					
LC_3.	Video lectures are available for each topic.					
LC_4.	The learning material is easy to understand.					
LC_5.	The learning material is prepared according to the students' level.					
LC_6.	The learning material is interesting and engaging.					
LC_7.	The video lectures are also available in Urdu language for easy understanding.					
LC_8.	The video lectures are delivered by the instructor for our own university.					
LC_9.	The learning material uses examples from our own country.					
LC_10.	The learning material is available online.					
LC_11.	The learning material can be accessed from a mobile phone.					
	Tangibles					
TA_1.	The online course is offered by a recognized university.					

TA_2.	The online course is delivered by an experienced teacher.					
TA_3.	The online course is offered by a university which has a physical campus as well.					
TA_4.	The online course certificate/degree is recognized.					
	Course Website					
CW_1.	The site provides relevant information for the course.					
CW_2.	The website has an attractive design.					
CW_3.	The website is easy to use.					
CW_4.	The website is updated regularly.					
CW_5.	The website uses multimedia elements properly.					
CW_6.	The website provides high quality information.					
	E-Learning Quality					
LQ_1	Your perception of the overall quality of the instruction you get from e-learning					
LQ_2	The instructional web site works well					
LQ_3	The instructional web site has clear instruction					
LQ_4	The instructional web site seems to be up to date					

Appendix C

C1. Research Questionnaire – Delivery Modes

Please take a few minutes to complete this survey. The purpose of this survey is to determine the perception of quality of your e-learning experience, where you have used study material online in text, text plus audio, and full audio/video formats. Please note that this is not a student evaluation of the instructor, but an attempt to understand which elements of e-learning system are considered to be most important for students when they take e-learning courses.

For each statement, please tick (✓) the appropriate choice to show the extent to which you agree or disagree with the statements.

This survey is anonymous and the information will be used only for research purposes. Thank you in advance for participating in the survey.

D_1. Your Gender? ___ Male ___Female

D_2. Your Age?

a) ____ Below 18 years
b) ____ Between 19 and 25 Years
c) ____ Between 26 and 30 Years
d) ____ Above 30 Years

D_2. What degree program are you enrolled in?

g. ____ BSc Honors
h. ____ MBA
i. ____ EMBA
j. ____ Engineering
k. ____ BSc Sciences
l. ____ Other _____

D_3. What is your monthly household income?

d. ____ Below Rs. 20,000
e. ____ Rs. 21,000 to Rs. 50,000
f. ____ Rs. 51,000 to Rs. 100,000
g. ____ Above Rs. 100,000

D_4. You had your schooling from _____ A public school _____ A private school

		Text only					Text with Audio					Full Audio/Video				
	Assurance	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
		1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
AS_1.	The instructor is knowledgeable in his/her field.															
AS_2.	The teaching material is easy to understand.															
AS_3.	The teaching material is suited to my learning style.															
AS_4.	The lectures are easy to follow.															
AS_5	I can understand the teaching material without any help.															
	Empathy															
EM_1.	The teaching material is appropriate for my level.															
EM_2.	The language is appropriate.															
EM_3.	The instructor has the students' best interest in mind.															

EM_4.	The teaching material is developed keeping my needs in mind.															
EM_5.	The teacher is concerned about students' success.															
	Responsiveness															
RS_1.	I can access the teaching material at any time.															
RS_2.	The course team is willing to go out of their way to help students.															
RS-3.	The course team quickly provides information when needed.															
RS_4.	The course team guides the students properly.															
RS_5.	The instructor provides support to students when needed.															
	Reliability															
RA_1.	The instructor consistently delivers good lectures.															
RA_2.	The lecture material is always of high quality.															
RA_3.	The instructor follows the course outline.															
RA_4.	The material prepares me for course success.															
RA_5.	The course material is regularly updated.															
	Learning Content															
LC_1.	The learning material used in the course is of high quality.															

LC_2.	The learning material is easy to understand.															
LC_3.	The learning material is prepared according to the students' level.															
LC_4.	The learning material is interesting and engaging.															
LC_5.	The lectures are easy to follow.															
LC_6.	Learning online saves me time.															
LC_7.	The learning material is easy to locate.															
LC_8.	The learning material can be easily accessed from a mobile phone.															
LC_9.	The learning material is easy to share.															
	Tangibles															
TA_1.	The online course should be offered by a recognized university.															
TA_2.	The online course should be delivered by an experienced teacher.															
TA_3.	The online course should be offered by a university which has a physical campus as well.															
TA_4.	The online course certificate/degree should be recognized.															
	E-Learning Quality															
LQ_1	The quality of the instruction you get from online learning is high.															
LQ_2	The e-learning material works well.															
LQ_3	The e-learning material is beneficial.															

LQ_4	The e-learning material seems to be up to date.															
CW_1.	The site provides relevant information for the course.															
CW_2.	The website has an attractive design.															
CW_3.	The website is easy to use.															
CW_4.	The website is updated regularly.															
CW_5.	The website uses multimedia elements properly.															
CW_6.	The website provides high quality information.															