Perceptions of quality in e-learning for higher education

PERCEPTIONS OF QUALITY IN E-LEARNING FOR HIGHER EDUCATION

A Dissertation by

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PERCEPTIONS OF QUALITY IN E-LEARNING FOR HIGHER EDUCATION

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DEDICATION

To my dear mother, who kept waiting for a couple of years to receive a joyous answer to her persistent question: When will you be back? And to my dear father who that very question but kept hiding it for the same length of time.

To my stoical wife, who assisted with undertaking all of my concerns while she also was burdened with her own.

To my two little son and daughter (Hattan & Wajd) who lived on expatriate life by no choice of their own.

To my late brother (Ibrahim), whom I lost in my life, and I will miss indefinitely.

To my brothers and sisters who supported me their support, encouragement while I was away.

To my instructors who believed in my capabilities.

To all my friends who supported me.

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ABSTRACT

E-learning quality is a complex and multi-faceted issue. Some argue that the quality of e-learning should be judged by the same criteria and standards as face-to-face education. Others hold that conventional quality concepts are not appropriate because e-learning is so structurally different. This research aimed at identifying perceptions of quality in e-learning. These included the perceptions of the students, instructors, and top administrators of higher education institutions offering e-learning programs, utilize three samples of publications. The first used to identify the perceptions of quality from the perspective of top administrators of e-learning institutions. The other two samples were randomly selected a pool of peer reviewed publications. A special coding scheme was developed based on these dimensions and validated by a panel of experts to ensure content validity. This coding scheme was then used in Computer-Aided Text Analysis (CATA) coupled with factor analysis (FA) to examine the relevance of these dimensions' top administrators', Instructors', and students' perceptions of quality in e-learning for higher education.

The findings indicate that all 12 dimensions were essential to adequately represent perceptions of quality in e-learning for higher education. Three sets of meta-dimensions were identified for the main stakeholders. First, trust, and engagement, which affect the perception of top administrators. Second, Aptitude, infrastructure, friendliness, and operational procedures, which influence the perceptions of instructors. Finally, Students' perceptions are dominated by reliable interaction, self-efficacy, trust, and institutional commitment.

The research findings are supposed to contribute to a better understanding of the dimensions of quality and to the direction of improvement efforts in this essential service sector.

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LIST OF ABBREVIATIONS

FA	Factor analysis
IT	Information Technology
ICT	Information and commutation Technologies
COVID19	Coronavirus disease of 2019
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	Nations International Children's Emergency Fund
CATA	Computer-Aided Text Analysis
US	United States
ISO	International Organization for Standardization
EDUQUAL	Educational quality
HiEdUAL	Higher Education Quality Instrument
QM	Quality Matters
HLC	Higher Learning Commission
SERVQUAL	Service Quality Measurement Instrument
WSU	Wichita State University
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
KMO	Kaiser-Meyer-Olkin
PC	Principal Component
PDF	Portable Document Format
HEdPERF	Higher education Performance

CHAPTER 1

INTRODUCTION

The world is facing rapid changes as a result of advances in information technology (IT) and communications. With the emergence of computers and the internet, information has become easy to access. IT and communications have been influential in effecting changes in all sections of human life in recent years (Kattoua, Al-Lozi, & Alrowwad, 2016). Many educational institutions around the world have adopted e-learning programs, with the success of these programs depending on the availability of supporting technologies and their efficient utilization. Digital, computer-based, virtual, technology-enhanced, and computer-assisted are some of the terms that have been used to describe e-learning.

Together with social demand for better access to higher education, the diffusion of information and communication technologies (ICT) has driven the rapid growth of the adoption of e-learning (Oh & Yoon, 2014). Nowadays, with the increase in competition between universities to reduce costs and attract more students and meet their educational needs, e-learning systems are becoming vital (Arpaci, 2015). A recent study found that over 69 percent of higher education institutions use e-learning systems, and believe that they constitute a cornerstone of their long-term strategies (Allen & Seaman, 2013). Indeed, the market research report published by Ambient Insights, (2016) affirms this positive view. The worldwide market for e-learning systems steadily grew from $32.1 billion in 2010 to $46.9 billion in 2015, with an annual growth rate of around 8% (Ambient Insights, 2016). By shifting the paradigm from teacher-centered to learner-centered (Oye, Iahad, & Rahim, 2014) and promoting both face-to-face and remote course delivery at anytime and anywhere, e-learning technologies are transforming the field of education (Phahlane

& Kekwaletswe, 2014). However, only when students make use of its wide range of features can the effective adoption of e-learning systems be achieved (Saadé & Bahli, 2005).

Students must believe that such programs provide them with sufficient support and meet their educational needs by mimicking the experience of the classroom (Sharma, Joshi, & Sharma, 2016). In addition, while e-learning can be regarded as a global technology, it is also important to assess the efficacy of such tools locally as users typically function in local/national contexts (Li & Kirkup, 2007; Tarhini, Ammar, Tarhini, & Masa'deh, 2015; Teo, 2009).

Educational policymakers need to consider the factors that can impede or promote the implementation of e-learning systems in order to devise strategies to boost student learning experiences (Brown, S., 2010). However, the effectiveness of e-learning cannot be accomplished purely by implementing a technical solution effectively. A variety of behavioral, human, social, organizational, and cultural variables are also linked to performance (Browne, Jenkins, & Walker, 2006; Schepers & Wetzels, 2007). These factors play a critical role in how the systems are developed and used (Teo & Noyes, 2014). Indeed, current research shows that students' active adoption and use of technology differs across demographic groups, communities, and societies (Venkatesh & Zhang, 2010; Venkatesh, Thong, & Xu, 2012). The implementation of such innovations is spreading far into developed and third world countries in today's globalized and linked world, and extant research shows that the successful adoption and use of technologies by students varies across population groups, societies, and cultures (Venkatesh et al., 2010; Venkatesh et al., 2012).

Despite the attempt to avoid the spread of covid-19 with non-pharmaceutical treatments and preventive measures such as social distancing and self-isolation, the novel coronavirus and associated COVID-19 is increasingly spreading around the world, causing the widespread closing

of primary, secondary, and tertiary schools across the world. Over 72% of the world's student population has been affected by these closures (UNESCO, 2020).

A number of nations have adopted localized closures that affect millions of additional students. On March 2020 it was reported that 186 countries were implementing national closures, according to UNICEF tracking, and eight were implementing local closures, affecting about 98.5 percent of the world's student population (UNESCO, 2020). As of April 2020, in response to the pandemic, nearly 1,725 billion students had been personally affected due to school closures.

Currently, as the emergency situation of COVID-19 progresses, many countries have found ways of introducing flexible teaching and learning methods into their education systems, and one of the key approaches is online education. As a branch of distance learning, online learning has always been concerned with offering access to educational opportunities that are at least more versatile in time and space than campus education, through the use of various forms of technology. Some countries have introduced various solutions during the pandemic to continue the education process including online libraries, TV broadcasts, video lectures, online channels.

Quality has always been a major concern in digital education in general. According to Williams & Jacobs (2004), a quality framework, particularly for e-learning, could be a critical factor for progress. However, quality is a very abstract notion with different dimensions such as quality of service, quality of information, and quality of systems. Therefore, a quality e-learning program cannot be defined without looking at the details.

The research utilized three samples of publications. The first was used to identify the perceptions of quality from the perspective of top administrators of e-learning institutions. The top 100 ranked universities offering e-learning in the US have been identified. (please see list in Appendix A).

The other two samples have been selected from the published literature. A database search of all articles listed in the academic search engine at Wichita State University (WSU) and Google Scholar with full text in the English language has been performed. An initial search of publications with titles containing the word "quality" combined with the words "e-learning education," "online education," "distance education," "blended education" resulted in 3992 publications. Lists of the publications included within each sample are shown in Appendixes B and C.

Chapter 2 presents a literature review about quality in e-learning for higher education. Included in this chapter are definitions, models, and standards of quality in e-learning. Chapter 3 discusses the research gap in the literature review and the research objectives. Chapter 4 provides a description of the research procedures and the methodology involved in analyzing the data. Chapter 5 describes the results obtained. Conclusions and future research are highlighted in Chapter 6.

CHAPTER 2

LITERATURE REVIEW

This chapter provides a review highlighting e-learning quality studies in higher education to assess similarities and differences between different perspectives. The review includes a definition of quality, e-learning in higher education, and models of quality in higher education and e-learning.

2.1 Background

E-learning has been researched since the 1980's when courses were offered utilizing various networked computers (Hill, 2014; Levine, 1997; Simonson, Smaldino, Albright, & Zvacek, 2012). Earlier forms of e-learning involved communication between students and professors via email (Reiser, 2001a; Reiser, 2001b; Simonson et al., 2012). Due to advancement in communication technology, a limited number of universities explored and experimented with the concept of distance learning, which resulted in a transition to courses being delivered over the radio during the 1920s, and on television in the 1930 and1950s. Satellite and network communication made their contributions during the 1980 and1990s (Reiser, 2001a; Reiser, 2001b; Simonson et al., 2012). In 1985, the internet took its rightful place in communications technology, making it possible to deliver courses through via the internet. However, the execution and delivery did not gain much popularity until Mosaic and Netscape navigators were developed in 1993, offering access to individuals wanting to learn via the world wide web (Hill, 2014; Simonson et al., 2012).

The largest provider of courses happened to be for-profit institutions, a small number of private schools whose offerings were geared towards adult learners and tailored to meet their needs

(Clinefelter & Aslanian, 2014). However, in time, programs and courses came about to provide access to more students (Levine, 1997; Simonson et al., 2012).

During the early years of the 2000's, e-learning was on the rise, with year-to-year enrolment outpacing that of higher education overall. Between 2002 and 2010, enrolment for e-learning grew at a rate of 18.3%, while overall student enrolment across higher education increased by just over 2% (Allen & Seaman, 2011). According to Allen & Seaman (2014) more than one out of every three students in higher education at that time had enrolled in at least one e-learning class. They stated, "Over 95% of institutions with 5,000 or more students participated in some type of e-learning." Business, Information Technology, and Nursing were the most popular majors and e-learning programs (Clinefelter & Aslanian, 2014).

Both Aslanian, Carol B. & Clinefelter (2012) and Simonson et al. (2012) attributed the growth in e-learning enrolment to student-related and institution-related factors. Student-related factors included convenience and flexibility (Aslanian, C. B. & Clinefelter, 2013; Howell, Williams, & Lindsay, 2003; Koper, 2015; Simonson et al., 2012). These factors are important, especially to adults and those non-traditional learners who are often limited by schedules (Ivankova & Stick, 2007; Koper, 2015). Students also have the chance to enroll in programs which are held outside their geographical region, at no additional cost (Park & Choi, 2009). Other contributing factors to the growth of e-learning are pedagogical as students are free to learn at their own rate and participate in programs beyond their geographical area.

Institution-related factors include the ability to meet the demand for a greater number of courses than the institution can physically accommodate (Bannier, 2010). Thus, e-learning allows institutions to recruit more students (Simonson et al., 2012). In financial terms, institutions are able to serve a larger number of students at a lower cost (Aslanian, Carol B. & Clinefelter, 2012). E-

learning coincides with the pedagogy of higher learning education as a whole, with a lecture-based, teacher-centered model that is focused on the student (Conrad & Donaldson, 2011; Heyman, 2010; Simonson et al., 2012). With the evolution of the newer generation of e-learning tools, which include blogs, social networking sites, wikis, and podcasts (collectively known as Web 2.0), a variety of collaborations have been promoted and used to create content for students (Simonson et al., 2012). In addition, with tools from e-learning resources and pedagogy, institutions have declared increased interest in e-learning classes, and on some occasions, exceeded what is traditionally found in the classroom (Aslanian, Carol B. & Clinefelter, 2012; Simonson et al., 2012). In an annual survey conducted by Babson Research (Allen & Seaman, 2016) only 50% of chief academic officers believed that e-learning was critical to the long-term strategy of their institutions in 2002.

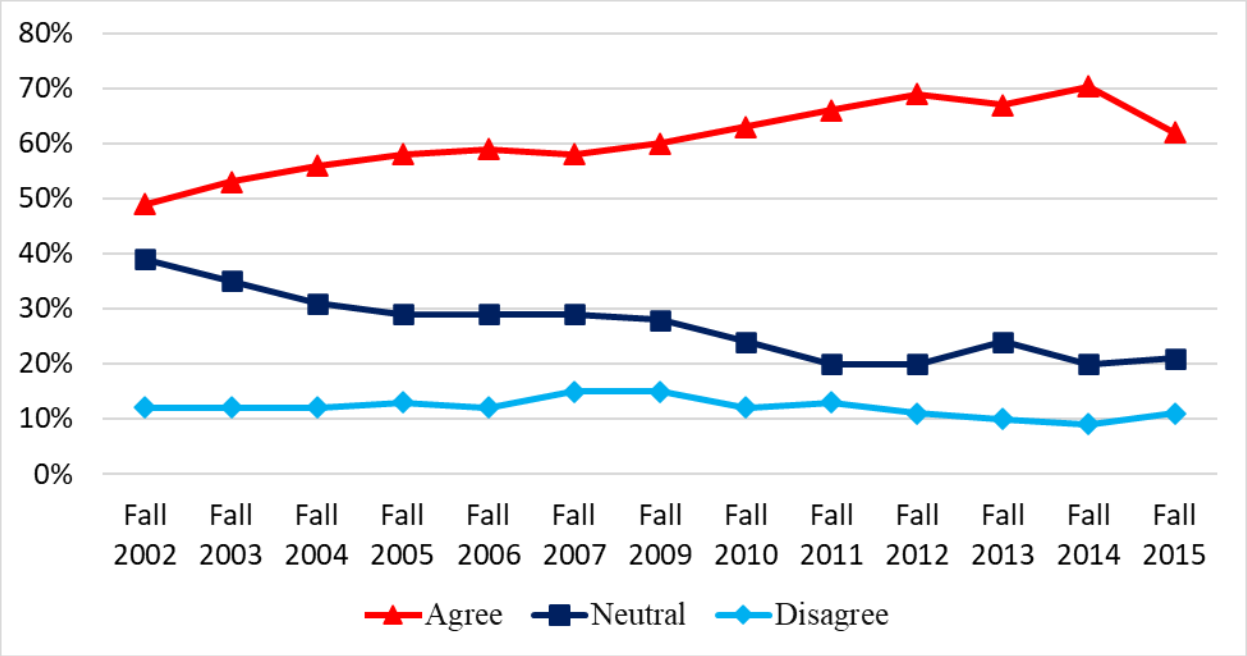

Figure 2.1: E-Learning education and long-term strategy Allen and J. Seaman, (2016).

In 2014, the percentage of academic leaders who believed distance learning to be critical for their long-term strategy reached a record 70.8%, and in 2015 that percentage dropped to 61% of academic leaders who believed distance learning to be critical for their long-term strategy, as shown in Figure 2.1.

Support, based on additional evidence, can be found in the meta-analysis that compares the effectiveness of e-learning to traditional face-to-face instruction (U.S. Department of Education, 2010), which reported that “on average, students in e-learning performed better than those receiving face-to-face instructions.”

2.2 Definition of Quality

The term "quality" can be used for the description of goods and/or services. It is understood differently by various individuals and groups and to date numerous attempts have been made to create a common understanding of the concept. The definition of quality was closely linked to products; therefore, the issue of quality is prominent in the manufacturing context and most of the meanings of quality are related to products. Quality was originally seen as a protective mechanism but nowadays it is considered to be both a strategic tool for creating new markets and a rise in market share (Davis, Aquilano, & Chase, 2003).

Juran (1988) defined quality as "fitness for use." This definition of quality sees the attainment of a certain standard as its main component and a product is deemed "fit for use" when it is of that standard and is therefore approved. Crosby (1979) described consistency as essential and suggested that a good or service is considered better when it meets the needs of the consumer. It must be free of flaws and fulfill all requirements to meet the necessary requirements. Piggott (1990) defined quality as satisfying the customer by continually meeting and improving on the requirements. Harrington (1987) claims that perfection is an infinite activity, and "good is not good

enough" unless it becomes better and best, therefore companies must change in order to constantly keep their clients happy. It is impossible for consumers to be drawn away from a product if they are satisfied with it. According to Feigenbaum (1983), quality reflects the full process of marketing, production, manufacturing, and servicing goods and services that fulfill consumers demands. Also, ISO 9000 (1992) described quality as the overall characteristics and capabilities of a product or service, satisfying specified or implied specifications.

Garvin (1984) stated that quality definitions are likely to fall into one of five groups: transcendent, product-based, production-based, user-based, and value-based approaches to development. Furthermore, he suggests eight elements for assessing product quality: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality as show in the Table 2.1. He also stated that the quality of products and services can be assessed through these dimensions.

Table 2.1. Eight dimensions of quality from Garvin (1984)

Dimension	**Definition**
Performance	Primary operating characteristics of a product.
Features	Secondary characteristics of product that supplement its basic functioning.
Reliability	Probability of product's failure-free over specified time period.
Conformance	Degree to which product's physical and performance characteristics meet design specification.
Durability	Measure of useful product life.
Serviceability	Ease, speed, courteousness, and competence of repair.
Aesthetics	How product looks, feels, sounds, tastes, or smells, as a matter of personal preferences.
Perceived Quality	Quality based on image, brand name, or advertising rather than product attributes, as subjectively assessed.

Adapted from Hussain &. Ranabhat (2013)

Nelson (1974) suggests two property categories, search qualities, and experience qualities, which customers use during their evaluation process. Search qualities, which include color, price, and smell, are characteristic that customers can distinguish before purchasing, whereas experience qualities, including courtesy, wearability, and purchase satisfaction, can only be identified during and after buying. Darby and Kami (1973) introduced credence qualities, which customers may find difficult to assess even after purchasing.

Parasuraman et al. (1985) define quality as measuring how consistently a service meets customers' expectations. In this regard, the customer's perception of service quality depends on their expectations of the outcome and the actual service delivered during the service process.

Parasuraman et al. (1985) developed a conceptual model of service quality as a result of a comprehensive investigation carried out involving many well-known service companies, by conducting in-depth interviews with focus teams of managers and customers. The model detects customers' perceptions of the quality-of-service gap (GAP 5) based on four other service delivery gaps (GAP 1 to 4) as shown in Figure 2.2

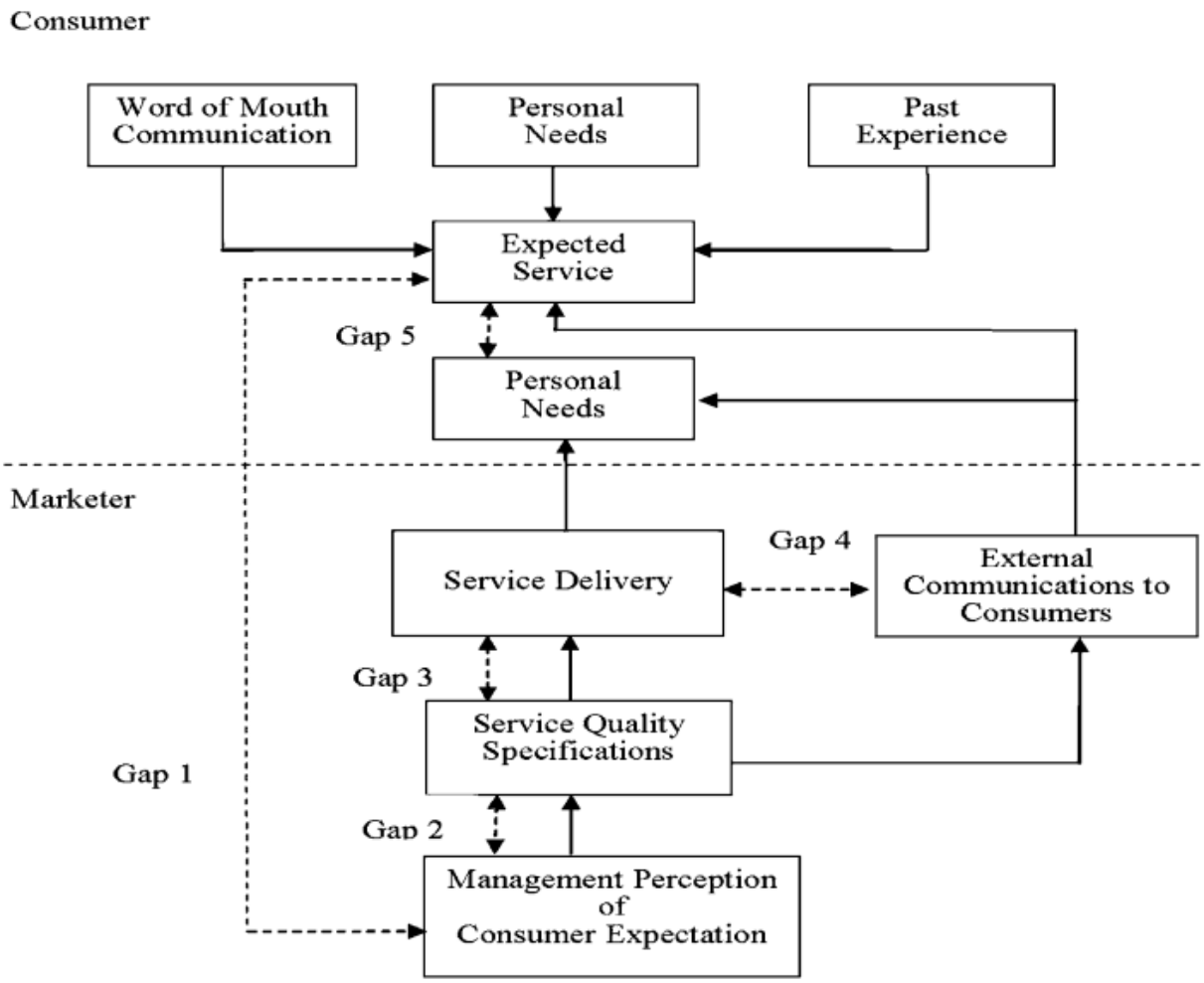

Figure 2.2: Conceptual model of service quality gap

Parasuraman et al. (1988) went on to develop a technique for measuring quality of service that led to the SERVEQUAL tool which is a five-dimensional tool for evaluating/measuring customers' expectations and service quality perceptions based on 22 attributes relating to the defined dimensions.

In relation to education Peters & Waterman (1982) defined quality in terms of educational excellence. Cheng & Tam (1997) considered quality in higher learning establishments to be the attainment of previously-specified goals. Ramsden & Moses (1992) described quality as a function

of the level at which students can understand the materials taught in higher educational institutions. Knowledge evaluation can be carried out by analyzing patterns in test scores and engaging students in implementing learned concepts. Brysland & Curry (2001) suggested that quality can be measured by students' satisfaction.

2.3 Definition of e-learning

The term e-learning is used in literature and business to describe many fields such as web training, distance learning, remote learning, and technology-based teaching (Paulsen, 2002). E-learning has become a central element in the educational process, transforming conventional learning environments to make the learning experience more appealing and accessible.

Many researchers from information technology (IT), computer science, education, and education technology have made significant contributions to e-learning. E-learning is believed to be the learning and education mode of the modern generation and is also viewed as a new pattern for providing education and training (Bhuasiri, Xaymoungkhoun, Zo, Rho, & Ciganek, 2012; Malik, 2010; Odunaike, Olugbara, & Ojo, 2013). Information technology and computer science researchers like (Alhomod & Shafi, 2013; Al-Yaseen & Al-jaghoub, 2012; Bertea, 2009; Selim, 2007), have presented e-learning concepts.

Govindasamy (2002) viewed e-learning as the provision of education through any form of electronic media, including the internet, intranets, extranets, satellite, audio/video, interactive TV, and CD-ROM. In support of this view, Ozkan & Koseler (2009) described e-learning as learning via electronic learning devices, including content delivery through electronic media such as the internet, audio and video, satellite broadcasting, interactive TV and CD-ROM. In addition, Ozkan & Koseler (2009) described e-learning as an educational system that delivers knowledge using IT resources such as the internet, intranet, satellite broadcast, and multimedia applications.

Mayadas & Miller (2014) provided a list of definitions that are used in higher education to help both faculty and students understand the different kinds of e-learning systems. These definitions have two characteristics; one includes definitions at both the course level and the program level, while the second incorporates the instructional delivery mode, time, and flexibility as three key parameters.

Some of the above definitions depend on the use of information and communication technology (ICT) to deliver content (technical perspective), while others concentrate on the role of technology in promoting learning and the learning process as well as the value of e-learning implementation (learning perspective). In the context, e-learning can be described as education and learning, supported by the use of ICT resources and applications to enable students to develop new knowledge, and to support teaching and learning processes, and to offer content to students and teachers and improve their interactive learning. In essence, e-learning refers to using technology resources and software as either a resource used by students to support their studies or as a tool to deliver content. This is similar to the views presented by Mbarek & Zaddem (2013) and Vrana, Zafiropoulos, & George (2006).

2.4 Enrollment in e-learning

E-learning education has expanded rapidly and become standard practice and a preferred higher education option in some cases (Carrol & Burke, 2010; Sun, A. & Chen, 2016). The increased use of the internet and technological advances have made online education the fastest expanding higher education sector (Carrol & Burke, 2010; Sun, A. & Chen, 2016). As a result, there has been a significant increase in the number of students enrolling in online courses (Lee, 2016).

Allen & Seaman (2014) tracked online education in the United States found that the online enrollment growth ranged from 9.6 percent in 2002 to 33.5 percent in 2012, as shown in Figure 2.3. Allen & Seaman (2015) pointed out to the uneven rate of growth in distance learning. The overall growth rate of students taking at least one course in 2014 was 3.7 percent, which was much lower than previous online growth rates. Also, for-profit four-year institutions reported the first-ever decrease in online enrolment of students by 8.7%.

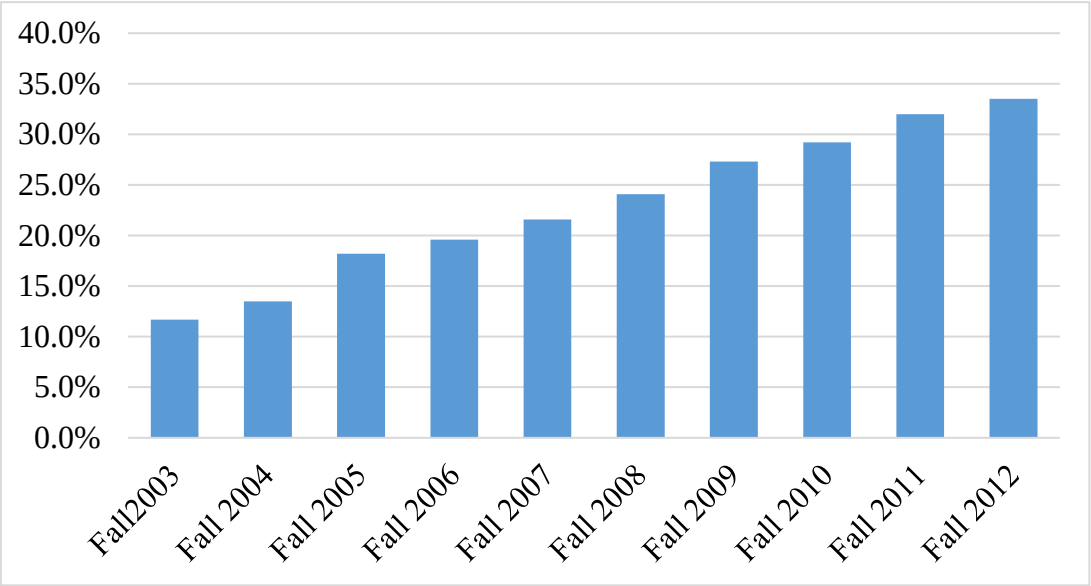

Figure 2.3: The rate of online enrolments in U.S. from Allen & Seaman (2014)

As shown in Figure 2.4, Seaman, Allen, & Seaman (2018) reported that during the fall of 2016, the number of students who took one or more online courses was more than 6.3 million, or nearly one-third (31.6%) of all students. Almost half of those (14.9%) participated exclusively in distance courses, while the rest (16.7%) combined distance and face to face learning. Furthermore, 52.8% of all students who took at least one distance learning course also attended a course on

campus. These data show that online education is now part of mainstream higher education. Also, online education is no longer the domain of profit-making educational institutions. The majority (69.1%) of administrators in public universities consider the provision of online courses essential for their institutions' future as did more than two-thirds (68.9%) of all students taking at least one online course at a public college or university (Seaman et al., 2018). Therefore, as online courses become a more popular part of the educational experience for an increasing number of college students, the differences between online and face-to-face students becomes less apparent. Instead of being a pedagogy of choice for particular student populations, online courses are more and more common and less an exception for the general population of students. This may be even more true since COVID-19 as most colleges and universities in America and elsewhere have moved away from face-to-face teaching towards remote teaching and e-learning, and even students at elementary and secondary schools have been introduced to remote teaching. The data show this to be an important change as an increasing number of students take online courses, both traditional and non-traditional (Lederman, D. (2020), Bhattacharya et al., 2020).

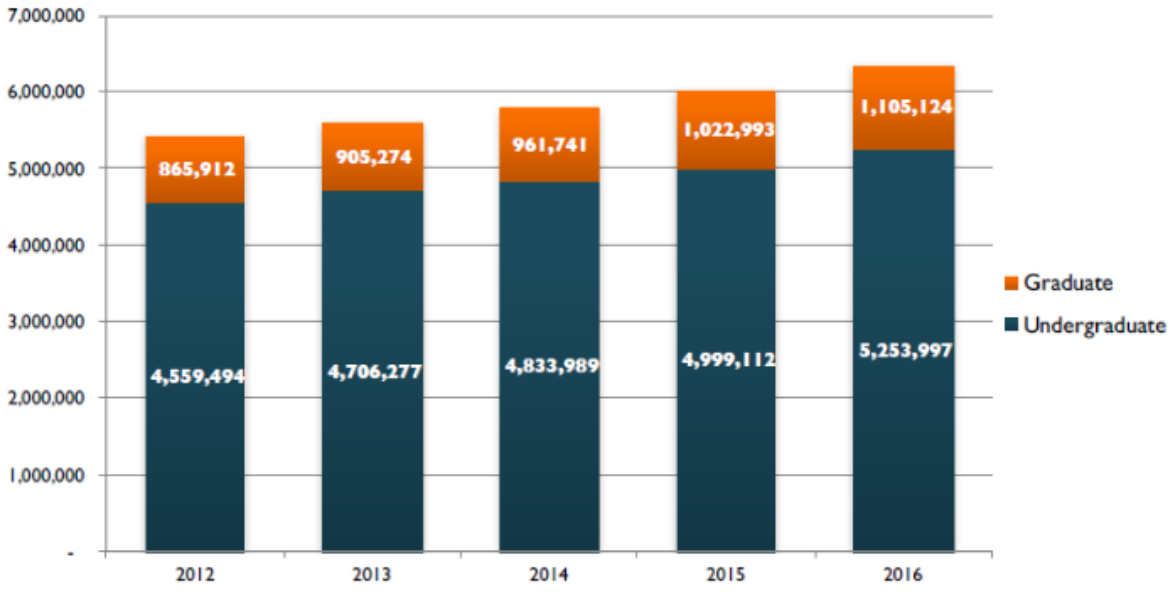

Figure 2.4: Students Taking Distance Courses by Level (Allen & Seaman, 2018)

2.5 Stakeholders in e-learning

The international standard ISO 26000 (International Organization for Standardization, 2010) defines a stakeholder as an "individual or group that has an interest in any decision or activity of an organization." Stakeholders are the key participants in the operations of all organizations. A higher education institution may have the best e-learning systems and tools but that does not guarantee that their stakeholders will be an asset to their e-learning system (Marić, 2013). Alsabawy, Cater-Steel, & Soar (2011) noted that studies tend to neglect the role stakeholders play in e-learning, typically focusing on students only. Sudfelt, Campbell-Meier, McGuire, & Tate (2016) supported this argument and emphasizes the need to consider views other than those of the students.

There are several stakeholders in e-learning including learners/users, faculty/instructors, software developers, instructional designers, administrators, online facilitators, digital designers,

and designers of learning materials (Abdellatief, Sultan, Jabar, & Abdullah, 2011; Ozkan & Koseler, 2009; Selim, 2007). Selim (2007) identifies four major stakeholders in higher education, including learners, instructors, institutions, and administrators. He noted that quality standards differ between stakeholders, as they have significantly differing expectations.

Moore & Kearsley (1996) identify eight groups of key stakeholders in distance education systems: students, course developers, site coordinators, tutors, proctors, student support services, administrators, and teachers. Table 2.2 summarizes these groups and their responsibilities.

Table 2.2. Stakeholders in a distance education system and their responsibilities

Stakeholder	**Responsibilities**
Student	Self-directing and have learner autonomy.
Course developer	Works in a team of specialist including technology, content, media, and instructional design specialist.
Site coordinator	Communicates with the teacher, student, and the larger community, organizes, and manages local circumstances, provides learner support at local site for administrative, technological, and content issues.
Tutor	Provides individualized instruction, grade assignments, and monitor student progress.
Proctor	Proctors exam and quizzes at local site.
Student support services	Counselled provides guidance; administrative staff provides routine administrative assistance
Management/ administration	Manges policy, planning, staffing, budgets, scheduling, resources, etc.
Teacher	Humanizes the learning environment, facilities and encourages interaction, organizes, and presents information and proves feedback.

Source: From. Distance education: A systems view" by Moore, M., & Kearsley, G. (1996). *Belmont: Wadsworth Publishing Company*

A similar idea was presented in the responsibility matrix created by Wagner et al. (2008), who identified seven groups of stakeholders in e-learning in higher education. These are students, instructors, educational institutions, content providers, technology providers, accreditation bodies,

and employers. They summarized the responsibilities of each group and outlined the cooperation between them. According to Wagner et al., (2008), the first three stakeholders in relation to online learning are students, educational institutions, and instructors. Others include employer groups, course content providers, and technology support. Student success and drop-out prevention in online courses can be achieved through student-teacher-manager collaboration, which can lead to enhanced student completion a common goal.

E-learning systems provide important channels of communication between students and instructors. Learners can be individual students or employees of a company which uses such techniques to comply with their employees' development objectives. These are external users who interact with the system directly. Stakeholders can include schools, universities, or educational institutions in general. This is an internal user group which also interacts with the system directly. Accreditation entities are external stakeholders and interact with the system directly for audit purposes. Instructors are internal users and directly interact with e-learning platforms. Content providers can be internal or external but interact with the system directly. Additional external groups are educational ministries, federal and state education boards, teacher associations, student boards, and technology providers. They interact directly with the systems to support the educational institutions in their teaching role. Although technology suppliers are outside the system, they offer maintenance services and technical support. Each stakeholder group interacts with the system differently, although all stakeholders play an essential role in e-learning.

2.5.1 Students as stakeholders

Students are the main stakeholders in e-learning and the real beneficiaries of successful systems (Bhuasiri et al., 2012). They require an e-learning which is only useful and efficient if students use it properly. For students, the demand for education has grown to a new level and they

stand to benefit greatly from such programs and therefore have good reason to wish to influence them.

Students' perceptions of the quality of e-learning programs are essential. Campos & Harasim (1999) undertook a study to measure students' perceptions of an e-learning environment developed by Simon Fraser University in Canada. They found that 84% of the students were satisfied with their e-learning experience. Vrasidas & McIsaac (1999) emphasized other factors, including previous computer knowledge, expertise in using the conference system, speaking, and moderating online discussions. Phipps & Merisotis (2000) indicated that one characteristic of a quality e-learning is the appropriate response to students' needs.

LaPadula (2003) conducted a study on the student support services' satisfaction levels at the New York Technology Institute, involving 92 e-learning students. The research findings ranked support services as follows: library, admission fees, textbooks, pre-learning, credit assessment, academic counseling, financial assistance, grant recipients, and registrar. The students demonstrated interest in community programs such as social services, academic guidance/career counseling, professional assistance, and personal/mental health advice.

As was noted by Keramati et al., (2011), the implementation of e-learning has increased significantly in higher education institutions as students recognize the benefits of using e-learning systems. However, as instructors and students are not in one place, a number of problems may arise including both mental and physical readiness. There are various other challenges that may affect students’ willingness to use e-learning systems (Assareh & Bidokht, 2011).

2.5.2 Instructor’s as stakeholders

Instructors represent major stakeholders and are considered instrumental in the growth of an institution growth by developing new structures for the transmission of information. This is an essential factor which contributes significantly to students' perceptions of the e-learning experience. The behavior and attitude of the professors towards their students influence the perceptions of the quality of the program and performance of the system. The instructor's teaching style plays a significant role and affects student acceptance and satisfaction in online instruction. The teacher’s characteristics are significant in determining an educational learning system’s efficiency, impact, and effectiveness (Selim, 2007; Sun, P., Tsai, Finger, Chen, & Yeh, 2008).

Sun et al. (2008) emphasized that characteristics such as emerging technology methods, technology frameworks, and teaching-learning styles determine the outcome and conclusions of a learning system. Instructors must be given the necessary training in order to attain the skills needed for e-learning. Some studies have found that instructors' attitude changes positively after receiving appropriate training (Idris & Osman, 2015).

Different studies identified barriers related to instructors' satisfaction. For example, the lack of information and communications technology (ICT) skills represents a serious barrier to satisfaction (Aldowah, Al-Samarraie, & Ghazal, 2019; Rasheed, Kamsin, & Abdullah, 2020). It is important to note that training should be provided to instructors as well as to students so that maximum benefit is attained from an e-learning system (Alomari, El-Kanj, Alshdaifat, & Topal, 2020).

2.5.3 Top administrator as stakeholders

Administrators represent major stakeholders in higher education institutions because they provide effective leadership for students, teachers, and other stakeholders (Asiyai, 2015). They must ensure that the relationships between stakeholders are fostered in an encouraging environment. Top administrators are the system definitive actors and determine whether or not e-learning is to be carried out (Sudfelt et al., 2016). Administrators have to ensure that they achieve excellence when providing services. Fitzgerald et al., (2016) argued that management has a duty to inculcate a democratic culture in an organization by developing sustainable policies. According to Sudfelt et al., (2016), top administrators and executive managers in higher education institutions play a significant leadership role as they are responsible for strategic and long-term planning.

Leadership requires understanding and the ability to express the vision to others, encourage them to act, and motivate them to work towards the greater good. Gardner (1995) speaks about reaching followers using different approaches, finding the ones that touch people's hearts, and respond to their needs. A successful leader has the ability to inspire stakeholders, provide opportunities for those encouraged to contribute, and cooperate rather than dominate. To be effective and sensitive to stakeholders at a higher education institution, they must know who the stakeholders are and what they want. Bennis & Townsend (1995) emphasized that today's leaders must be receptive to the opinions of everyone participating in an institution, and recognize the fact that anyone can make a significant contribution. Successful distance learning leaders must have a positive impact on these stakeholders and be able to make decisions that reflect the best interests of stakeholders (Beaudoin, 2003).

E-learning instructors, staff, and administrators can be seen as a holistic caring team focused on the e-learning environment. Pielstick (1998) noted that "the shared nature of the vision

is unifying, and creates a sense of community." They all have a mission to motivate, inspire, and provide the best e-learning environment for students as well as being responsible for marketing and managing programs. They also must ensure compliance with laws and provide assessment frameworks for institutions already involved in distance education.

2.6 Quality Models in Higher Education

Harvey & Green (1993) propose five categories of quality, with regard to service provided to students: understanding, consistency, fitness for function, value for money, and transformation. In 1996, Owlia & Aspinwall proposed a model for quality in higher education. The model included the six dimensions shown in Table 2.3. The model focuses specifically on the higher education sector, and the six quality factors represent views of the students as the primary clients.

According to Cheng & Tam (1997) quality in higher education is determined by input, process, and output measures. They defined seven components of quality: resources, satisfaction, processes, legitimacy, goal and specification, lack of problems, and organizational training.

In relation to quality of administration in higher education, Leblanc & Nguyen (1997) proposed seven dimensions. These are managerial staff, reputation, workforce, educational plan, responsiveness, access to facilities, and physical proof.

Houston & Rees (1999) asserted that, although it is difficult to establish varying markers to facilitate the assessment of quality in higher education, it is essential to do so due to the increased competition which exists between higher learning institutions. Donnelly & Shiu (1999) indicated different facets of quality that can be concurrently assessed. They emphasized the importance of providing accommodation in terms of the assessment of service.

Table 2.3. Dimensions of quality in higher education

Dimension	Definition
Tangibles	Sufficient equipment/facilities. Modern equipment/facilities. Ease of access. Visually appealing environment. Support services (accommodation, sports, etc.).
Competence	Sufficient (academic) staff. Theoretical knowledge, qualifications. Practical knowledge. Up-to-date teaching expertise, communication.
Attitude	Understanding students' needs. Exhibiting willingness to help. Being available for guidance and advice. Giving personal attention. Showing emotion, courtesy.
Content	Relevance of curriculum to students' future jobs. Effectiveness. Containing primary knowledge/skills. Completeness, use of computer. Communication skills and team working. Flexibility of knowledge, being cross-disciplinary.
Delivery	Effective presentation. Sequencing, timeliness. Consistency. Fairness of examinations. Feedback from students, encouraging students.
Reliability	Trustworthiness. Giving valid award. Keeping promises, matched to goals. Handling complaints, solving problems.

Note: From "A framework for the dimensions of quality in higher education," by M. S. Owlia and E. M. Aspinwall, *Quality Assurance in Education*, 4(2), p. 19.

Chua (2004) recommended achieving consistency standards in marketing a higher learning institution. He categorized service processes into: input, method, and output. Input covers the criteria for selection (requirements for admission into the program) as per higher education norms, while method consists of the actual teaching and learning work of the faculty, and output covers

variables such as opportunities for high-paid work, location, and academic success. Typically, students consider method and output as the most relevant processes, staff members prefer to focus on input and processes. These differing perspectives regarding the values of these processes mean that students and staff will view quality differently.

Abdullah (2006) noted that quality requires more than academic performance and encompasses facets of the overall service setting and the students' experience. He also recognized the link between the standard of quality and features including customer satisfaction, profitability, loyalty, appeal, retention, and positive word-of-mouth. Thus, Abdullah suggested utilizing the HEdPERF (Higher Education Performance) scale in assessing quality.

Mahapatra & Khan (2007) developed the EduQUAL instrument to measure the critical factors of students' perceptions of quality of service through the use of learning outcomes as shown in Table 2.4.

Table 2.4. EduQUAL dimensions in higher education

Dimensions	**Definition**
Learning Outcomes	Ability to provide the promised service dependably and accurately
Responsiveness	Willingness to help customers, provide prompt service, provide physical facilities (equipment, personnel and communication material)
Personality Development	Overall development of students' personality, enhancement of knowledge
Academics	Expert faculties, individualized attention to the customer

Morales & Calderón-Moncloa (2008) observed that students' opinions on quality present the most essential definition in higher learning institutions. They introduced five service quality indicators in higher education: empathy, management, tangibility, efficiency, and instructors.

Faganel (2010) pointed out that initiatives to deliver quality in higher education frequently focus on a single area, such as teaching. The findings are then assumed to reflect the institution's overall quality, ignoring administrative resources. He indicates that enhancing the transparency, precision, and efficiency of instructors' services is critical to the overall quality of their services.

Ling, Chai, & Piew (2010) stressed four aspects of quality: staff responsiveness, curriculum, librarians and recreational activities. They identify eight dimensions that greatly affect students: perceptions of quality of service, contact personnel, the staff responsiveness, curriculum, quality of librarians, and access to facilities, activities, and cost of courses.

According to Ong & Nankervis (2012), service quality must be taken into consideration to improve student advisory services, create long-term relationships between the university and its customers and increase its brand image.

Annamdevula & Bellamkonda (2012) proposed another scale for assessing the quality of services in higher education (HIEdQUAL). Their research showed students as the industry's primary consumers. This scale covers 25 elements related to teaching and instructional materials, financial, technical, campus facilities, and support resources.

2.7 Quality Models in E-learning

Quality in e-learning may be viewed from each stakeholder’s perspective and measured over a wide range of factors, such as students, curriculum, instructional design, faculty characteristics, and technology used (Jung, 2011). However, it is often argued that only the end user's (i.e. the student’s) perceptions can measure quality since it is essential that the students are satisfied, particularly since it is they who will recommend the service to others. Therefore, it is

more likely that the relationship with the service provider will continue if the end user is satisfied (Farahmandian et al., 2013).

Shaik et al., (2006) identified two quality dimensions of online distance learning programs, namely administrative services and instructional services. The former mainly applies to support desk programs, consultants, administrative staff, and school administrators, while the latter relates to the instructor's educational interactions and data on the university's education portal.

Lin (2007) identified factors leading to the success of e-learning systems in Taiwan. He reported that service quality, information quality, and system quality are the three factors with the most positive impact.

Jung (2011) conducted an investigation to distinguish the quality measurements as experienced by adult students who had taken at least one e-learning course offered by advanced education institutions in South Korea. They identified seven measurements that could characterize e-learning quality. These are staff support, interaction, institutional quality assurance mechanism, learner support, institutional credibility, learning tasks, and information and publicity.

Wu & Hwang (2010) identified five dimensions of e-learning effectiveness. These are supportive issues, quality of the system, service quality, appeal to learners, and instructor attitudes. Tseng et al., (2011) used a fuzzy evaluation model to determine aspects related to quality in terms of system, information, service, and website. Khan & Granato (2008) developed an e-learning framework with eight dimensions, namely, ethical, pedagogical, resource support, technological, institutional, interface design, management, and evaluation.

Peltier et al., (2007) stated that e-learning teaching quality may be measured based on teacher support and mentoring, teaching quality, student interactions, student-teacher interactions,

course content, and course structure. Of these six factors, program quality was most important for determining the online e-learning environment's perceived quality. The frequency of interactions among students and teachers was not directly correlated with the perceived overall curriculum quality.

The Higher Learning Commission (HLC, 2009) offers accreditation and equivalence services for all universities, students, and professionals. They also set stringent criteria for on-site and off-site assessments and include guidance for online universities and institutions to help them further develop their processes and educational quality as needed by the international community. Accreditation requirements are quality standards by which the HLC decides if an organization receives accreditation or accreditation reaffirmation. The criteria, implemented by all six U.S. regional accrediting bodies, cover nine quality requirements for distance education programs. The published guidelines for evaluation of distance education can help institutions plan distance learning and provide an assessment framework. These guidelines may be obtained from the HLC website https://www.hlcommission.org.

In 2015, Quality Matters (QM) developed general standards and rubrics for evaluating online programs. With more than 60,000 members representing colleges and universities throughout the world, QM is focused on quality assurance in online learning and provide a standard for certifying online courses and programs. A copy of the unannotated version of the 6th edition of these standards can be obtained from https://www.qualitymatters.org/.

CHAPTER 3

RESEARCH OBJECTIVES AND QUESTIONS

This research is motivated by the work of Alotaibi (2016), who identified the perceived dimensions of quality in higher education. He utilized computer-aided text analysis (CATA) coupled with principal component analysis to analyze the textual contents of two samples of publications. Alotaibi (2016) identified the thirteen constructs shown in Table 3.1 from the literature about quality. He developed a special coding scheme based on these constructs, as shown in Table 3.2, and used a panel of experts to ensure content validity. He reported that all thirteen dimensions were needed to represent perceptions of quality in higher education. Two sets of meta-dimensions were identified. Academic aspects, safety, evidence, and empathy were the dimensions affecting the perceptions of academicians, whereas empathy, attitude, safety, and reputation appeared to influence perceptions of top administrators. He pointed out that academicians appeared to place more emphasis on academic aspects while top administrators emphasized empathy and attitude.

Parasuraman et al., (1985) pioneering work motivated researchers to measure quality as the difference between expectations and perceptions. Their original reported work focused on retail bank customers, credit card institutions, securities brokers, and repair facilities. Education was not included in their study. Compared to other models of service quality, Parasuraman's model appears to include the most inclusive list of dimensions. Parasuraman et al. (1985) identified five major gaps that face organizations seeking to meet customer's expectations of the customer experience as shown in Figure 2.2. However, Parasuraman et al., (1988) reduced the total number of dimensions to 5 in a follow-up study, forming the basis for SERVQUAL.

Diversity of the stakeholders, acceptance requirements, the variability of offerings, and the extended duration of delivery made higher education a particular type of service. Several authors have addressed aspects of quality in higher education. Owlia and Aspinwall (1996) proposed a framework for measuring quality in post-secondary education. This framework modeled quality in the classroom as a product of six factors. Studies on e-learning have shown increased concerns about the quality of instructions, learning, and participant interactions (Hathaway, 2009 and Ward, et al., 2010).

Table 3.1. Initial constructs defined

Construct	Definition
Reliability	Consistency of performance and dependability; means performing the service right the first time and that the institution honors its promises.
Responsiveness	Willingness and readiness of faculty and staff to provide service.
Competence	Possession of required skills and knowledge to perform the service.
Access	Approachability and ease of contact.
Courtesy	Politeness, respect, consideration, and friendliness of contact person.
Communication	Keeping stakeholders informed and listening to them.
Credibility	Trustworthiness, believability, and honesty.
Security	Freedom from danger, risk, or doubt.
Understanding	Making an effort to understand stakeholders' needs.
Tangibles	Physical evidence of service.
Performance	Primary operating functions of the institution.
Conformance	The extent to which the institution meets pre-established standards (both internal and external).
Features	Supplemental characteristics offered by the institution.

Table 3.2. List of codes

Construct	Code
Reliability	Accuracy Completeness Confidence Consistency Stability
Responsiveness	Flexibility Diversity Readiness Willingness Preparedness
Competence	Capability Experience Knowledge Skill Qualification
Access	Advising Affordability Approachability Availability Capacity
Courtesy	Accommodating Consideration Friendliness Politeness Respect
Communication	Contact Inform Interact Listen Participate

Construct	Code
Security	Assurance Confidentiality Protection Safeguard Safety
Understanding	Accept Assist Appreciate Cooperate Recognize
Performance	Developing Evaluating Improving Measuring Training
Conformance	Accredit Achieve Review Satisfy Update
Features	Curricula Degree Offerings Opportunities Program
Credibility	Believability Ethical Honesty Integrity Trustworthiness

3.1 Research Gap

While dimensions of quality in higher education appear to have received a great deal of attention in published research, the same is not true for the quality in e-learning. In 2009, the Higher Learning Commission (HLC) published guidelines for the evaluation of distance education (on-line learning). These guidelines comprise nine hallmarks of quality in distance education. These hallmarks (dimensions) reflect the perceptions of one of the stakeholders of e-learning in higher education (the Council of Regional Accrediting Commissions). In addition, the QM standard focuses primarily on course design and offers a set of eight general standards with a scoring system used to evaluate the design of online courses.

Perceptions of other stakeholders need to be identified and understood to achieve quality. Also, it is important to note that perceptions of quality are subject to changes over time. Changes in learning management systems, advancements in communication technology, and the general attitudes towards e-learning are expected to change the perceptions of the stakeholders.

3.2 Research Objectives

The proposed research is aimed at identifying perceptions of quality in e-learning. These will include the perceptions of the students, instructors, and top administrators of higher education institutions offering e-learning programs. As the research efforts will be guided by the perceptions of quality in higher education identified in Chapter 2, the results will allow for an objective assessment of differences in the perceptions of quality in e-learning. In other words, this research will seek to provide objective answers to the following two questions:

- What set of dimensions appear to dominate perceptions of quality in e-learning from the perspectives of the top administrators, instructors, and students?

- Are there any differences between perceptions of quality in higher education and e-learning programs from the perspectives of these three key stakeholders?

CHAPTER 4

RESEARCH METHODOLOGY

To achieve the research objectives, three steps have been required. In the first step, a poll of relevant publications has been identified. A sample of these publications was used as units of analysis in conducting computer-aided text analysis (CATA) during the second step. Textual analysis was based on the dimensions utilized by Alotaibi et al., (2016), shown in Table 3.1. Only the dimension describing tangibles was excluded as it represents physical aspects such as laboratories, classrooms, and libraries. These are not relevant to e-learning programs. The analysis adopted the same coding scheme for the remaining 12 constructs developed by Alotaibi et al., (2016) as shown in Table 3.2. The results of the textual analysis were statistically analyzed in the third step. Results from the statistical analysis were validated based on the research cited in Chapter 2 and the eight hallmarks proposed by the HIC. These steps are depicted graphically in Figure 4.1 and explained in the following sections.

4.1 Publication Selection

The research utilized three samples of publications. The first has been used to identify the perceptions of quality from the perspective of top administrators of e-learning institutions. In this case, the sample of publications included statements made by administrators to highlight aspects of their programs (please see list in Appendix A). These statements are typically prepared by the administrators with input from marketing specialists and posted on the institution's website to support recruitment efforts. The top 100 ranked universities offering e-Learning in the US have been identified. Public announcements made by administrators in these programs have been

downloaded from the institutions' websites. These have been used as units of analysis in performing textual analysis.

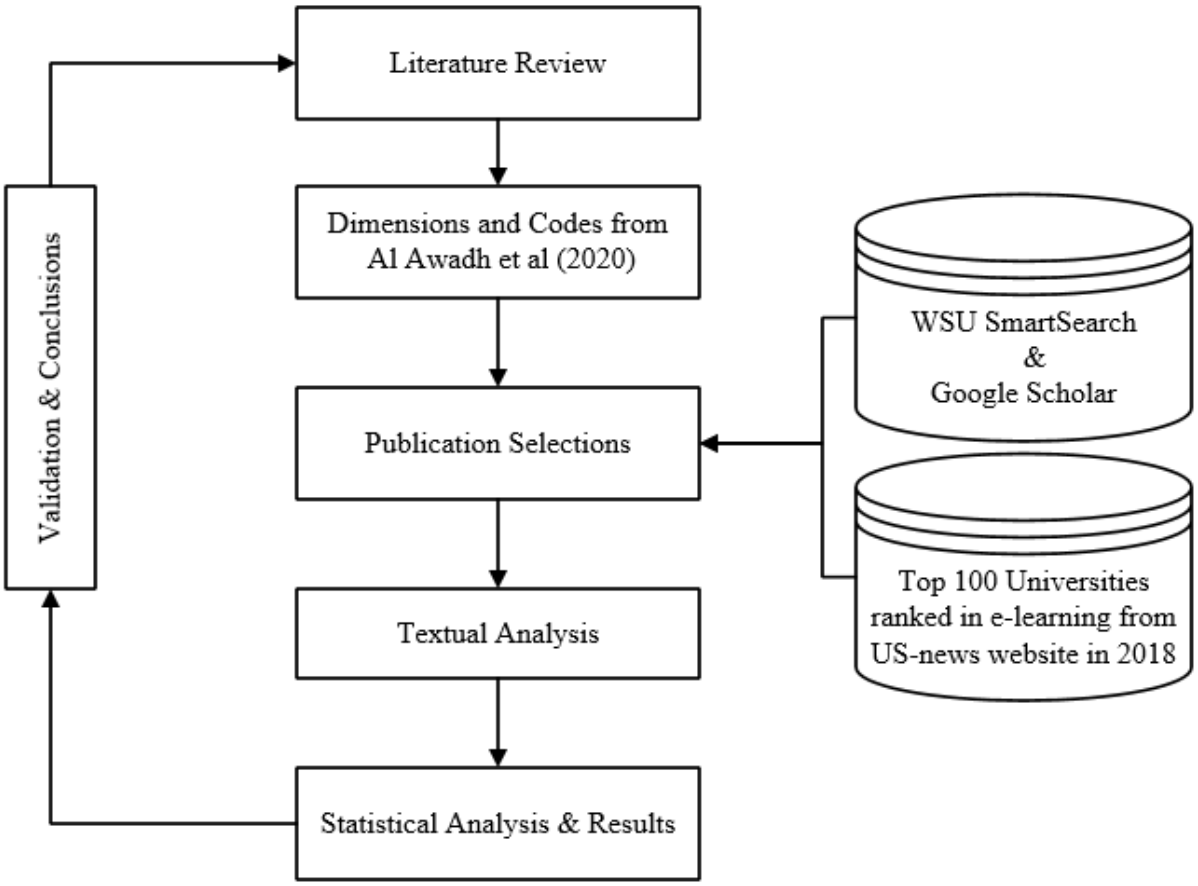

Figure 4.1: Research Methodology

The other two samples have been selected from the published literature. A database search of all articles listed in the academic search engine at Wichita State University (WSU) and Google Scholar with full text in the English language has been performed. An initial search of publications with titles containing the word "quality" combined with the words "eLearning education," "online education," "distance education," "blended education" resulted in 3992 publications. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines have

been followed to assure quality. Abstracts of these publications have been screened by this author and classified into three samples. As shown in Figure 4.2, one sample included publications representing the instructors' views (teachers or professors), and the second included publications representing the students' views (e-learners), and the third reflecting views of both instructors and students. Lists of the publications included within each sample are shown in Appendixes B and C.

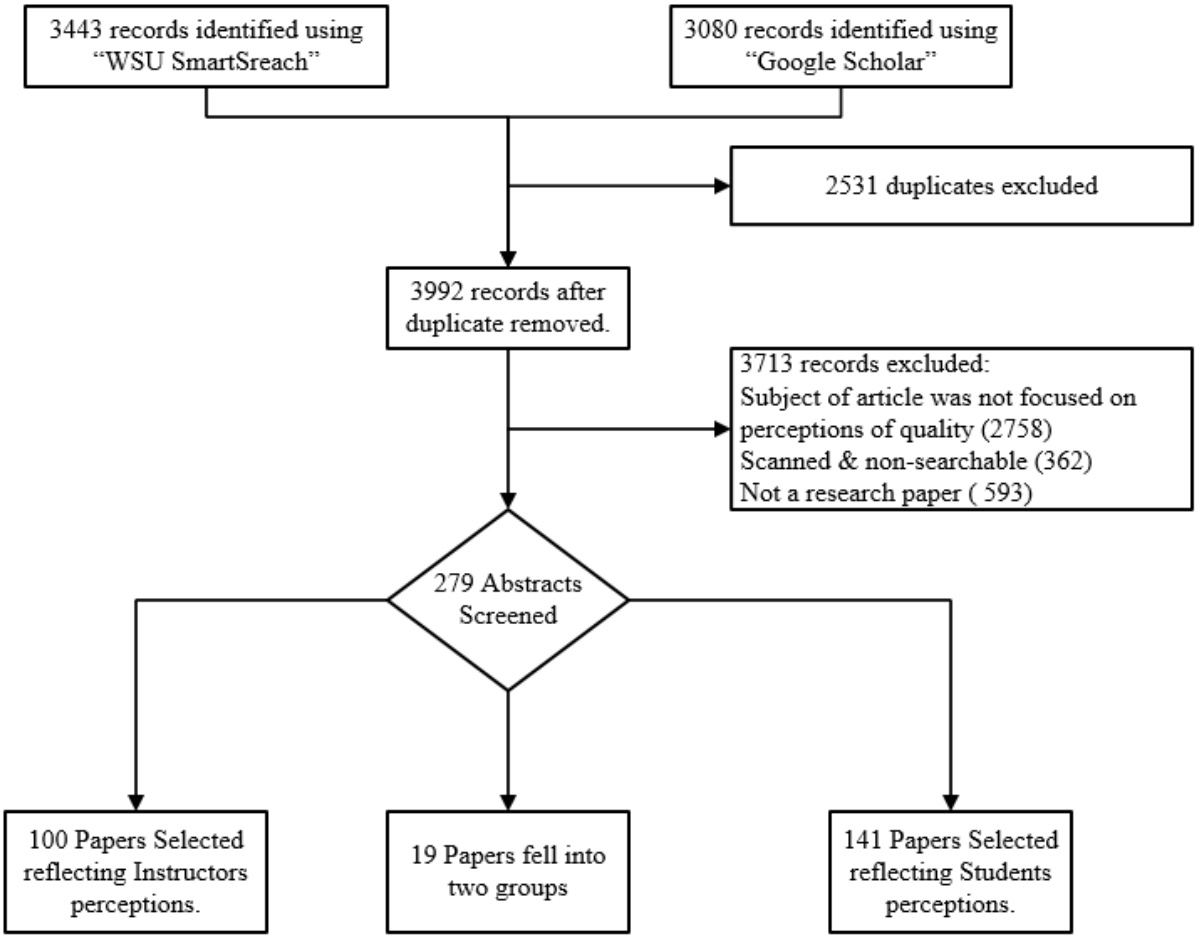

Figure 4.2: PRISMA flowchart for publication selection

4.2 Textual Analysis

The second step involved performing a textual analysis of the contents of the three samples. This approach was chosen for its ability to analyze the textual content of a large sample of publications. According to (Berelson, 1952), content analysis is utilized in research for a systematic, objective, and quantitative description of the manifest communication content. Holsti (1968) pointed out that content analysis is inherently broad and yields reliable results. In this step, the full manuscript of each publication within each sample were analyzed using the NVivo Version 12 (QSR International 2016). Publications (units of analysis) from each sample have been imported into the software to determine the frequency of occurrence of each dimension and its associated codes (shown in Table 3.2).

CHAPTER 5

RESULTS AND ANALYSIS

In this step, results from the textual analysis have been analyzed using statistical methods. The frequency of occurrence was used to indicate the importance of each construct within each sample. Important constructs are expected to occur the most within each sample of publication. Analysis of these frequencies can help reveal the perceptions of the stakeholders represented in each sample. Also, they can be used to indicate the relative importance of each of the 12 dimensions from the three perspectives.

Further, results have been amenable to factor analysis (FA). This is a statistical technique typically used to reduce dimensionality. According to (Brown, T. A., 2015), FA uses the frequencies obtained from textual analysis to identify strong patterns in the data and possibly decrease the total number of factors. The analysis has been performed using the Statgraphics software (Statpoint Technologies Inc., Centurion version 17.2, 2016). The Kaiser-Meyer-Olsen (KMO) measure was utilized in determining the number of factors to be extracted. These factors presented a set of meta-dimensions validated based on the research cited in Chapter 2 and the eight hallmarks proposed by the HIC. This provided objective answers to the research questions. The following sections present the results for the perceptions of top administrators, instructors, and students respectively.

5.1 Top Administrators' Perceptions

Textual analysis indicated the frequency of occurrence of each dimension and its codes. The frequency of occurrence is assumed to reflect the importance of each dimension from the viewpoint of administrators. The textual analysis resulted in 23,256 occurrences for all 12 dimensions and their codes. The results are depicted in the Pareto chart shown in Figure 5.1. As can be seen, *features, performance, competence, access, communication, understanding, and conformance* appear to be the top constructs used by the administrators. These dimensions accounted for 85 % of the total count. Features (18%) is the dimension used the most by administrators, followed by the performance (14%). These two dimensions are used to describe the supplemental characteristics and operating functions offered by the institution.

On the other hand, responsiveness, reliability, security, and credibility contributed less than 15 % of the total count. These appear to have much lower importance from the administrators' point of view. Both security and courtesy contributed about 3% each to the total count. Whereas credibility was the least observed count, contributing only 1% of the total.

Factor analysis (FA) was applied in an attempt to reduce the dimensionality of the data into four uncorrelated factors as was reported by Alotaibi et al., (2016). FA uses the frequencies obtained from textual analysis to identify strong patterns in the data and possibly decrease the total number of constructs (Brown, T. A. , 2015). The frequency data were used to construct a 100 by 12 matrix that was used for the factor analysis. The analysis was performed using the Statgraphics software (Statpoint Technologies Inc., Centurion version 17.2, 2016). A Kaiser-Meyer-Olsen (KMO) measure of 0.904 was obtained, suggesting that some common factors can be extracted. The results of the factor analysis are shown in Table 5.1. The Kaiser-Guttman rule was used, which

is the most popular stopping criterion in factor analysis (Kaiser, 1960). The criterion requires that factors linked to eigenvalues greater than 1.0 are considered nontrivial.

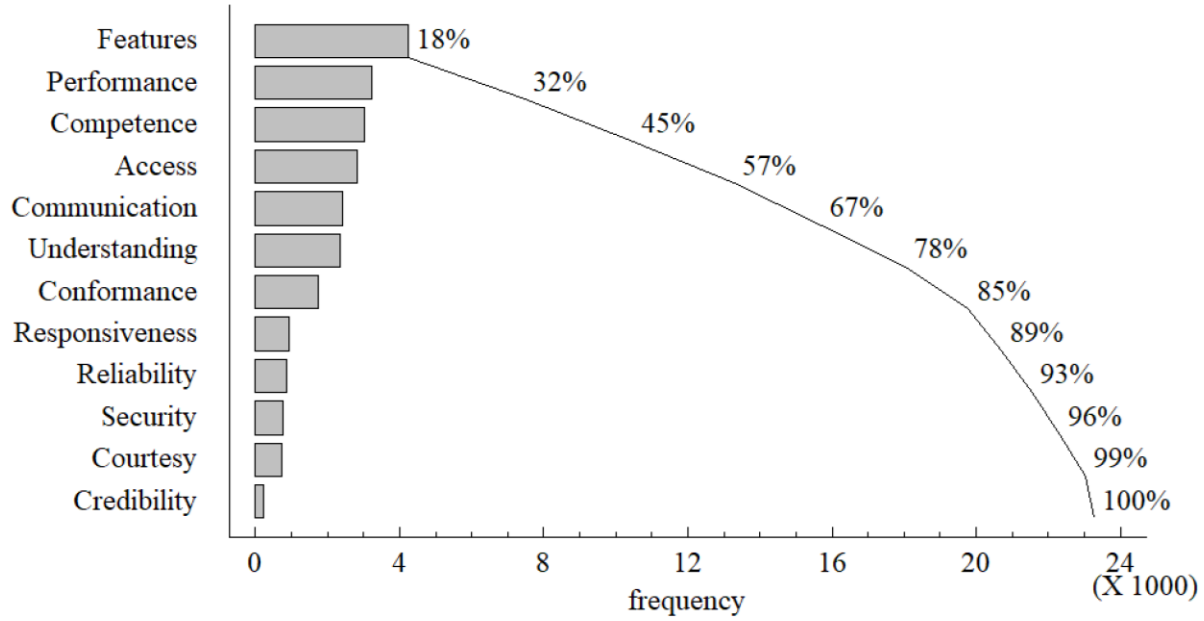

Figure 5.1. Pareto analysis of administrators.

As shown in Table 5.1, two uncorrelated factors can be extracted from the data. These are nontrivial factors accounting for 82% of the total variation. They appear to be used by administrators to distinguish their own programs from others within the sample.

Table 5.2 illustrates the eigenvector coefficient (weight) of each of the 12 dimensions relative to each factor.

The results in Table 5.3 indicate that access, communication, competence, understanding, and responsiveness made significant contributions to the first factor. This factor contributes 69% of the total variability and suggests engagement as a distinguishing factor. Engagement refers to the program's ability to maintain communication, identify students' needs, and address these needs. This is especially important in e-learning where attrition rates are higher than in the face-

to-face settings, as was noted by (Allen and Seaman, 2015; Boston and Ice, 2011). Engagement can be assessed during or after program completion and may be classified as an experience property, as was proposed by Nelson (1974).

Table 5.1 Results of factor analysis: Administrators.

Factor Number	**Eigenvalue**	**Percent of Variance**	**Cumulative Percentage**
1	8.31505	69.292	69.292
2	**1.6067**	13.389	**82.681**
3	0.570544	4.755	87.436
4	0.482104	4.018	91.453
5	0.266088	2.217	93.671
6	0.16335	1.361	95.032
7	0.14734	1.228	96.260
8	0.124005	1.033	97.293
9	0.105777	0.881	98.175
10	0.0917678	0.765	98.939
11	0.0775395	0.646	99.586
12	0.0497279	0.414	100.000

Table 5.2 Factor score coefficients: Administrators.

Dimensions	***Factor 1***	***Factor 2***	***Factor 3***	***Factor 4***
Access	**0.900552**	0.167035	0.136146	0.147325
Communication	**0.648048**	0.593407	0.253198	0.271443
Features	0.568972	0.182766	0.690571	0.298983
Performance	0.627608	0.298928	0.633663	0.174813
Competence	**0.809141**	0.391615	0.267709	0.216845
Understanding	**0.815992**	0.173207	0.279338	0.352765
Conformance	0.270555	**0.706565**	0.494863	0.286485
Responsiveness	**0.855221**	0.276861	0.232101	0.136366
Reliability	0.300787	**0.863524**	0.187918	0.215099
Security	0.230985	**0.805619**	0.453047	0.0520705
Courtesy	0.39278	0.24127	0.211574	0.854444
Credibility	0.160771	**0.943649**	-0.0720457	0.0687832

The second distinguishing factor includes conformance, reliability, security, and credibility. This factor is shown to contribute 13% of the total variability and can be referred to

as trust. In this context, trust relates to the environment and the ability to protect students' information consistently.

Table 5.3. Top administrators' perceptions of quality in e-learning

Factor 1	Factor 2
Access	Credibility
Responsiveness	Reliability
Understanding	Security
Competence	Conformance
Communication	

5.2 Instructors' Perceptions

The textual analysis resulted in 23,256 occurrences for all 12 dimensions and their codes. The results are depicted in the Pareto chart shown in Figure 6.2. Assuming that the frequency of occurrence reflects the importance of each dimension, it appears that communication, performance, features, competence, reliability, responsiveness, and understanding appear to be the most important dimensions used. These seven dimensions account for 85 % of the total count. Communication is the dimension used the most by instructors (23%), followed by the performance (20%). These two dimensions are used to describe the operating functions offered by the institution. On the other hand, conformance, credibility, security, and courtesy contributed less than 15 % of the total count. These appear to have much lower importance from the instructors' point of view. Both conformance and credibility contributed about 7% each to the total count. Whereas security and courtesy were the least observed dimensions, contributing only 2% of the total as shown in Figure 5.2.

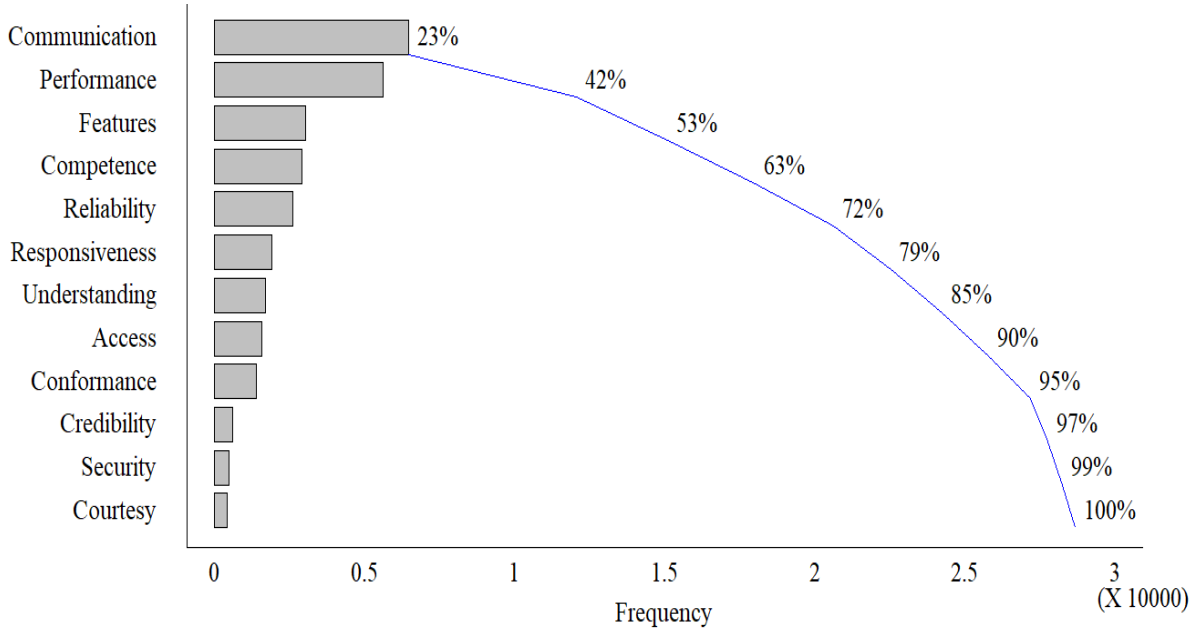

Figure 5.2: Pareto chart analysis: Instructors

Factor analysis (FA) was applied in an attempt to reduce the dimensionality of the data into a smaller number of uncorrelated factors (meta-dimensions). FA uses the frequencies obtained from textual analysis to identify strong patterns in the data and possibly decrease the total number of dimensions (Brown, T. A., 2015). The frequency data were used to construct a 119 X 12 matrix that was used for the factor analysis. The rows represented the publications and the columns accounted for the dimensions. Cells of the matrix contained the frequency of occurrence of each dimension within a given publication. The analysis was performed using the Statgraphics Version 18 (Statpoint Technologies 2020). A Factorability test was performed to determine if some common factors can be extracted. The Kaiser-Meyer-Olson (KMO) test utilizes a statistic that measures how efficiently FA can reduce the dimensionality of a data set. It compares the magnitudes of the correlation amongst the variables to the magnitude of the partial correlations, determining how much common variance exists amongst the variables. According to Johnson and

Wichern (2002) for the analysis to be useful, KMO should be greater than or equal to 0.6. In our data, the test resulted in a value of 0.76 suggesting that FA should be able to efficiently extract common factors. The results of the FA are shown in Table 5.4. The Kaiser-Guttman rule was used as the stopping criterion in factor analysis Kaiser (1960). The criterion requires that factors linked to eigenvalues greater than 1.0 are considered nontrivial. As shown in Table 5.4, four uncorrelated factors can be extracted. These four factors account for about 60% of the total variability in the data.

Table 5.4 Results of factor analysis: Instructors.

Factor Number	**Eigenvalue**	**Percent of Variance**	**Cumulative Percentage**
1	**3.59837**	29.986	29.986
2	**1.3229**	11.024	41.011
3	**1.20367**	10.031	51.041
4	**1.0309**	8.591	**59.632**
5	0.825679	6.881	66.513
6	0.789081	6.576	73.088
7	0.73795	6.150	79.238
8	0.64908	5.409	84.647
9	0.597289	4.977	89.624
10	0.572938	4.774	94.399
11	0.390028	3.250	97.649
12	0.282113	2.351	100.000

Table 5.4 illustrates the eigenvector coefficient (weight) of each of the 12 dimensions relative to each factor. As pointed out by Dunteman (1989), a positive value of weight indicates a positive correlation between the dimension and the factor. Similarly, negative values indicate negative correlations. Dimensions with absolute values of the eigenvector coefficients greater than 0.25 are considered as major contributors to each factor. The results indicated that *competence, communication*, and *understanding* made significant contributions to the first factor (F1).

Communication had the highest frequency in the publications accounting for 23% of the total count. Whereas, *responsiveness*, *access*, and *reliability* made significant contributions to the second factor (F2). Both *courtesy and credibility* contributed to the third factor (F3). Security, features, conformance, and performance made significant contributions to the fourth factor (F4). These results are summarized in Table 5.5.

Table 5.5 Factor score coefficients: Instructors.

Dimensions	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**
Reliability	0.47068	**0.581138**	0.279166	0.159954
Communication	**0.650759**	0.20888	0.0438067	-0.0242288
Performance	0.233967	0.47644	0.243263	**0.499079**
Understanding	**0.636415**	0.080191	0.243206	0.0902959
Access	0.0476949	**0.608613**	0.154799	0.191275
Courtesy	0.00350684	0.130985	**0.886796**	-0.0277119
Responsiveness	0.109784	**0.857348**	0.0198162	-0.114527
Conformance	0.471142	-0.0224799	-0.0355626	**0.526213**
Security	-0.364903	0.112007	0.00226512	**0.723873**
Credibility	0.242296	0.168917	**0.810159**	0.145519
Competence	**0.719279**	0.0996312	0.0259568	0.0675944
Features	0.392532	0.043766	0.102888	**0.567689**

The results in Table 5.6 indicate that the first factor includes *competence*, *communication*, and *understanding*. These dimensions relate to the instructor's knowledge and ability to develop a close and harmonious relationship (rapport) with his students. It contributes 30% of the total variability and appears to be the factor driving instructors' perceptions. This factor was identified as a key element in engaging students as was noted by Kulenschmidt (2010), Smidt, et al., (2017), and Al Awadh and Weheba (2020).

The second factor includes *responsiveness*, *access*, and *reliability*. Within the sample of publications analyzed, these dimensions appear to focus on the characteristics of the system used to deliver content. This factor contributes 11% of the total variability and relates to the technology infrastructure. It refers to the system's ability to support e-learning easily and dependably. It also refers to the ability of the supporting staff to manage the system and help its users. This factor was identified as "*technology"* by Alaneme, Olayiwola, and Reju (2010), Bokhari and Ahmad (2011), and Paul and Cochran (2013). Also, Burnette (2015) referred to this factor as the infrastructure, resources, and systems required for delivering instructions.

Both *Courtesy* and *credibility* contribute to the third factor, which accounts for about 10% of the total variability. This factor considers aspects related to the interactions between instructors, students, and the supporting staff. Instructors appear to value friendly and honest interactions. A similar finding was reported by Anderson (2004), Selim (2007), and Balaji and Chakrabarti (2010).

The fourth factor includes *security*, *features*, *conformance*, and *performance*, which account for 9 % of the total variability. These dimensions pertain to institutional standards and the procedures used in achieving them. Within the context of e-learning, this factor appears to encompass all institutional functions required to support e-learning activities. The significance of this factor was noted by Ehlers (2004) and Yang and Liu (2007).

Table 5.6 Instructors' perceptions of quality in e-learning

Factor 1	**Factor 2**	**Factor 3**	**Factor 4**
Competence	Responsiveness	Courtesy	Security
Communication	Access	Credibility	Features
Understanding	Reliability		Conformance
			Performance

5.3 Students' Perceptions

A Pareto analysis of the results was performed to help identify the vital few dimensions contributing to the majority of the count. The results as depicted in the Pareto chart shown in Figure 5.3, indicates that communication, performance, reliability, competence, features, access, and responsiveness represented 84% of the total count. These appear to represent the most common dimensions used to describe quality in e-learning from the students' point of view. Communication is the most frequency dimension which appear to be the most important dimensions discussed in the publications followed by performance around 20.28% of the total count. These two dimensions are used to describe the operating functions offered by the institution. Reliability and competence had frequencies of 10.23% and 10.11%, respectively. Features, access, responsiveness, and understanding resulted in frequencies of 8.49%, 6.70%, and 5.82% of the total count, respectively. On the other hand, understanding, conformance, credibility, security, and courtesy contributed less than 16 % of the total count. These appear to have much lower importance discussed in the publications from the students' point of view. Both understanding and conformance contributed about 10% each to the total count. Security, courtesy, and credibility are the least frequent dimensions discussed in the publications, and contributed less than 5% each to the total count.

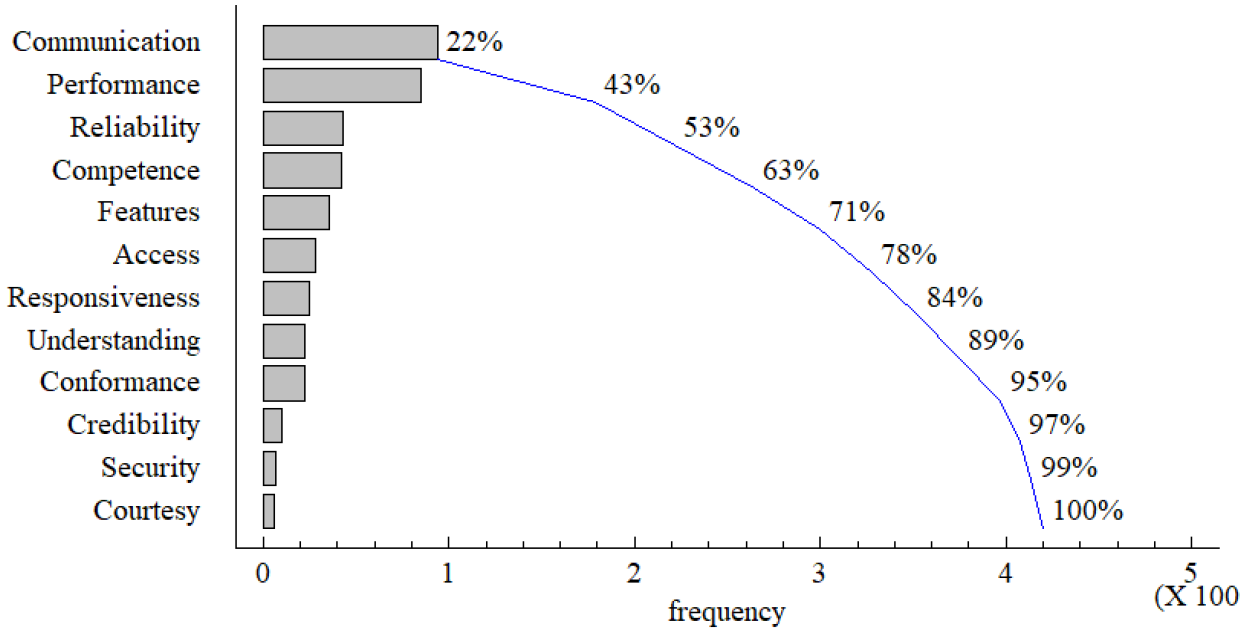

Figure 5.3: Pareto chart analysis: Students.

Factor analysis (FA) was applied in an attempt to reduce the dimensionality of the data into a smaller number of uncorrelated factors (meta-dimensions). The frequency data were used to construct a 160 X 12 matrix. The rows represented the publications and the columns accounted for the dimensions. Cells of the matrix contained the frequency of occurrence of each dimension within a given publication. The analysis was performed using the STATGRAPHICS Centurion 17 (Statgraphics Technologies, Inc.). A Factorability test was performed to determine if some common factors can be extracted. In our data, the test resulted in a value of 0.71 suggesting that FA should be able to efficiently extract common factors. The Kaiser-Guttman rule was used as the stopping criterion in factor analysis Kaiser (1960). The criterion requires that factors linked to eigenvalues greater than 1.0 are considered nontrivial.

As shown in Table 5.7, four uncorrelated factors can be extracted. These four factors account for about 54% of the total variability in the data. They appear to be used to describe

students' perceptions of quality in the publication sample. Table 5.8 illustrates the eigenvector coefficient (weight) of each of the 12 dimensions (constructs) relative to each factor.

The analysis suggested that four factors or "meta-dimensions" may be used to describe quality in e-learning from the students' perspectives as shown in Table 5.9. The results indicated that *communication* which is the most frequent dimension used made significant to the first factor with, *understanding*, *competence* and *reliability*. These dimensions relate to the students' interactions and ability to communicate with the instructor. Interaction has been deemed one of the most important components in distance education due to the isolation of instructors and learners (Moore & Kearsley, 1996). This factor contributes 22% of the total variability and suggests interaction as a distinguishing factor. Communication was the most occurring dimension and accounted for 23% of the total. *Competence* involves skills and knowledge of the instructors and contributed 10% of the count. *Understanding* involves awareness of students' needs and contributed 5% of the count. Ku, Tseng, and Akarasriworn (2013) suggested in e-learning specifically, interaction is an important factor for perceived student learning and motivation. Moore (2002) found instructor-learner interaction to be the most significant factor in "student satisfaction" as well as in "student learning outcomes."

Table 5.7 Results of factor analysis: Students.

Factor Number	Eigenvalue	Percent of Variance	Cumulative Percentage
1	2.67006	22.251	22.251
2	1.44264	12.022	34.273
3	1.19499	9.958	44.231
4	1.12015	9.335	53.565
5	0.944323	7.869	61.435
6	0.85285	7.107	68.542
7	0.769714	6.414	74.956
8	0.742641	6.189	81.145
9	0.628331	5.236	86.381

Table 5.7 (continued)

10	0.605129	5.043	91.424
11	0.553136	4.609	96.033
12	0.476034	3.967	100.000

Table 5.8 Factor score coefficients: Students.

Dimensions	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**
Access	0.267273	0.307627	**0.662154**	-0.0704812
Communication	**0.641678**	-0.0592431	-0.0519179	0.43993
Competence	**0.737402**	-0.134163	0.326931	0.0401495
Conformance	0.255965	0.363492	-0.0625721	**0.397129**
Courtesy	-0.0445934	**0.686436**	0.0229626	0.250361
Credibility	0.173695	0.0897275	**0.563543**	0.00389198
Features	0.00614032	0.0819209	0.145118	**0.758359**
Performance	0.10341	**0.702593**	0.109589	0.13367
Reliability	**0.46447**	0.201399	0.119068	0.389933
Responsiveness	-0.237487	-0.0933774	**0.71262**	0.361087
Security	0.0268643	**0.632468**	0.179992	-0.329845
Understanding	**0.652113**	0.194549	0.033182	-0.12657

Performance, which is the second most frequent dimension, made it the second factor with *courtesy* and *security*. These two dimensions are least frequent dimensions discussed in the publications contributed which is less than 5% each to the total count. This factor considers aspects related to self-Efficacy. *Self-Efficacy* related to a learner's confidence to successfully accomplish a learning task. Ensuring that learners are much comfortable and competent with using the technological tools is an important consideration in e-learning. Definition of self-efficacy is not just restricted to the measure of ICT skills but a comprehensive term which refers individual's capabilities to be self-organized and carry out actions to achieve desired performance levels (Bandura A, 1997); as proposed by many including Oyku Isik , 2008;Liaw and Huang, 2013; Andersson& Gronlund, 2009; Malik, 2010; Sun et al, 2008; Kuo et al., 2014;John VK et al, 2018.

Responsiveness, access, and credibility contributed to the third factor, accounting for about 13% of the total variability and can be referred to as *trust*. *Trust* relates to the degree to which a student is able to rely on the e-learning system and has faith and confidence in the professor or the educational institution to take reasonable steps that help the student achieve his or her learning objectives. This description is also consistent with the concept of trust, contained in the education literature (Bulach, 1993; Ghosh et al., 2001).

Both *Features and conformance* contribute to the fourth factor, which accounts for about 9% of the total variability. These two dimensions accounted for 13% of the total count. This factor considers aspects related to *Institutional Commitment*. Institutions need to commitment adequate infrastructure and technical support for students. In addition, an organization should be able to ensure that the course is meeting legal, regulatory and copyright compliance requirements (Wang, 2006). Administrators must make provisions to make it a top priority to ensure successful e-learning environments.

TABLE 5.9 Students' perceptions of quality in e-learning

Factor 1	**Factor 2**	**Factor 3**	**Factor 4**
Competence	Performance	Responsiveness	Features
Understanding	Courtesy	Access	Conformance
Communication	Security	Credibility	
Reliability			

CHAPTER 6

CONCLUSIONS AND FUTURE RESEARCH

This chapter summarizes the research efforts of this dissertation, provides some concluding remarks, discusses the answers to both research questions, and cites areas where continuous research effort is needed.

6.1 Conclusions

Assuming that dimensions with a high frequency of occurrence in the samples reflect their importance in the scholarly discourse. The ranking obtained can represent the relative importance of the 12 dimensions from the perspective of each group. Table 6.1 provides a summary of the ranks obtained from the Pareto charts presented in Chapter 5. The first column provides the 12 dimensions followed by the rank order obtained from each sample. The value of the range (difference between the maximum and minimum ranks) reported in the last column of Table 6.1 is used to examine consistency. A range of zero indicates consistent ranking within the three samples. The larger the range, the higher the level of inconsistency between the samples.

As shown in Table 6.1, Performance was consistently ranked second among the three samples. This consistency attests to the importance and relevance of the primary operating functions of the institution. On the other hand, *Reliability* appears to have the maximum inconsistency with a range of 6. Differences may be explained by the way the term is used within each sample. Both Communication and Features have a range of 4. In both cases, the inconsistencies are driven by the rank identified from the administrators' sample. It appears that administrators place a much higher emphasis on Features and not as much on Communication.

Similarly, administrators seem to put *Access* (approachability and ease of contact) at a higher rank than the other two groups. In publications representing the instructors' perceptions, it appears that Access did not receive as much attention.

Table 6.1: Consistency in ranking

Construct	**Sample 1 Students**	**Sample 2 Instructors**	**Sample 3 Administrators**	**Range**
Communication	1	1	5	4
Performance	2	2	2	0
Reliability	3	5	9	6
Competence	4	4	3	1
Features	5	3	1	4
Access	6	8	4	4
Responsiveness	7	6	8	2
Understanding	8	7	6	2
Conformance	9	9	7	2
Credibility	10	10	12	2
Security	11	11	10	1
Courtesy	12	12	11	1
			Average	2.42

As was pointed out by Parasuraman (1985), "these differences represent major hurdles in attempting to deliver a service which consumers would perceive as being of high quality."

According to Montgomery (2020), the standard deviation of sample ranges can be estimated as 0.525 X 2.42 = 1.27 based on the distribution of sample ranges. As such, ranges of 3 or less should not be of concern as they could be attributed to sampling errors.

Results of the factor analysis from each sample are summarized in Table 6.2. In the first column, factors are listed in descending order based on their contributions to the total estimated population variance. This implies that F1 accounts for a higher percentage of the overall variance than all the others. Dimensions with significant contributions to each factor are listed under each sample. Ideally, the identified factors would be the same from the three samples. Students' perceptions of quality in e-learning should match those of the instructors and administrators.

Table 6.2: Factors defining quality in e-learning by sample.

Factor	Sample 1 Students	Sample 2 Instructors	Sample 3 Administrators
F1	Competence Understanding Communication Reliability	Competence Understanding Communication	Competence Understanding Communication Access Responsiveness
F2	Courtesy Security Performance	Access Responsiveness Reliability	Credibility Conformance Security Reliability
F3	Access Responsiveness Credibility	Courtesy Credibility	
F4	Features Conformance	Features Conformance Security Performance	

There appears to be an agreement within the three samples regarding the significance of *Competence, Understanding,* and *Communication*. These dimensions made significant contributions to F1 in the three samples. *Access* and *Responsiveness* contributed to F3 within the students' sample, F2 within the instructors' sample, and F1 within the administrators' sample. This suggests that administrators place more emphasis on these dimensions than is actually needed. In

contrast, both *Features* and *Conformance* made significant contributions to F4 within the students' sample and instructors' sample. While *Features* (and its codes) was the most frequent dimension discussed in the administrators' sample, only *Conformance* made a significant contribution to F2. Also, *Credibility* made similar contributions to F3 within the students' sample and instructors' sample and F2 within the administrators' sample.

However, there are some differences regarding the contributions of the remaining dimensions. *Reliability* was included in F1 in the students' sample with Competence, *Understanding*, and *Communication*. A closer examination of the students' sample statements indicated that reliability was mainly used in reference to completeness. This suggests that the students expect to complete the requirements within the stated time as was initially promised. Whereas, instructors' research appears to include *Reliability* in connection with *Access* and *Responsiveness*. A closer examination of the statements made indicated that instructors' publications are more concerned with the *Reliability* of the technology (ICT). This suggests that instructors expect the technology utilized to provide consistent access and dependable responsiveness. Within the administrators' sample, *Reliability* contributed to F2 in association with *Credibility*, *Conformance,* and *Security*. A review of the statements indicated that administrators' views on reliability align with those of the students. The majority of statements were made about the number of courses required to obtain a degree. As previously stated, these statements create students' expectations and tend to have a direct impact on their perceptions.

In addition, *Credibility* contributed to F3 in both the students' and instructors' samples, and F2 in the administrators' sample. This indicated that *Credibility* might have been used to represent different perceptions. An examination of the statements made revealed that students' used the dimension in reference to institutional or program credibility. Instructors used the term in relation

to academic integrity, as they care for fairness in evaluating the student performance. In contrast, administrators associated *Credibility* with program accreditation. While accredited programs are typically perceived as credible, the opposite is not necessarily true.

In conclusion, the 12 dimensions considered in this research appear to represent quality in e-learning adequately. These 12 dimensions appear to have been used in the three samples to describe perceptions of quality. The research indicated some gaps in perceptions from the administrators' side that are likely to affect quality as perceived by the students and instructors. Results of the factor analysis suggested that the 12 dimensions can be reduced to a smaller number of factors or meta-dimensions. This indicated that some common factors might affect perceptions of quality in e-learning. However, because of the variety of the stakeholders considered and the breadth of quality in e-learning, keywords have potentially overloaded. Detailed examination of statements from the textual analysis indicated some of the dimensions were used to represent different aspects.

6.2 Future Research

This study describes the quality dimensions of e-learning for higher education based on selected samples. It is expected that different samples would provide different results; just as much as various stakeholders would have different perceptions about quality. Quality factors include time, among other things. Such variability requires further investigation, as suggested in the following subsections.

Post-COVID Perceptions:

This research provided a static picture of perceptions of quality in e-learning for higher education before the COVID-19 pandemic. As of March 2020, almost all educational institutions had

to make an abrupt switch to digital learning. Institutions had to depend on e-learning to mitigate the severe economic and social consequences of school closures. Online education and e-learning were no longer alternatives for face-to-face classes. Online education became the only acceptable solution. As more recent publications become available, continuing research on this topic would help determine the impact of the pandemic on the perceptions of quality in e-learning.

Correlates of Quality:

No attempt was made in this research to stratify the data by economic, geographic, or demographic factors. Stratifying sample data according to these factors may assist in quantifying their effects. Classifying the sample data according to the geographic regions (country), funding sources (public and private), and students' demographic factors (age and gender) may assist in quantifying the impact of these factors on the perceptions of quality. Future research on these factors would provide new insights and propositions concerning expectations and perceptions of quality.

Other Stakeholders:

This research focused on perceptions of quality from the viewpoints of top administrators, instructors, and students. One of the defining characteristics of higher education is the large number and variety of its stakeholders. Different stakeholders are likely to have varying perceptions of quality. With the increasing popularity of social media and data mining techniques, future research would examine perceptions of parents of the students, current and prospective employers, and members of the supporting staff.

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APPENDICES

APPENDIX A

Top-ranked 100 Universities in the U.S. in E-learning Education

Source: us news and world report education (2018)

Rank	University
1.	Embry-Riddle Aeronautical University Worldwide
2.	Arizona State University
3.	Ohio State University Columbus
4.	Oregon State University
5.	Pennsylvania State University World Campus
6.	University of Florida
7.	University of Illinois Chicago
8.	Colorado State University Global Campus
9.	University at Buffalo SUNY
10.	University of North Carolina Wilmington
11.	University of Oklahoma
12.	Loyola University of Chicago
13.	University of Alabama Birmingham
14.	University of Central Florida
15.	CUNY School of Professional Studies
16.	Utah State University
17.	Western Kentucky University
18.	University of Arkansas
19.	West Texas A&M University
20.	Colorado State University
21.	George Washington University
22.	Indiana University Online
23.	University of Massachusetts Amherst
24.	Washington State University
25.	Ball State University

Rank	University
26.	Charleston Southern University
27	University of Georgia
28	University of Massachusetts Lowell
29	Siena Heights University
30	University of Arizona
31	The University of Missouri St. Louis
32	University of Northern Colorado
33	City University of Seattle
34	Creighton University
35	Daytona State College
36	University of Illinois Springfield
37	Pace University
38	Rutgers University Camden
39	Texas A&M University-Commerce
40	University of North Carolina Charlotte
41	University of North Florida
42	California Baptist University
43	Lee University
44	Maranatha Baptist University
45	Regent University
46	University of Nebraska Lincoln
47	University of Wisconsin Whitewater
48	Marist College
49	New England Institute of Technology

APPENDIX A (continued)

Rank	University
50	Robert Morris University
51	University of Massachusetts Boston
52	University of Nebraska Omaha
53	University of Wisconsin Milwaukee
54	Utica College
55	Westfield State University
56	Bowling Green State University
57.	Clarion University of Pennsylvania
58.	Florida International University
59.	Illinois State University
60.	McKendree University
61.	North Carolina State University Raleigh
62.	Northern Arizona University
63.	SUNY College of Technology Delhi
64.	Sacred Heart University
65.	University of Memphis
66.	Western Carolina University
67.	Concordia University of Chicago
68.	Saint Leo University
69.	University of Cincinnati
70.	University of North Dakota
71.	University of North Texas
72.	Old Dominion University
73.	Savannah College of Art and Design

APPENDIX A (continued)

Rank	University
74.	Granite State College
75.	Missouri State University
76.	Sam Houston State University
77.	University of Denver
78.	Anderson University
79.	Brandman University
80.	Cornerstone University
81.	Drexel University
82.	Eastern Kentucky University
83.	Southeast Missouri State University
84.	Texas Tech University
85.	Union Institute and University
86.	Dakota Wesleyan University
87.	Herzing University
88.	New England College of Business and Finance
89.	SUNY College of Technology Canton
90.	University of Houston Downtown
91.	University of Southern Mississippi
92.	Berkeley College
93.	Bluefield College
94.	Central Michigan University
95.	Central Washington University
96.	Florida Institute of Technology
97.	Kansas State University

Rank	University
98.	Lindenwood University
99.	Southwestern Oklahoma State University
100.	Arkansas State University

APPENDIX B

PUBLICATIONS WITHIN THE INSTRUCTORS' SAMPLE

Agrawal, V., Agrawal, A., & Agarwal, S. (2016). Assessment of factors for e-learning: an empirical investigation. *Industrial and Commercial Training.*

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APPENDIX C

PUBLICATIONS WITHIN THE STUDENTS' SAMPLE

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