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Service Quality and Perceived Value of Cloud Computing-Based Service Encounters: Evaluation of Instructor Perceived Service Quality in Higher Education in Texas

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Service Quality and Perceived Value of Cloud Computing-Based Service
Encounters: Evaluation of Instructor Perceived Service Quality in Higher
Education in Texas

by

Eges Egedigwe

A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in
Information Systems

Graduate School of Computer and Information Sciences
Nova Southeastern University

2015

We hereby certify that this dissertation, submitted by Eges Egedigwe, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Proposal paper Submitted to Nova Southeastern University
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

Service Quality and Perceived Value of Cloud Computing-Based Service Encounters: Evaluation of Instructor Perceived Service Quality in Higher Education in Texas

by
Eges Egedigwe
May 2015

Cloud computing based technology is becoming increasingly popular as a way to deliver quality education to community colleges, universities and other organizations. At the same time, compared with other industries, colleges have been slow on implementing and sustaining cloud computing services on an institutional level because of budget constraints facing many large community colleges, in addition to other obstacles. Faced with this challenge, key stakeholders are increasingly realizing the need to focus on service quality as a measure to improve their competitive position in today's highly competitive environment. Considering the amount of study done with cloud computing in education, very little has been done in examining the needs and the satisfactions of the instructor customer. The purpose of this study was to examine the expectations and perceptions of instructors' usage of cloud computing based technology on overall quality of service (QoS).

An extension and adaptation of the SERVQUAL model tailored to the higher education environment was introduced for this study. Using the established service quality (SERVQUAL) dimensions (tangibles, reliability, responsiveness, assurance, and empathy), the study investigated the relationship between instructors' views (perception and expectation) and overall service quality received on their use of cloud computing based technology. A total of 301 online instructors at large Texas community colleges completed a Web-based survey containing previously validated and adapted items. The participants in this study completed four parts of the survey instruments that were used to measure service quality of academic cloud computing technology: Service Quality Expectations, Service Quality Perceptions, Perceived Service Quality and Demographic. The survey questions were answered using a seven-point Likert scale and the survey results were analyzed using descriptive and inferential statistical methods.

The results indicated that the difference between instructors' perception and expectation affected their perceived service quality of cloud computing based systems. The differences between the expectation and perception on all five SERVQUAL dimensions load to the instructors' perceived service quality; gender but not age, income or education has significant effect on instructors' overall perceived service quality. The results of the study create an awareness of instructors' needs and offer useful feedback to college administrators and institutional planners in their efforts to improve service quality of educational technology initiative in higher education.

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Chapter 1

Introduction

Background

The explosive growth in computer usage by business, government, educational

institutions, combined with global collaboration provided by the Internet, and competition has

brought a considerable increase towards computer usage along with the associated need to

maximize the use of available resources while minimizing costs. One area of growing interest for

meeting these needs is the use of cloud computing to centralize computing and information

management functions for large, often geographically dispersed organizations. Cloud computing

is an approach where information technology services and capabilities are delivered to the

customer or user via the Internet by a centralized provider (Robinson, 2009). Users only need to

pay for the services they actually use (Kim, Kim, Lee, & Lee, 2009). It offers potential benefits

related to reductions of server/storage infrastructure and delivery of services (Leavitt, 2009). The

computing resources are held by the provider. These resources are accessible over the Internet

via personal computers, laptops, smart phones, and other electronic devices. According to Kim et

al. (2009), cloud computing provides access to programs, storage, processing, applications, and

software development. This access is granted after an agreement is negotiated between the cloud

computing provider and the recipient of services. With a commercial cloud computing provider,

resources are normally available, for a set fee, based on usage. For the majority of cloud vendors

that charge for cycles or time used, an accounting and billing procedure is needed, with

contractual terms agreed upon before service is granted. According to Kim et al. (2009) and

Leavitt (2009), these approaches of having large scale computational resources available upon

demand to organizations and individuals that are connected to the Internet are not completely new.

As a concept, cloud computing is not entirely new (Robinson, 2009). There are various technologies that predate the coining of the term cloud computing including the time-sharing systems of the 1960s, the network computing and grid computing of the 1990s, and the utility computing of 2000s (Kim et al., 2009). Several studies (Kim et al., 2009; Leavitt, 2009) described these technologies as follows: A time-sharing system, similar to a thin client, connects to a central server which houses commercial, multi-license applications designed for multiple simultaneous users. Grid computing in its most common form is a collection of computers connected (or clustered) together as a "grid" dedicated to performing a single task. This centralized server dispatches the computing jobs to available computing resources. Utility computing is the packaging of computing resources, such as computation, storage and services, as a metered service similar to a traditional public utility (such as electricity, water, natural gas, or telephone network). Both grid computing and utility computing have many features similar to those of cloud computing, with users sending jobs to a central server that arranges for these jobs to be run (Leavitt, 2009). By moving the applications and processing requirements from the user's desktop to a central server, time sharing clients allow deployment of inexpensive, low-powered terminals to user desktops (Robinson, 2009).

Some of the primary types of cloud computing services include infrastructure as a service, platform as a service, and software as a service (Leavitt, 2009; "National Institute," 2011). Leavitt (2009) also included a general group called services, which consist of storage, middleware, collaboration, and databases provided via the Internet. The descriptions of these cloud services, as explained by Leavitt (2009), follow: Infrastructure as a Service, offers

storage/computer resources that developers and IT organizations can use to deliver business solutions. Platform as a Service, offers black-box services with which developers can build applications on top of the computer infrastructure. Finally, Software as a Service consists of complete turnkey computing applications, such as for enterprise resource management, available online.

These technologies and services, described above, together comprise the majority of the types of computing services available from cloud computing, ranging from hardware and software services, to entire computing environments. Cloud computing offers potential benefits related to reductions of server/storage infrastructure and delivery of services (Kim et al., 2009; Robinson, 2009). Cloud computing can be highly beneficial in educational settings. Among the possible benefits is the enhanced usefulness of the existing technology (Erenben, 2009). With its emphasis on the delivery of low-cost or free applications anywhere on the Internet, cloud computing is a promising prospect for educational institutions faced with budget restrictions and mobile student population (Denton, 2012). The weak economy has accelerated a need to maximize the use of available resources while minimizing costs for many large community colleges. And in times of fiscal challenge, fostering innovation becomes a critical strategic goal for the organization. Emerging technology, such as cloud computing, holds great promise for enhancing instruction and operations for large academic institution (Denton, 2012).

Compared with other industries, colleges have been slow on implementing and sustaining cloud services on an institutional level because of budget constraints facing many large community colleges, in addition to other obstacles (Young, 2011). Many educational institutions do not have the wherewithal needed to sustain and reap the full benefits of cloud computing (Pocatilu, Alecu, & Vetrici, 2010). In some cases, you find a patchwork of a growing trend of

"rogue" technology on campuses. Professors are making their own decisions of using cloud computing even if campuses do not approve those (Young, 2011). This raises legal and security issues, and makes it more difficult for a college to provide central technical support. In other cases, some institutions that can afford it, host their own private clouds for faculty, staff and students. It is not unusual to find a combination of both in some campuses. Bateson (1995) argued that in the current economic climate, many colleges and universities are giving serious thoughts to the issue of getting good quality service.

Cloud computing based systems as educational tools offer the educators and learners access to well-structured and easily-updatable study materials, task-based activities, online resources, and tutorial support (Robinson, 2009). In spite of these benefits, however, educators and learners may be left frustrated or disappointed, because cloud computing based systems do not sufficiently address their needs or expectations. Most cloud computing based systems may have been developed mainly by software designers and developers with a high level of technical expertise, but without knowledge about educators' (or learners') needs (Nam & Smith-Jackson, 2007) and/or perceived service quality. As a result, difficulties may arise when technical usability is overemphasized to the detriment of pedagogical aspects (Brinck, Gergle, & Wood, 2002). Although technical usability as defined by Brinck et al. (2002) may be important to minimize the cognitive load and helps to free more resources for the learning processing, but it does not necessarily measure the educational quality of cloud computing based systems in terms of educating and learning process. This means that existing cloud computing based systems still lack a number of important issues that need to be considered, therefore, a study to examine and understand these quality attributes will provide a means of measuring service quality. They are

also an effective and meaningful strategy to remaining productive (Kuo, Lu, Huang, & Wu, 2005).

According to Barak, Lipson, and Lerman (2006), in education, the application of computer technology in academic classroom can improve teaching when used appropriately. Accordingly, with the proliferation of cloud computing initiatives across campuses combined with the growing mobile student population, evaluation of such initiatives becomes the logical next step. The evaluation ultimately centers on the key stakeholders of high education – instructors, students, staff and administrators. For these initiatives to be implemented and sustained, the service quality they provide must be perceived as satisfactory. In other words, the level of satisfaction perceived by the customer (student or instructor) must be greater than the expected service (Parasuraman, Zeithaml, & Berry, 1985). Previous studies in higher education have focused mainly on educational service quality or educational information technology service quality as evaluated by students' satisfaction (Hampton, 1993; Harvey & Knight, 1996). Rarely have they evaluated educational service quality of computer technology from the perspectives of faculty or instructors. In that regard, the objective of this study focused on instructors' perception regarding the Service quality provided by cloud computing based system in large community colleges in Texas as expected. SERVQUAL is a service quality measurement model developed and refined by Parasuraman, Zeithaml, and Berry (1988, 1991a) for measuring service quality from a customer's perspective. This study builds on the SERVQUAL model to analyze the significance of expectations and perceptions of instructors' usage of cloud computing technology in community colleges. Further, the study analyzed the role of demographic variables of the instructors in evaluating the service quality and also established how factor analysis was used to identify number of factors underlying SERVQUAL

components (items). The study contributed to a better understanding of the implementation, management and sustainability of information technology (IT) based initiatives in education with a particular emphasis on cloud computing.

The following introductory sections of chapter 1 described the problem that was investigated and the dissertation goal that was achieved. The other sections of this chapter include the research questions and/or hypotheses, analysis of the relevance and significance, discussion of barriers and issues related to achieving the goal, assumptions, limitations and delimitations of the study, and the definition of terms. Finally, a summary is provided at the end of this chapter.

Problem Statement

The role of service quality in higher education (HE) has received increasing attention during the last few decades (Brochado, 2009). Higher education (HE) institutions should ensure that all services encounters are managed to enhance customer perceived quality (Brochado, 2009). While there is a consensus on the importance of service quality issues in higher education (HE), the identification of the different customers for these institutions and their corresponding needs is a challenge that those who aim to gain a better understanding of the quality issues with an impact on the customers' experiences face. According to Maguad (2007), the future success of higher education institutions will increasingly depend on proper identification of their mission and the customers they serve.

A review of the literature reveals that previous studies in higher education have focused mainly on educational service quality or educational information technology service quality as evaluated by students' satisfaction (Hampton, 1993; Harvey & Knight, 1996; Ong & Nankervis, 2012; Schwantz, 1996; Shekarchizadeh, Rasli, & Hon-Tat, 2011); on non-academic staff

perceptions of service quality delivered to students; and/or on both (Smith, Smith, & Clarke, 2007; Tan & Kek, 2004; Yeo, 2008; Yu, 2008). This is mainly based on the notion that students are the primary customers in higher education in the sense that they are beneficiaries with needs that should be satisfied (Harvey & Knight, 1996)). Rarely have they evaluated technologies directly via instructors' satisfaction. This study was aimed to correct this imbalance. Further, no consistent framework in education for identifying the needs and expectations of faculty-customers was evident. According to Massy, Wilger, and Colbeck (1994), the customer stands at the center of quality management and satisfying customer needs signifies the dominant goal. Higher education (HE) institutions must identify, listen to, and deliver value to all the parties they serve (Massy et al., 1994). Part of that value is determined by the quality of service instructors receive and not just only the students and staff. Unless instructors understand, endorse and perceive a high quality from cloud computing as a means of software delivery, students will probably not understand the benefits from the system (Behrend, Johnson, London, & Wiebe, 2011).

According to Comesky, McCool, Byrnes, and Weber (1991; see also Maguad, 2007), customer service and satisfaction, when applied to higher education, must involve an examination of the institution's knowledge of the customer and who that customer is. A study of instructor customers should identify their perception regarding the service quality provided by cloud computing based system as expected.

To summarize, while a great deal of research has been conducted on the importance of service quality measurement in educational institutions and information and communication technology sectors (Al-alak & Bekhet, 2011), less have focused on instructors' perceived service quality on the introduction of new technology such as cloud computing. This study sets out to

address this through an investigation of the effect of service quality dimensions towards instructors' perceived service quality under the perspective of SERVQUAL service quality model.

Dissertation Goal

The study was an empirical analysis of the expectations and perceptions of instructors' usage of cloud computing based technology on overall quality of service (QoS). Using the established service quality (SERVQUAL) dimensions (tangibles, reliability, responsiveness, assurance, and empathy), the study investigated the relationship between instructors' views (perception and expectation) and overall service quality received on their use of cloud computing based technology in large community colleges in the State of Texas. The study also analyzed the role of demographic variables of the instructors in evaluating the service quality and also ascertained how factor analysis was used to identify number of factors underlying SERVQUAL component.

The outcome of this study may assist key stakeholders, such as instructors, administrators or information technology (IT) professionals of higher education to understand and evaluate the suitability of a particular technology, such as cloud computing, in terms of its ability to provide quality education service before implementing new technology or upgrading the current. The results of the improvement effort may certainly benefit the students as well. In addition, the current study may provide a better understanding of faculty needs and will help implement new programs so that purpose and missions of the higher education institutions can be served.
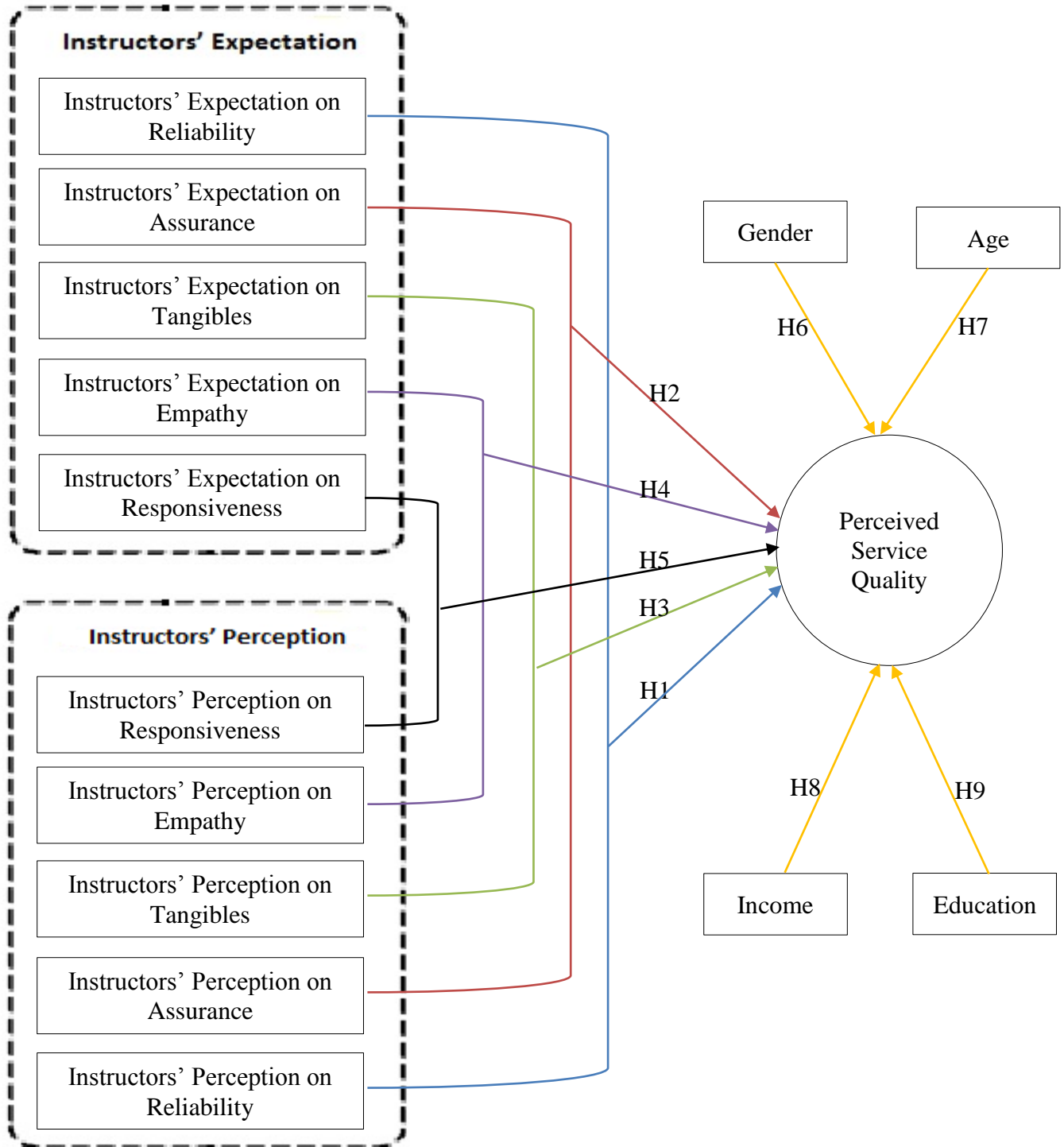
Figure 1. Conceptualization of model to be tested. Paths between expectation and perception represents the differences between these values.

Specifically, the study developed a standard instrument to measure instructors' service quality perception, which include, but not limited to, using the established SERVQUAL scale (Cronin & Taylor, 1992) that includes multiple measures of each of the five identified service quality dimensions (tangibles, reliability, responsiveness, assurance, and empathy). Another set of items were developed to measure the comparison of expected and perceived service with perceived service quality. Finally, items were designed to measure demographic variables influence on perceived service quality (or overall quality of service – QoS). The full conceptual model that was developed and tested is shown in Figure 1 above. The main objectives were: (a) to examine the relationship between the use of service quality dimensions (SERVQUAL - tangibles, reliability, responsiveness, assurance, and empathy*)*, perception, expectation, and instructors' perceived service quality on the use of cloud computing based technology; and (b) to examine the effect of demographic variables on the perceived service quality.

Research Question

Several research questions were used to guide this investigation. The primary research questions that were addressed in this study are as follows:

Research Question 1

RQ1: Do the difference between instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems?

$H_0 1$: The difference between expectation and perception of reliability will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 1$: The difference between expectation and perception of reliability will significantly load onto perceived service quality of cloud computing based systems.

$H_0 2$: The difference between expectation and perception of assurance will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 2$: The difference between expectation and perception of assurance will significantly load onto perceived service quality of cloud computing based systems.

$H_0 3$: The difference between expectation and perception of tangibles will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 3$: The difference between expectation and perception of tangibles will significantly load onto perceived service quality of cloud computing based systems.

$H_0 4$: The difference between expectation and perception of empathy will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 4$: The difference between expectation and perception of empathy will significantly load onto perceived service quality of cloud computing based systems.

$H_0 5$: The difference between expectation and perception of responsiveness will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 5$: The difference between expectation and perception of responsiveness will significantly load onto perceived service quality of cloud computing based systems.

Research Question 2

RQ2a: Is there a difference in instructors' perceived service quality by gender when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2b: Is there a difference in instructors' perceived service quality by age when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2c: Is there a difference in instructors' perceived service quality by income when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2d: Is there a difference in instructors' perceived service quality by level of education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

$H_0$6: Instructors' perceived service quality will not differ by gender among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

H_a6: Instructors' perceived service quality will differ by gender among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_0$7: Instructors' perceived service quality will not differ by age among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

H_a7: Instructors' perceived service quality will differ by age among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_0$8: Instructors' perceived service quality will not differ by income among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

H_a8: Instructors' perceived service quality will differ by income among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences..

H_09: Instructors' perceived service quality will not differ by level of education among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

H_a9: Instructors' perceived service quality will differ by level of education among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

The study measured user (instructor) perceived service quality with the level of cloud computing based technology service at large community colleges in Texas and pinpointed problem areas, if they exist. Service Quality, as a concept, is widely addressed in the business world and its use is slowly spreading to academic areas. The motivation for the study was to analyze the significance of expectations and perceptions of instructors' usage of cloud computing based technology in community colleges.

Relevance and Significance

Focusing on the use of cloud computing based systems by instructors' at large community colleges in Texas, the study examined the relationships between service quality, expected and perceived value, and instructors' perceived service quality. Further, the study also examined the influence of demographic variables (such as age, gender, monthly income (MI) and highest qualification (HQ)) of the instructors on perceived service quality when instructors' expectation plays a mediating role. It also ascertained how factor analysis can be used to identify

number of factors underlying SERVQUAL components (or items). At present, research that

measure instructors' satisfaction (or perceived service quality) with cloud computing technology

in educational settings and the effect of demographic factors in evaluating perceived service

quality is lacking. Not only organization needs empirical data to understand the level of

customers' (instructors') satisfaction in any new technology but also the role of demographic

variables in evaluating perceived service quality. This knowledge gap is where the present study

wishes to contribute.

Large community colleges educate a rapidly growing number of students (Fisher, 2000),

often with underfunded IT resources. IT administrators are always seeking ways to deliver IT

while keeping budgets manageable, with cloud computing promising to be an effective tool

towards this goal. Careful planning, which is one of the goals of the study, is needed to ensure

that cloud computing investments do not go to waste. Unless the users (like instructors and

students) of this technology (cloud computing) feel comfortable in its use, that the technology is

an easy and reliable alternative, perceived a high level of quality in its use, they will not use it

and hence the college will not be benefited. In information technology (IT) context, cloud

computing based system value is perceived as positive when the degree of outcome exceeds user

expectation via the service process (Woodruff, 1997). Thus, the cost of a cloud computing based

system will be considered high if its performance does not live up to expectations or it does not

fulfill the needs and service requirements of users.

Resource prioritization provides another reason for undertaking a research in cloud

computing for large community colleges in Texas. Armbrust et al. (2010) noted that in a healthy

economy, resources are readily available to foster technological innovation and allow a wide

range of exploration; however, the current financial challenges require greater strategic planning

of resources to achieve the organization's goals. The constraints of physical space, existing infrastructure, available staff, funding for purchases, and existing commitments will need to be taken into account in pursuit of any given technology initiative, such as cloud computing (Armbrust et al., 2009). Any new investment will require close examinations of many issues, including the way faculty, staff, and students use technology and its perceived value. Formal prioritization of initiatives at all levels will allow the application of resources to their best effect in alignment with organization goals. A formal process for development of cloud computing technology initiatives with clearly articulated levels of review and approval from the key stakeholders will provide initiatives, which is the greatest opportunity for success (Armbrust et al., 2010).

Another relevance of the study may provide additional insight on the role of the instructor in evaluating educational technology initiative. Interacting directly with students in an educational context, instructors use cloud computing technology to attend to their students. When it comes to evaluating the usefulness of any new technology initiative, Maguad (2007) have argued that the direct experiences of the instructors are key measure because the instructors routinely interact with the students using the cloud computing based technology. The instructors are knowledgeable about these applications and familiar with their use. Thus, they are well placed to provide effective feedback to management in terms of their own experience with using the technologies and also how this cloud computing based technology has been experienced and received by their students. This feedback is crucial for upgrading cloud computing based technology to improve the quality of the entire service. In fact, Robinson (2007) in a clinical research he conducted, made the point that if those who work directly with the customers of any organization are not actively involved in the selection of an information technology (IT), its

implementation is unlikely to be successful. Robinson (2007) also pointed out that it is important for other staff operating these technologies, who work alongside instructors, to have a clear understanding of the perceptions and expectations of instructors so that they too can feel confident they are providing a good service with positive outcomes for students. Therefore, the problem that the current study investigated focused on instructors' perception regarding the service quality provided by cloud computing based system in large community colleges in Texas but not from the students' perspectives. This mode of evaluation confirmed if cloud computing based technology in higher education is useful, accessible, controllable, and beneficial to both the instructor, students and the institution (Schumann, Keller, Wngenheim, & Holzmüller, 2007).

Further, the study was used to inform college IT planners about the possible risks and benefits of cloud computing based technologies before engaging in wide-scale implementation (Behrend et al., 2011). Thus, college-level cost analysis has to go hand-in-hand with organizational 'fit' of the tool. That is, 'cost-effectiveness' and actual utilization of the tool have to be likely taken into account when judging the success of a project. According to Behrend et al. (2011), providing decision makers, both potential and current cloud computing adopters, with information to enable them to make informed decisions about current and future organizational computational resource needs is vital. Therefore, the goal of this research was valuable because it benefits large community colleges as they plan to or continue the implementation and support of cloud computing based technology. Both network and software engineers have struggled for years to rationalize the implementation process. The addition of the new cloud computing technology has further complicated this process. This study contributed to the body of knowledge and improves professional practice by an extension and adaptation of the SERVQUAL model tailored to the higher education environment.

To summarize, the study has both theoretical and practical contributions. With the proliferation of technology-based initiatives in education, studies examining the effect of service quality dimensions towards instructors' perceived service quality of cloud computing based system complement existing attempts to evaluate overall quality of service in higher education. Specifically, evaluating the effectiveness of such IT-based initiatives in education provided insight regarding the factors behind the success or failure of such initiatives. Based on the findings of this study, we have identified factors of service quality in higher education that are considered vital from the instructors' point of view in their use of cloud computing technology. Such insight can be used for diagnostic purposes for the planning and management for technology-based initiatives in education. From a theoretical perspective, the research has added to the literature dealing with instructors' satisfaction with cloud computing technology in educational settings. The research also contributes to the general service quality literature by studying the theoretical validity and empirical applicability of the SERVQUAL model.

Barriers and Issues

The goal of the study was challenging because in higher education, the notion of referring to instructors (or even students) as customers is foreign to many academic institutions. Even the suggestion of the term can arouse many emotions, preconceptions, and misconceptions (Canic & McCarthy, 2000). Administrators and faculty alike are reluctant to call an instructor or anyone else a customer (Teeter & Lozier, 1993). They find the commercial flavor distracting and difficult to translate to education. Those that admit to have customers, usually refer to businesses, government agencies, and the society at large as their customers (Maguad, 2007). That is not generally the case with students, which explains the reason that previous studies have

concentrated on service quality from the perspective of students. All too often this perspective is reinforced by administrative actions that tend to put the benefits of the institution before the needs of the faculty. Many educational institutions are very hesitant to consider themselves as customer-driven entities (Lewis & Smith, 1997), therefore, a study that measure service quality of academic cloud computing technology of large community colleges in the State of Texas from instructors' perspectives becomes a challenge too. Maguad (2007) have argued that the future success of colleges and universities will increasingly be determined by how they identify and satisfy their various customers.

Another challenge relates to the theoretical framework, which the study is based on. Although the SERVQUAL instrument is ubiquitously employed, it has received heavy criticism from both a theoretical and practical perspective. The issues questioned include the use of gap scores, the overlap among the five dimensions, poor predictive and convergent validity, the ambiguous definition of the "expectation" construct, and unstable dimensionality (Babakus & Boller 1992; Carman, 1990; Brown, Churchill, & Peter, 1993; Van Dyke, Kappelman, & Prybutok, 1999). By discarding the expectations portion in the SERVQUAL model, Cronin and Taylor (1992) justified the SERVPERF or performance only instrument in place of the gap measurement approach. In addition, they showed that the SERVPERF instrument empirically outperforms the SERVQUAL scale across several industries. As a result of these issues, the performance only measures are used and suggested by many scholars in various industries (Gilbert, Veloutsou, Goode, & Moutinho, 2004; Keillor, Hult, & Kandemir, 2004; Law, Hui, & Zhao, 2004; Parasuraman, Zeithaml, & Berry, 1994; Van Dyke et al., 1997). The above issues notwithstanding, SERVQUAL is still a reliable instrument that was created around 1985, and

over the years, it has been modified by the authors. Its final version, which includes five dimensions, has proven to measure user's satisfaction.

One of the methods the study used for data collection is the administration of survey over the Internet and informing potential participants via e-mail. According to Creswell (2007), this data collection method is faced with the barrier of low or no responses. Campbell, Calvert, and Boswell (2003) noted that the biggest challenge the researcher faces is how to separate the survey (authentic e-mail) from spams/hoaxes. Spam, unsolicited junk e-mail offering dubious business deals, pornography, and other rip-offs, are nuisance that all the users of e-mail must face (Campbell et al., 2003). Another is hoaxes that further threaten the number of participants completing and/or responding to the survey. The potential for deleting and thrashing the email invitation received with a link to the online survey is very high (Yin, 2009). To overcome this barrier associated with e-mail, the participants were made aware of this through other means and they were also made aware of expected e-mail 'subject' along with the date. In addition, follow-ups were also sent to those that have not responded to the survey. This is definitely additional time in completing the survey. Despite early warnings, responses might still be low because of the difficulty stated above (Creswell, 2007).

As with all study or research, the findings of this study are tentative. It is important to note that the sample size, site and procedures for participant selection, while appropriate for the study, may not support generalization to a larger population.

Assumptions, Limitations and Delimitations

The assumptions underlying the study on service quality in higher education included the following:

- The instructors' online survey (hosted over the Internet by SurveyMonkey) reflected participants' perceptions regarding their experiences with cloud computing based technology in large community colleges.

- The instructors surveyed are representative of faculty members at the selected community colleges.

- Although customer service is an unusual element to consider in higher education, it is assumed that respondents are aware of customer service in other aspects of their lives, such as at departmental stores, restaurants, and hotels, and could apply those personal concepts to their experience in education. It is also assumed that faculty members are able to express their expectations and perceptions of service quality through answering a survey.

- The motivations driving the responses of the respondents are unknown.

This study will focus on a single level of analysis, namely instructor behavior. Successful analysis of the significance of expectations and perceptions of the usage of cloud computing technology in community colleges also depends on student beliefs and behaviors, professional staff, as well as those of the administration and IT staff. Therefore, the results of the analysis are applicable only to faculty at these institutions and may not be generalizable to other groups or institutions. The results are limited by the validity and reliability of the survey instrument and the timeframe in which the data was collected. The data for the study was collected using an online survey. Sample participants had the option to choose to participate, or not participate, in the survey.

The study was delimited based on the scope of the population for this study. The participants were randomly selected from a database of all instructors or faculty members of

large community colleges in the State of Texas. Only faculty members in community colleges that have implemented some form of cloud computing initiative were randomly selected to participate in the online survey.

Definition of Terms

To examine the nature of service quality, it is helpful to have a common understanding of terminology and usage. For purposes of this study, the following key terms based on definitions and usage within the literature and within this dissertation proposal are used:

Cloud computing - an approach where information technology services and capabilities are delivered to the customer or user via the Internet by a centralized provider (Robinson, 2009). Users only need to pay for the services they actually use (Kim et al., 2009). The National Institute of Standards and Technology [NIST] (2011) also defines cloud computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources, such as networks, servers, storage, applications, and other information technology services and capabilities, that can be quickly provisioned and released with minimal management effort or service provider interaction (Mell & Grance, 2009).

Cloud computing based technology (or system) - includes information technology services and capabilities that are perceived as useful and accessible, which enable the users to provide beneficial services via technological interfaces (Robinson, 2009).

Grid computing - refers to a network of computers set up so that a job submitted to the network can be completed on any available network computer (Leavitt, 2009). Delic and Walker (2008) also defined grid computing as very large-scale collections of communication and

computation resources permitting new types of applications and bringing several benefits of economy-of-scale.

Infrastructure as a service (IaaS) - an arrangement that provides a full computer infrastructure via the Internet (Leavitt, 2009).

Platform as a service (PaaS) - a full or partial application development environment accessible online, with collaboration possible (Leavitt, 2009).

Software as a service (SaaS) - is a complete turnkey computing application available online (Leavitt, 2009).

Provider - an organization supplying cloud computing resources to outside users.

User - an organization or individual that uses cloud computing resources as a customer of a cloud computing provider.

Community college instructor – an academic staff (or educator) who works at a college or university. An instructor is sometimes referred to as a faculty member or Professor. Community college instructor directs his or her energies and labor toward providing academic support to students with multiple identities and responsibilities. The instructor participates in an environment that underscores academic support, student services, effective instruction, and academic remediation (Levin, 2012).

Service - any activity offered to a customer that is consumed simultaneously as it is produced. It encompasses the process, delivery, and outcome of the activity (Parasuraman, Zeithaml, & Berry, 1990).

Customer Service - understanding the needs and expectations of the customer and responding to meet those needs and expectations (Chaffee, 2006; Johnston, 1993).

Expectation - the performance anticipated or expected by the consumer. They are formed by word-of-mouth, advertisements, and past experiences (Parasuraman et al., 1990). They form the reference point against which product or service performance is compared (Nolan & Swan, 1985).

Perception - the customer's judgment about the service encounter – the actual service received (Parasuraman et al., 1990).

Customer satisfaction and dissatisfaction - Lin (2003) defined customer satisfaction as a result of a mental and emotional evaluation, where some comparison standard is compared to the actually perceived performance. If the perceived performance is less than expected, customers will be dissatisfied. On the other hand, if the perceived performance exceeds expectations, customer will be satisfied (Lin, 2003). In order words, met expectations result in customer satisfaction; unmet expectations result in customer dissatisfaction (Oliver, 1980).

Disconfirmation paradigm - the model that describes the customer's comparison of expected performance to actual performance to determine met expectations (satisfaction) or unmet expectations (dissatisfaction) (Oliver, 1980).

Service quality or Perceived Service quality – Service quality is defined as the customer's perception of the level of success or failure in meeting expectations (Lewis & Booms, 1983; Parasuraman et al., 1990). It is a measure of how well service level delivered matches customer expectations on a consistent basis (Webster, 1989, 1991). Perceived Service quality, similar to service quality, is a value judgment based on the gap between actual experiences and expectations of the consumer. It is the result of the comparison of expectation with perception of service quality (Parasuraman et al., 1990).

SERVQUAL – a service quality measurement instrument developed and refined by Parasuraman et al. (1988, 1991a) for measuring service quality, on a 7-point Likert scale, from a customer's perspective. The instrument measures customers' expectations (the customer's expectations for the type of service they expect they will receive from an excellent business entity) and customers' perceptions (how well they perceived the actual service received). The end result is a SERVQUAL difference score, customers' perceptions scores minus their expectations scores, item by item.

Summary

The above introductory chapter describes the proposed study, problem that was investigated and the goal to be achieved. The other sections of this chapter include the research questions/hypotheses, analysis of the relevance and significance, barriers and issues, assumptions, limitations and delimitations, and definition of terms.

Chapter 2 covers the literature review that establishes the rationale and framework for this investigation. A background and history of cloud computing, service quality measurement, and its perceived service quality relating to cloud computing are discussed. Next, Measuring Service Quality in Information and Communication Technology and in higher education is covered. Chapter 3 describes the research methodology - the methods used in the study, the survey instrument, the research design, and the procedures used to obtain the research data. Chapter 4 will present an analysis of the data and the results. Chapter 5 will contain a summary of the findings, conclusions, and recommendations from the study.

Chapter 2

Review of the Literature

Introduction

The literature review that follows establishes the rationale and framework for this investigation. The overall purpose of this study was to expand on the concept of "service quality" in higher education, along with its associated implementation strategies and their influence on customer satisfaction. This chapter presents a review of the pertinent literatures that are related to the current study. The review begins with an overview of cloud computing background and history, follows with a discussion of literature specific to the subject of service quality measurement, service quality and customer perceived service quality, measuring service quality in information and communication technology (ICT), dimensions of quality in higher education, and measuring service quality in higher education (HE). The evolution of service quality in higher education is explored, along with a discussion of methods to measure service quality.

Cloud Computing Background and History

While important cloud computing research was published by Chellappa in 1997 (Mei, Zhang, & Chan, 2008), implementation of cloud computing has been a fairly recent phenomenon. This term began surfacing commonly in the literature around 2006 and refers to computing over the Internet (Aymerich, Fenu, & Surcis, 2008). By 2008, cloud computing was receiving extensive research interest that had surpassed grid computing, (defined as "very large-scale aggregates of communication and computation resources enabling new types of applications and bringing several benefits of economy-of-scale.") (Delic & Walker, 2008), in the

amount of media interest received (Wang, Archer, & Zheng, 2006; Youseff, Butrico, & Da Silva, 2008). Many of the initial cloud providers were Web-based companies and start-up companies (Leavitt, 2009). As cloud computing demand expanded, the types of cloud providers extended to include public and community clouds ("National Institute," 2011). Although the term cloud computing is relatively new, this technology had its basis in many other earlier computing methods.

A cloud computing entity contains parallel and distributed resources from a group of connected and virtual computers that are exhibited as one combined system (Buyya, Yeo, & Venugopal, 2008; Foster, Zhao, Raicu, & Lu, 2008). These systems are made available based on service-level agreements between the provider and the user (Buyya et al., 2008). The key features of a cloud computing entity are massive scalability to meet user needs, the existence as an abstract entity to deliver multiple service levels to outside users, economy of scale, and dynamic configuration of services on demand, often by virtualization (Foster et al., 2008). Delic and Walker (2008) portrayed cloud computing to be the third wave of Internet advancement, following the Internet as the first wave and the Web as the second. From a different perspective, Hayes (2008) compared cloud computing to computing fifty or more years ago when service bureaus and time sharing systems gave users access to mainframe computers. These computing advances were fostered by earlier predecessor technologies. Some of the predecessor technologies to cloud computing include Service-Oriented Architecture (SOA), distributed computing, virtualization, and grid computing (Sandhu et al., 2010).

Cloud computing has strong ties to pervasive computing, where multiple computing resources are available for use via the Internet (Su, Kuo, & Huang, 2008). It also had its roots in the search and retrieval systems that emerged in the 1990s (Aymerich et al., 2008). These search

and retrieval systems originally were based on cluster computing but eventually migrated to the geographically dispersed grid computing (Aymerich et al., 2008). Cloud computing can be considered a natural evolution from grid computing in its approach to providing computing resources to remote users.

Cloud computing based technology has taken colleges and universities by storm as university professors use this technology and its resources to enhance education (Fernando, 2008; Thomas & Qing, 2008). It has drastically changed technology access, use, and connection both inside and outside educational settings. Community colleges in Texas have begun to offer more distance learning courses in the hopes that with a greater flexibility to complete their coursework, more students will be able to enroll in online classes (Beyth-Marom, Chajut, Roccas, & Sagiv, 2003; Selim, 2007). This age of virtual simulation, real time interaction, and scalable and flexible resource use provides instructors and students the tools for creativity, innovation, and engagement (Dong, Zheng, Yang, Li, & Qiao, 2009; Srinivasa, Nageswara, & Kumari, 2009; Sultan, 2010). Cloud computing is an infrastructure that can bring a new value to a community college, as educational services can be delivered in a reliable and efficient way. It also provides a suitable environment for ubiquitous learning activities. As a result, efforts to introduce cloud computing in community colleges in Texas have been initiated over the last couple of years and are ongoing. Several different approaches of cloud computing based technology have been implemented in various community colleges in Texas.

Considering the existing IT infrastructure in a community college, the cloud computing paradigm has been implemented with various approaches. The colleges choose the deployment model appropriate for that educational institution. Depending on the type of ownership of physical resources and infrastructure available, you will find any of the following deployment

models of cloud computing in large community colleges in Texas: a private cloud, a public cloud, a hybrid cloud, and a community cloud. The characteristics of each deployment model from the standpoint of infrastructure are management, ownership and location - access rights to cloud resources (Mell & Grance, 2011). Researches and case studies pointed out the most common approaches, not only within community colleges or universities, but in the other fields of cloud computing solutions, are private and public cloud (Jin et al., 2010). Public clouds are owned and operated by third parties – the cloud service providers. Main advantage of a public cloud is that the educational institutions do not need to invest and house large IT infrastructures for educational and research purposes. A private cloud model enables educational institutions to have complete control of services, data security, applications and resources that are provided to their users. Depending on how technology is provided and used, these solutions implement one or more cloud computing service models (Costanzo, Assuncao, & Buyya, 2009): infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS). According to Despotović-Zrakić, Simić, Labus, Milić, and Jovanić (2013), the main aim of IaaS is to provide computing resources or storage as a service to users. For this service model, users install operating system on the machines as well as their application software by themselves. PaaS model enables programming language execution environment for users. This model allows users to develop and deploy their own software solutions. SaaS model provides specific software that runs on a cloud computing infrastructure. The users of these services do not control or manage underlying infrastructure and application platform (Despotović-Zrakić et al., 2013). Although solutions found in the literature add new value to learning and enable numerous services and features, one of the challenges of using cloud computing in community colleges, which may not

have been fully explored, is evaluating educational service quality of this technology from the perspectives of the instructors.

Service Quality Measurement

According to Renganathan (2011), quality is a subjective concept that has no generally agreed definition for it. The word quality means different things to people according to the context. Garvin (1988) identified five perspectives on quality, namely: the transcendent view, the product-based approach, the User-based definitions, the manufacturing-based approach, and the value based definitions. In order to be able to manage the quality of any product or service, it must be measured. Without measurement, managers and stake holders cannot be sure whether product or service quality gaps exist (Lovelock, Wirtz, & Chatterjee, 2006). According to Lovelock et al. (2006), measurement is needed to determine whether goals for improvement are being met after changes have occurred.

In general it is difficult to measure and quantify service quality. The main purpose of measuring service quality is to ensure whether service is provided as per the expectations of the customers. There are several well-known tools for measuring service quality or customer satisfaction. The most eminent instrument in attempting to systematize the service quality is "The gap model" of service or SERVQUAL developed by Parasuraman et al. (1985). This conceptual framework was developed initially to measure customer perception of service quality for the financial service sectors but later extended to sectors such as hospitality, telecommunications and healthcare. The SERVQUAL's model, which was developed by Parasuraman et al. (1988) used a survey to ask respondents for an indication of their expectations as well as their perceptions of service, and establishes the gap between the two. Other researchers, such as Cronin and Taylor (1992), held that only the perception of quality is

important. SERVQUAL has been used in universities to assess satisfaction not only with

teaching and learning, but with support services such as information technology (Smith et al.,

2007). Authors have proposed several variations, including SERVPERF, optionally asking

respondents to weight the importance of their answers, and HEdPERF – devised specifically for

use in higher education by Firdaus (2006).

The service quality or SERVQUAL scale is a major instrument in the services marketing

literature for assessing quality (Parasuraman et al., 1988, 1991a). According to Parasuraman et

al. (1988, 1991a), this instrument has been widely used by both managers and academics

(Babakus & Boller, 1992; Carman, 1990; Crompton & MacKay, 1989; Cronin & Taylor, 1992;

Webster, 1989) to measure customer perceptions of service quality for a variety of services,

which include, but not limited to financial companies, repair and maintenance companies, and

long distance telephone companies. Grounded on Parasuraman et al. (1988)'s conceptualization

of service quality, the original SERVQUAL instrument included two 22-item sections that

intended to measure the (a) customer expectations for various aspects of service quality, and (b)

customer perceptions of the service they actually received from the principal service organization

(Parasuraman et al., 1988). The SERVQUAL instrument is based on the gap theory

(Parasuraman et al., 1985) and suggests that a consumer's perception of service quality is a

function of the difference between what is expected from a service encounter and the perception

of the actual service encounter. Operationalized in Figure 2 below:

Service Quality (Q)		Perception of Service Quality (P) (What Customers Perceive Service Provider Actually Offered)		Expectation of Service Experience (E) (What Customers Believe the Service Provider Should Offer)
	=		-	
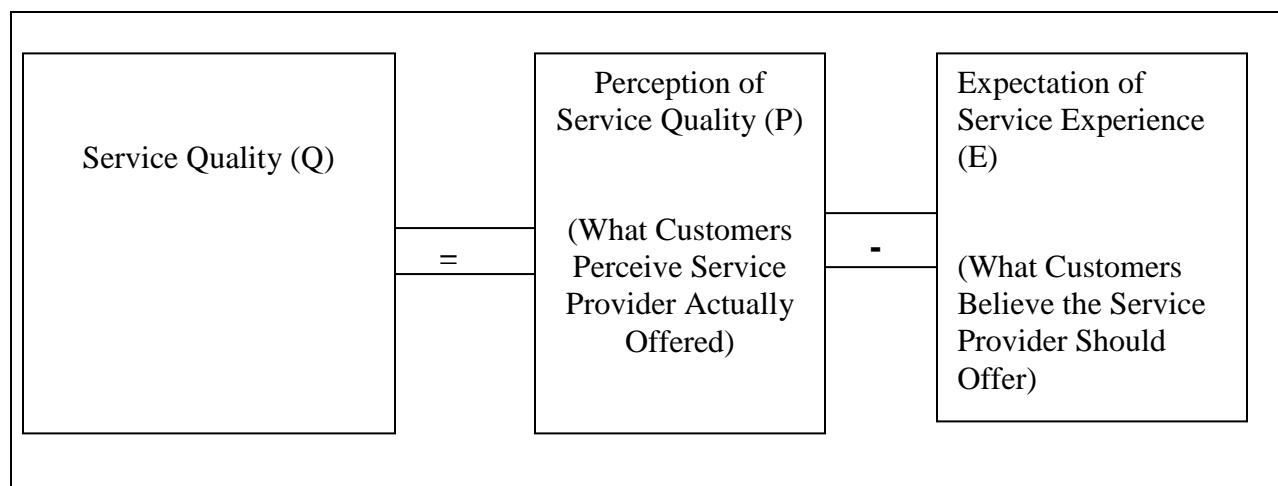
Figure 2. Measurement of service quality:

Service Quality (Q) = Perception (P) - Expectation (E).

The results of the initial published application of the SERVQUAL instrument by

Parasuraman et al. (1988) indicated that five dimensions of service quality emerged across a

variety of services. These dimensions are reliability, responsiveness, tangibles, assurance, and

empathy (Carman, 1990; Crompton & MacKay, 1989; Parasuraman et al., 1985, 1988, 1991a).

Reliability involves consistency of performance and dependability – that means that a firm

performs the service right the first time and honors its promises; responsiveness is the

willingness or readiness of employees to provide service – that is the timeliness of service;

tangibles are the physical evidence of the service – such as physical facilities, appearance of

personnel, or tools or equipment used to provide the service; assurance corresponds to the

knowledge and courtesy of employees and their ability to inspire trust and confidence; and

finally empathy which pertains to caring - individualized attention that a firm provides to its

customers.

A study by O'Neill, Fitz, and Wright (2001) showed some benefits of using the

SERVQUAL approach such as its ability to make a clear indication of how well the company

performs to meet the customer's requirement according to the customer's perception. In addition,

SERVQUAL also helps the company to priorities customer needs, wants and expectations based on customer's opinion. Furthermore, SERVQUAL allows the organization to set the standards to meet the quality requirement issued by customers and other recipients of the services offered.

Service Quality and Customer Perceived Service Quality (or Customer Satisfaction)

Review of the literature reveals a lack of consensus on the definition of satisfaction as a concept with the service, and therefore, there is no generally accepted measurement scale for customer satisfaction in higher education (Garcia-Aracil, 2009). Some scholars claimed that service quality is an outcome of the service encounter and that customer satisfaction is related to prior expectations and is conceptualized as a response to service quality in the form of disconfirmation (Oliver, 1980). Many studies propose that customer satisfaction and service quality are separated and distinct constructs that share a number of similar qualities (Parasuraman et al., 1994).

Models of satisfaction often focus on comparing customer expectations to the observed service delivered (Oliver, 1980; Morad, Rezaei, Alipour, & Salehi, 2011), which are referred to as the service quality gap (Parasuraman et al., 1994). Perceptions of service quality are built on previous expectations of what should be and will occur compared to the actual service delivery (Boulding, Kalra, Staelin, & Zeithaml, 1993). Indeed, empirical evidence has confirmed that the customers' perceptions of service quality and customer satisfaction directly affect their intention to positively favor an organization.

A study by Harvey and Green (1993) indicated that quality in higher education is a complex and multilayered concept; therefore, a single accurate definition of quality is lacked. As a consequence, consensus concerning the best way to define and measure perceived service

quality in high education or anywhere else does not exist yet (Clewes, 2003). Every stakeholder

in higher education, such as students, instructors, professional bodies, and governments has

his/her/their own view of quality due to particular needs. According to Maguad (2007), despite

efforts to substitute other words for the term customer in higher education, it appears that they

cannot truly capture the true essence of the term. Maguad (2007) argued that every stakeholder in

academia serves customers and is also a customer. Student may be regarded as the primary

internal customers of the college or university. But besides students, higher education serves a

broad range of other customers whose needs and expectations ought to be met or exceeded

(Maguad, 2007). Based on the findings in the service quality literature, therefore, colleges and

universities must fully understand their different customers and their corresponding needs.

Customer satisfaction in higher education will be defined as the difference between what a

customer expects to receive and his/her perceptions of actual delivery.

There are, however, conceptual issues in the services literature concerning the sequential

order of the two constructs. While these authors (Cronin, Brady, & Hult, 2000; Farrell, Souchon,

& Durden, 2001) viewed service quality as an precursor to perceived service quality, others, such

as Parasuraman et al. (1988), Bitner (1990), and Al-alak (2009, 2006), considered customer

perceived service quality (or satisfaction) as an antecedent to service quality. Farrell et al. (2001)

gave a good overview of this contentious conceptual issue. The majority of recent researches

consider service quality as an antecedent to customer satisfaction or perceived service quality

(Yavas, Benkenstein, & Stuhldreier, 2004; Carrillat, Jaramillo, & Mulki, 2007; Zeithaml, Bitner,

& Gremler, 2008). In particular, Zeithaml et al. (2008) pointed out that service quality and

customer perceived service quality are fundamentally different concepts. They also pointed out

that perceived service quality is a broader concept and in developing the framework of perceived

service quality, service quality should be considered as a component of perceived service quality. They supposed that customer perceived service quality was influenced not only by service quality perceptions but also by personal and situational factors. Further support can be found in the higher education literature as Browne, Kaldenberg, Browne, and Brown (1998; see also Al-alak, 2006, 2009; Guolla, 1999) showed that customers' perception of service quality is an antecedent to perceived service quality or satisfaction.

A few other studies have argued that demographic difference is an important aspect that affects the customers' expectations of service quality (Renganathan, 2011); hence instructors' demographic factors such as age, gender, monthly income, and highest qualification, become relevant in evaluating perceived service quality. Kotler (2003) noted that demographic characteristics were one of the most popular and well accepted bases for segmenting consumers. According Schiffman, Kanuk, and Das (2006), demographic information is often the most accessible and cost effective way to identify a target market. They claimed that demographics are easier to measure than any other segmentation variables; therefore, they are invariably included in psychographics and sociocultural studies because they add meaning to the findings (Schiffman et al., 2006). Kotler (2003) also noted that demographic variables are the most popular bases for distinguishing customer groups and they are easy to measure. Several researchers identified that tourists' images differed according to different demographic characteristics (Baloglu, 1997; MacKay & Fesenmaier, 1997; Walmsley & Jenkins, 1993). Skogland and Siguaw (2004) proposed that demographic variables positively influenced customer satisfaction. Literature suggest that hotel managers should not overlook the importance of the effect of demographic factors on customer perceptions of behavioral intentions, satisfaction, value, image, and

perceived service quality (Al-Sabbahy & Ekinci, 2004; Shergill & Sun, 2004; Skogland & Siguaw, 2004).

Measuring Service Quality in Information and Communication Technology

The use of SERVQUAL model for measuring service quality in information system is not new. Review of literature show how SERVQUAL model has been used to measure service quality in information system. Pitt, Watson and Kavan (1998) recognized SERVQUAL, an extensively applied marketing instrument, as an important tool that can be used to measure information system (IS) service quality. The paper highlighted the service component of the IS department, augmenting the IS success model, presenting a logical model for user's expectations. They believed that the effectiveness of an IS unit can be partially assessed by its capability to provide quality service to its users.

In addition Zhu, Wymer, and Chen (2002) proposed service quality model for IT related business. They claimed that IT-based services have a direct impact on the reliability, responsiveness and assurance dimensions; and an indirect impact on customer satisfaction or perceived service quality. IT can help service providers achieve higher level of customer satisfaction (Zhu et al., 2002). Santos (2003) proposed one important model to measure service quality of electronic business, which the author called 'model of e-service quality'. In this model, the author claimed that service quality is the key determinant for successful e-commerce since online comparison of the technical features of products is essentially costless, feasible, and easier than comparisons of products through traditional channels. The model also suggested determinants factors that are related with service quality measurement in e-business.

Another article by Van Dyke et al. (1997) reviewed a previous literature that recognized the application of SERVQUAL and discussed some of the implications for measuring service

quality in information systems context. Their findings indicate that SERVQUAL suffers from a number of conceptual and empirical difficulties. Conceptual difficulties include the operationalization of perceived service quality as a difference or gap score, the ambiguity of the expectations construct, and the unsuitability of using a single measure of service quality across different industries. Empirical problems, which may be linked to the use of difference scores, include reduced reliability, poor convergent validity, and poor predictive validity. They suggested that other alternatives that should be utilized and also that caution should be exercised in the interpretation of IS-SERVQUAL difference scores. The use of SERVQUAL was not condemned, but the authors suggested that further work is needed in the development of measures for assessing the quality of IS services.

A research by Sullivan and Walstrom (2001) focused on the application of the SERVQUAL model in web-based services by rewording the 22 statements of the SERVQUAL instrument (22 items) in the context of e-commerce (refer to Appendix H). In this study, 22 items were grouped into six dimensions (Responsiveness, Competence, Quality of Information, Empathy, WebAssistance and Callback Systems) that were generated as a new measurement scale. Another related case study by Li, Tan, and Xie (2002), identified important items and dimensions in web-based service quality measurement from customers' perspectives using SERVQUAL as a starting point. Although the study supported using SERVQUAL scale to identify the strengths and weaknesses of web-based service quality and areas for improvement, but it also strongly suggests that refinement of SERVQUAL is necessary before applying it.

Another study by Jaing, Klein, and Carr (2002), borrowed some of the dimensions of SERVQUAL model, which added to the understanding and applicability of SERVOUAL by

examining the validity of the instrument in the IS professional population. The five dimensions found in previous work were supported by the data collected here for two diverse populations. In addition, the study found that a significant expectation gap does exist in the sample population and this gap is related to a measure of user satisfaction, both premises in the theory behind SERVQUAL as a gap analysis technique (Parasuraman et al., 1990). SERVQUAL has demonstrated value as a diagnostic tool for managers, including IS managers (Pitt et al., 1998). The preliminary results reported in this study indicate that there may be a common structure in SERVOUAL across the diverse populations of IS users and IS professionals. Should these properties be present in the wider population, SERVQUAL can be a useful tool in IS service evaluation systems. It also may have the potential to serve as a measure of expectation differences to help analyze expectation gaps. The study supported the application of SERVQUAL as indicated in previous arguments, and the issues of validity appear to be minimal, certainly not to the point where a potentially valuable analytical tool should be dismissed as an application or research device.

SERVQUAL model has also been widely used in information technology and telecommunication industries for the purpose of measuring service quality, which enables the organization to know its position in the market and provides a strategic advantage to enhance its competitiveness. It has been used in telecommunication industries in different cultural context with high reliability and validity (Hoffman & Bateson, 2001; Tyran & Ross, 2006; Stafford, Stafford, & Wells, 1998; Sureshchandar, Rajendran, & Anantharaman, 2002). In a study of mobile telecommunication in South Africa, Van der Wal, Pampallis, and Bond (2002) used SERVQUAL with some modifications. The modified instrument resulted to reliability coefficient (Cronbach's alphas - a measure of internal consistency) of 0.95. In their study of

service quality in telecommunication services, Ward and Mullee (1997) used reliability, availability, security, assurance, simplicity, and flexibility as criteria of service quality. They argued that, from customers' perspective, it is not appropriate to separate network quality from the other dimensions of quality.

J.D. Power and Associates Survey (2007) studied the mobile phone users' satisfaction in the Canada. The study used a sample of 6000 mobile phone customers throughout Canada. Important dimensions of service quality included in the survey were call quality, billing, service plan options, cost of service and customer service. The study showed rising customer expectations with regard to the additional features and services from the mobile operators.

In another J.D. Power and Associates Survey (2011) of 7,275 smartphone users of wireless phone in the United States in 2011, the Wireless Phone Users' Satisfaction Index of United States of America indicated that important dimensions of service quality included customer satisfaction, ease of operation, operating system, physical design, features, and battery function. The study showed that overall satisfaction with smartphones and traditional mobile phones is considerably higher among owners who use their devices for social media activity, compared with satisfaction among owners who do not access social media platforms on their phones. Providing features that facilitate social networking activity that make it easy for users to communicate and share information between various social media sites may be an effective way for service providers to further engage customers and increase loyalty.

Dimensions of Quality in Higher Education

In today's environment of ever increasing worldwide competition, providing quality service is a key to the existence and success of many organizations, and many experts speculate

that delivering superior service quality is the most powerful competitive trend that will shape the

current-day strategy.

The definition of service quality in the educational sector is no less vague than that in the

business world. According to Galloway and Wearn (1998), service quality has different

meanings for different people. There is no single and universally-accepted definition for quality

(Wicks & Roethlein, 2009). Every quality expert has a different definition for quality. Despite

the lack of a specific definition, it follows the same definitions of quality in general (Sahney,

Banwet & Karunes, 2004), which includes, but not limited to the following:

> "the degree of excellence at an acceptable price and the control of variability at an
> acceptable cost" (Broh, 1982); "defect avoidance in the education process" (Crosby,
> 1979); "value addition in education" (Feigenbaum, 1983); "conformance of education
> output to planned goals, specifications and requirements" (Gilmore, 1974; Crosby, 1979);
> "fitness of educational outcome and experience for use" (Juran & Gryna, 1988); "meeting
> or exceeding customer expectations of education" (Parasuraman et al., 1985); "excellence
> in education" (Peters & Waterman, 1982); and "the summation of the affective evaluation
> by each customer of each attitude object that creates customer satisfaction" (Wicks &
> Roethlein, 2009).

Zemsky, Wegner, and Massy (2005) elaborated on the dimensions of service quality in higher

education. They defined quality based on money and the resources money can buy, such as the

school libraries, recreational facilities, lower faculty-to-student ratios, and the central role of

research and scholarship. The definition of quality in colleges and universities, therefore, is

multifaceted and diverse.

Irrespective of quality's definition in higher education, it most certainly encompasses

more than exclusively a service component. According to Sahney et al. (2004), quality definition

includes the quality of inputs in the form of students, faculty, support and administrative staff,

and infrastructure. It also includes the quality of processes in the form of learning and teaching

activity; and the quality of outputs in the form of the enlightened students that graduate out of the

system. The collection of potential services and service characteristics can include a wide range of measures, including the institution's emphasis on teaching students well, faculty availability for student consultations, library services, class sizes, information systems such as cloud computing technology, and recreational and classroom facilities. Higher education has a number of complementary and contradictory "customers." Being aware of the large number of stakeholders the educational system serves, this study defined the service quality dimensions exclusively from the instructors' perspective (such as cloud computing provider's website design (or tangibles), reliability, responsiveness, security/privacy (assurance), and personalization (or empathy)) - with the instructor considered a vital stakeholder of the educational system (Behrend et al., 2011).

Measuring Service Quality in Higher Education

Frequently, higher education institutions seek to provide high quality services in all parts of their educational curricula and administrative processes. Therefore, the importance of service quality makes its measurement and its subsequent management an issue of utmost importance (Shekarchizadeh et al., 2011).

The review of literature shows that some studies used the SERVQUAL model to measure service quality in higher education. Boulding et al. (1993) used SERVQUAL model to study expectations and perceptions linked with the delivery of services in an educational environment. Their study used SERVQUAL to measure students' satisfaction with overall quality of service in a higher educational setting (Al-alak & Alnaser, 2012). Hampton (1993) also used SERVQUAL model to measure college student satisfaction with professional service quality. In examining

students' perceptions of service delivery, he applied the gap model (the disparity between expectations and experiences).

Schwantz (1996) modified the usage of SERVQUAL instrument to make the comparison between traditional and non-traditional students' views of the quality of service in one higher educational institution. Students were asked to compare the quality of service (expected and received) of the support staff with that of faculty members. Based on factor analysis, the researcher identified the dimensions of the instrument where he used two dimensions instead of five, which are acknowledged by Parasuraman et al. (1990).

Other studies have borrowed some of the dimensions of SERVQUAL model to investigate the impact of a number of service quality attributes on satisfaction and loyalty in a higher education setting. Investigating the differences in student satisfaction and identifying dimensions of overall perceived quality, a study by Ong and Nankervis (2012) revealed that students with different academic performances perceived the impact of quality attributes on satisfaction differently compared with students with lesser performances. It was also shown that differences in overall satisfaction with educational experience were found among different lines of specializations.

Drawing concepts from services marketing and assessment literature, Duque and Weeks (2010) developed a conceptual model to assess student learning outcome. It was found that student perceptions of educational quality had a noticeable impact on student satisfaction. Another study by Garcia-Aracil (2009) showed that those graduates who were most satisfied with their course study scored course content and social aspects very highly, while opportunity to participate in research projects and poor supply of teaching materials were among the main reasons for dissatisfaction with higher education studies. Most of these studies have focused on

students' satisfaction with overall quality of service and/or with professional service quality in high education. There are little or no studies on instructors' satisfaction with cloud computing technology. This current study was to fill this void.

There has been considerable research to re-examine the reliability and validity of SERVQUAL (Asubonteng, McCleary, & Swan, 1996; Brown et al., 1993; Ladhari, 2008; Lam, 1997; Shahin, 2004). Asubonteng et al. (1996) listed a table for several studies comparing the reliability and validity of SERVQUAL. They reported the reliability coefficient (Cronbach's alphas) as between 0.87 - 0.90. Their studies provided some support for reliability and face validity for the SERVQUAL scores on the five dimensions. Brown et al. (1993) provided the following insights in their assessment of SERVQUAL: factor-analysis results relating to the convergent validity of the items representing each dimension are mixed, because in several studies the highest loadings of some items were on different dimensions from those of Parasuraman, Zeithaml, & Berry (1996); the lack of support for the discriminant validity of SERVQUAL is reflected by the factor-loading pattern, and the number of factors retained is inconsistent across studies; and the usefulness of expectation scores and the appropriateness of analyzing gap scores need to be examined. Ladhari (2008) suggested that industry-specific measures of service quality might be more appropriate than a single generic scale. He then encouraged researchers and scholars toward the development of an alternative industry-specific research instruments for measuring service quality. Lam (1997) found that the results are consistent with those reported in Babakus, Boller (1992), and Parasuraman et al. (1996), suggesting that both measures exhibit desirable levels of reliability and internal consistency. Shahin (2004) concluded that the concept of measuring the difference between expectations and perceptions in the form of the SERVQUAL gap score proved very useful for assessing levels of

service quality. This view was echoed by Asubonteng et al., in their 1996 research: that SERVQUAL will predominate as a service quality measure. They also pointed out that SERVQUAL's lowest reliability was 0.59 reported by Finn and Lamb (1991) and the highest reliability was 0.97 reported by Babakus and Mangold (1992).

Summary

The literature review chapter has reviewed the theoretical foundations of service quality, followed by a chronological evaluation of the historical context of key authors' contributions to the theories and conceptual frameworks that have defined service quality in higher education. The dimensions of service quality in education and measuring service quality in information and communication technology were examined, along with measuring service quality in higher education.

A worthwhile measure of service quality was proposed in a landmark study by Parasuraman et al. (1988) that conceptualized service quality gaps between customer expectations and perceptions. The resulting measurement instrument, SERVQUAL, provides the theoretical framework for measuring service areas in need of improvement. An extension and adaptation of the SERVQUAL model tailored to the higher education environment was introduced for this study. Based on the research and studies cited in this chapter, there is confident that the method that was employed for this study is an appropriate method for assessing service quality in higher education.

Summarizing, the literature review reveals the lack of studies on instructors' satisfaction with cloud computing technology in educational settings. While there are many studies that have emphasized the importance of service quality measurement and monitoring in educational

institutions (Al-alak & Bekhet, 2011; Angell, Heffernan, & Megicks, 2008; Ham & Hayduk, 2003; Harvey & Knight, 1996; Yeo, 2008) and information and communication technology sectors, few, if any, have focused on instructors' perceived service quality on the introduction of new technology such as cloud computing.

Chapter 3

Methodology

Introduction

This quantitative study was designed to use a service quality model to investigate instructors' perception regarding the service quality provided by cloud computing based system in large community (or two year) colleges in Texas. Additionally, the study also examined whether instructors' perceived service quality (or satisfaction) varies based on selected demographic characteristics. This chapter provides a review of the current study's research methodology and an explanation of the data collection process. The focus of the current study includes research method and design appropriateness, population, sampling, informed consent, confidentiality, geographic location, data collection, instrumentations, internal validity, external validity, and data analysis of the selected research methodology as they relate to this study.

Research Design

The current study involves the use of a quantitative method to collect and analyze data received from the sample population regarding instructors' perception of the service quality provided by cloud computing based system in large community colleges in Texas. According to Creswell (2005), when conducting a quantitative study, the researcher must identify the research questions, identify or create an instrument to gather the data when the questions are answered, and analyze the data using figures, data, and facts. The current study has identified two primary research questions that were used to guide this investigation, which are: (1) Do the difference between instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems? (2) Are there significant differences in the overall

perceived service quality based on instructors' age, gender, income, and highest qualifications? The study collected and analyzed data based on the above research questions from large community (or two year) colleges in Texas.

The use of quantitative methods ensure the current study is specific and narrow, which will allow for the discovery of measurable, observable data on the variables. Quantitative researches enable the collection of data from instruments with preset questions and responses, and acquire data from a large population (Creswell, 2005). The participants in the current study included individuals with the following criteria: faculty members of two year colleges in the State of Texas and (2) have sufficient experience using cloud computing technology.

The surveys were distributed to the sample population by accessing a SurveyMonkey© website link through each college's e-mail system to collect the results of the sample population's expectation and perception of instructors' service quality of cloud computing based systems. Using the college's e-mail system allowed only individuals in the sampling process that would represent the target population. The purpose of a survey was to collect information from the sample population and develop the figures that create the quantitative descriptions of the collected data (Salkind, 2006). According to Creswell (2005), researchers have increasingly used e-mail and websites to collect survey data.

Statistical surveys were used to collect quantitative information about items in a population (Weisberg, Krosnick, & Bowen, 1989). This study utilized a descriptive research design, which is useful for collecting data about a respondent's interests, beliefs, attitudes, and opinions and behaviors (Gay, 1992). Descriptive research describes data and characteristics about the population being studied, and is often collected using statistical surveys. Descriptive

research answers the questions of who, what, where, when, and how; however, it is not helpful in explaining causal relationships, where one variable affects another (Gay, 1992).

The Survey questions designed were based on the original 22 questions of SERVQUAL (see Appendix H). A demographic survey (see Appendix A) was used, covering questions pertaining to instructor's academic institution, gender, age, annual income, academic discipline, educational degree attained, and academic rank at the college. The data collected was used to respond to the research questions and test each hypothesis. An analysis of the collected data was required to conclude if instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems; and if there are significant differences in the overall perceived service quality based on instructors' age, gender, income, and highest qualifications within two year colleges in Texas.

Population and Sample

Population

According to Parasuraman et al. (1996), the only criteria that count in evaluating service quality are defined by customers and all the other judgments are basically inappropriate. Therefore, the target population for this study comprised of instructors or faculty members (referred to as 'participant') with sufficient experience using cloud computing technology in two year colleges in the State of Texas. Some studies question the appropriateness of using faculty (or student) subjects considering issues of external validity and generalizability (Gordon, Slade, & Schmitt, 1986) of cloud computing usage. However, Greenberg (1987) argued against this and suggested that it is important for theoretical and applied research to focus on internal validity in terms of operationalization and establishing strong theoretical foundation.

The population of community college faculty is better educated than the population of the conventional cloud computer user or customer and they are well placed to provide effective feedback to major stakeholders in their academic community of their own experience with using this technology (McKnight, Choudhury, & Kacmar, 2002). Thus, faculty members of large community colleges in Texas were invited to participate in the study. The inclusion criteria used were as follows: (1) faculty member of a large two year college in the State of Texas and (2) has sufficient experience using cloud computing technology. Using this criteria, seven (7) large community colleges were identified, which include: (i) Alamo Colleges (AC) - five (5) campuses, (ii) Austin Community College (ACC) – ten (10) campuses, (iii) Collin County Community College District (CCCD) – three (3) campuses, (iv) Dallas County Community College District – seven (7) campuses (DCCCD), (v) Houston College System (HCS) - seven (7) campuses, (vi) Lone Star College System (LSC) – (6) campuses, and (vii) Tarrant County College (TCC) – 5 campuses. The study obtained the sampling frame at random from this population - instructors or faculty members with sufficient experience within these large community colleges in the State of Texas, which has implemented some form of cloud computing initiative. This sampling technique allowed every element in the target population, and each possible sample of a given size, an equal chance of being selected.

Sample

Subjects were drawn mostly from faculty members' of three large community colleges (Dallas County Community College District (DCCCD), Houston College System (HCS), and Lone Star College System (LSC)) in Texas that provided Institutional Review Board approvals (see Appendices I, J, and K). The sample size is determined based on the size of the target population and the desired accuracy of the study. The target population is 11,395. In this study, a

random sample of 470 email addresses of faculty were selected from the target population using the "Random Numbers Generator" feature of the SPSS statistical package. All the 470 instructors that were randomly selected received an online survey hosted by SurveyMonkey.com.

Instrument

The model for this study leverages service quality (SERVQUAL) approach of Parasuraman et al. (1985). SERVQUAL is a multi-item scale developed to assess customer perceptions of service quality in service and retail businesses (Parasuraman et al., 1988). The scale breaks down the notion of service quality into five dimensions which were derived from five years of qualitative and quantitative customer service quality research (Parasuraman et al., 1988, 1990). The five service quality dimensions identified through this process and assessed using 22 item scale were: Tangibles - physical facilities, equipment, staff appearance, etc.; Reliability - ability to perform service dependably and accurately; Responsiveness - willingness to help and respond to customer need; Assurance - ability of staff to inspire confidence and trust; and Empathy - the extent to which caring individualized service is given. SERVQUAL measures service quality as the discrepancy (gap) between a customer's expectations for a service offering and the customer's perceptions of the service received. The SERVQUAL customer perception tool requires customers to answer questions about both their expectations and their perceptions and to assign a numerical weight to each of the five service quality dimensions (Parasuraman et al., 1988).

Survey questions were designed based on the 22 questions of SERVQUAL (see Appendix H). Some modifications to the wording were made to make them relevant to the cloud computing based environment (see Appendix A). The main purpose of this study was to measure service quality of academic cloud computing technology of large community colleges in the

State of Texas from instructors' perspectives and to determine cloud computing based systems' own performance towards meeting academic institution's expectations. A quantitative survey instrument, covering SERVQUAL dimensions and the role of demographic variables, were used to measure instructors' perception about service quality. The survey instrument covered the following sections. The first section, Service Quality Expectations survey, was used to measure instructors' expectation of cloud computing based technology. The second, Service Quality Perceptions survey, was correspondingly used to measures instructors' perceptions of cloud computing based technology. The third, Perceived Service Quality survey, measured overall customer satisfactions. Self-reporting measures of behavior rather than direct observations were used to determine the actual level of instructors' perceived service quality (or satisfaction). This question was constructed to rate the level of instructors' perceived service quality, such as overall satisfaction (QoS), cloud-usage experience, future visits, willing to recommend, willing to pay for cloud service, and more. The last section contained demographic data.

At the approval of the dissertation proposal, a pilot test was conducted at a local community college on 30 cloud computing based technology users to assess the semantic content and readability of the survey instrument. Problems or difficulties, such as ambiguity of wordings, misunderstanding of technical terms, were reported for further revisions.

As noted above, the survey instrument is based on SERVQUAL constructs validated in prior research (Gerbing & Anderson, 1988; Churchill, 1979; Parasuraman et al., 1985) and adapted to the context of this study. The SERVQUAL model has been widely used to study the service industry in general and education customer service, in particular (Kitchroen, 2004). Faganel (2010) also stated that the SERVQUAL method from Parasuraman, Zeithaml, and Berry is a technique that can be used for performing a gap analysis of an organization's service quality

performance against customer (instructor) service quality needs. SERVQUAL has its theoretical

foundations in the gaps model and defines service quality in terms of the difference between

customer expectations and performance perceptions on a number of 22 items (Parasuraman et al.,

1988). Customer expectations are opinions about service delivery that serve as standards or

reference points against which performance is judged, whereas customer perceptions are

subjective assessments of actual services performances through interaction with the providers

(Zeithaml et al., 2008). The SERVQUAL scale conceptualizes service quality as containing five

dimensions measured through the 22 items, namely tangibles, reliability, responsiveness,

assurance, and empathy.

In the context of this study, two versions of SERVQUAL instrument were prepared and

discussed with 13 panel participants selected. All the participants were faculty members in a

community college that currently implement cloud computing based technology. The first

version of SERVQUAL is the one described by Parasuraman et al. (1991a), a 22-item

instrument, based on their five dimensions of service quality, with the first 22 items designed to

reflect customer expectations and the second 22 to indicate customer's perceptions of the service.

The second instrument evaluated by the 13 member panel is described by Ford, Joseph, and

Joseph in their 1993 study contrasting the views of United States and New Zealand customers

concerning service quality in higher education. As explained in the review of literature, the

SERVQUAL instrument is generically designed to be applicable to any service, therefore, any

one of these instruments can be altered for the current study. The process above helped the panel

develop the first draft of the quantitative survey instrument that was submitted to the university's

Institutional Review Board (IRB) for approval. (See Appendix A: Survey Instrument). The items

in this instrument were extracted from the original scales, with minimum word adaptations to fit

the higher education (HE) context and this initial draft was used for a pilot testing through a focus group and expert evaluations.

A quantitative survey instrument, covering SERVQUAL dimensions of tangible, reliability, assurance, empathy, responsiveness and the role of demographic variables, was used to measure instructors' perception about service quality. The variables that were measured are the gap between instructors' expectations and perceptions in terms of SERVQUAL's five dimensions, namely Tangibles, Reliability, Responsiveness, Assurance, and Empathy. The survey instrument was also used to collect additional information related to demographics. All survey items were measured using a 7-point Likert scale ranging from 7 point meaning "strongly agree" to 1 point implying "strongly disagree". Further, instructors' responses were later compared to arrive at (P-E) gap scores, that is, disconfirmation model. This method of defining the construct provided a continuum, upon which to access the service quality rating that possesses possible diagnostic value. This continuum ranges from -6 to +6 (using a 7 point scale as noted above). A negative rating represents unfulfilled expectations and a positive rating represents a state in which expectations have been exceeded.

Reliability and Validity of Survey Instrument

According to Parasuraman et al. (1985, 1988), SERVQUAL is a generic instrument with good reliability, validity, and broad applicability in their original study of SERVQUAL. The main aim of SERVQUAL model is to serve as a diagnostic methodology for uncovering broad areas of an organization's service quality shortfalls and strengths. SERVQUAL's dimensions and items represent core evaluation criteria that transcend specific companies and industries, as implied by the systematic, multi-stage, and iterative process that produced the instrument (Parasuraman et al., 1985, 1988).

According to the reports above, SERVQUAL is a very reliable instrument for measuring service quality. Irrespective of the numerous theoretical, operational, conceptual, and empirical criticisms of the measurement instrument (Buttle, 1996; Ladhari, 2008; Van Dyke et al., 1997, 1999), SERVQUAL instrument has been extensively adopted by several academic researchers and practitioners worldwide to measure service quality (Shahin, 2004). The SERVQUAL instrument has been the major technique used to measure service quality and has been extensively implemented and valued by academics and practitioners (Ladhari, 2008).

Parasuraman et al. (1988)'s construct validity appraisal of SERVQUAL was used to guide the assessment of the validity of SERVQUAL for measuring cloud computing based technology service quality. To test for content validity, the original survey instrument was field tested with faculty members. The primary investigator conducted a pilot test at a local community college on 30 cloud computing based technology users to assess the semantic content and readability of the survey instrument. Problems or difficulties, such as ambiguity of wordings, misunderstanding of technical terms, were reported for further modification. Participants marked any item that seemed inappropriate or unclear for a survey of service quality in higher education. Validity of instrument was also partially established with Institutional Review Board (IRB) approval granted on August 30, 2013 (see Appendix B).

The reliability of each of the SERVQUAL's dimensions was assessed using Cronbach (1951)'s alpha. The survey was also pre-tested for its reliability (Nunnally & Bernstein, 1994; Straub, 1989). Reliability in this context is the extent to which a measurement procedure is free from error. All measurement procedures contain some degree of error that causes inconsistencies when attempting to replicate a survey. Reliability of the survey instrument was established via a test-retest sequence. The test-retest approach is one of the simplest experimental designs wherein

subjects are measured in terms of a dependent variable (the test) and later exposed to a stimulus representing an independent variable (the retest). The differences noted between the first and the second tests are then attributed to the independent variable. The expected outcome of this particular test-retest sequence is that there should be little or no significant difference between the results of Test 1 and Test 2 (Babbie, 2003).

Data Collection Procedures

Specific Procedures Employed

This study targeted instructors or faculty members with sufficient experience using cloud computing technology in two-year colleges in the State of Texas. The initial data collection process consisted of the following:

1. Receiving Institutional Review Board (IRB) approval.

    The appropriate materials, such as survey instrument, procedures used in data collection, and reporting procedures were submitted to the target university's Institutional Review Board (IRB) on August 7, 2013 seeking approval to conduct the survey before any data is collected. IRB approval was received on August 30, 2013. (See Appendix B: IRB Approval Letter).

2. Conducted a field/pilot test at a local community college on 30 cloud computing based technology users to assess the semantic content and readability of the survey instrument.

    As recommended by Nunnally and Bernstein (1994), Straub (1989), and Cook and Campbell (1979), peer review and/or field trials established the face and content validity of the survey instrument. Peer reviews and/or field trials to establish validity

are appropriate because the survey items represent a defined domain of content and logical validity (Messick, 1998). An online pilot test to evaluate the face and content validity of the instrument was completed on May 30, 2014 with a follow-up on June 5, 2014. In accordance with the structure suggested by Yun and Ulrich (2002), the pilot/field trials were conducted using thirty (30) instructors in a two-year community college who have used cloud computing technology. The purpose of the online pilot trials was to determine the ease of delivering and accessing the survey and if respondents would have difficulty with survey item comprehension and/or the format of the survey instrument.

For the online pilot/field trials, SurveyMonkey links with cover letters were emailed to the thirty instructors. The stated objectives of the pilot/field trials were to answer the following questions:

- Is access to the survey with less difficulty?

- Is the content of the survey appropriate for the audience?

- Are the survey items clear?

- Do the instructions make sense?

- Are any of the survey items intrusive, invasive, potentially embarrassing, or of a sensitive nature?

- Any other comments?

Two of the instructors made suggestions to help clarify the survey instructions. The redundant survey items were removed from the survey instrument and the suggested improvements to the instructions were incorporated into the instruments. Problems or

difficulties, such as ambiguity of wordings, misunderstanding of technical terms, were also reported and modified.

3. Refinement of the instrument.

    The improved version of the survey instrument was submitted to thirteen (13) panel participants that were selected and advisory dissertation committee members for feedbacks. Subsequent meeting with the thirteen panel participants supported the ease of access and clarity of the questions and instructions.

4. Final Approval

    The final version of the survey instrument was resubmitted to the chair for approval before distribution to the participants. The survey instrument, as refined upon recommendations of the panel and approval from the chair is found in Appendix A.

Once the instrumentation plan was completed, the actual study started with the collection of data. But before administering the survey, subjects' recruitment was the first to occur. Subject recruitment and data collection processes consisted of the following:

- o A listing of seven large community colleges in Texas that have implemented cloud computing technologies was obtained from Texas Community College Teachers Association (TCCTA) web site and TCCTA representative. Utilizing this list, campus representative for each college selected was contacted to help identify contact information for an authorized person (or Gatekeeper or IRB director) that will provide approval for a survey. All colleges responded and provided IRB contacts.

- o Request for approval to contact faculty letter/email was sent to each of the college's Institutional Review Board (IRB) (see Appendix C) along with two attachments – Adult Informed Consent (see Appendix F) and the Retention, Storage and Destruction

of Human Subjects Research Records (see Appendix G). Five (5) IRB

directors/assistants responded and provided forms and the procedures for obtaining

IRB approval. Two (2) colleges did not respond even with a follow-up letter. Of the

five that responded, two colleges requested for additional information from my chair

and the remaining three reported that I must obtain Notice of Intent to Conduct

Research (NOI) signatures from the presidents of each college in their system as a

requirement for IRB approval. In other words, all colleges in their system must

provide approval in order to obtain an IRB approval. Following several requests,

follow-ups, and even visits to the respective colleges, permissions to contact faculty

were granted from three main college systems consisting of nineteen (19) semi-

independent colleges. The colleges systems include: Dallas County Community

College District include: Brookhaven, Cedar Valley, El Centro, Mountain View,

Northlake, and Richland colleges; Houston Community College (HCC) System

include: HCC-Central, HCC-Coleman, HCC-District, HCC-Northeast, HCC-

Northwest, HCC-Southeast, HCC-Southwest campuses; and Lone Star College

System include: North Harris, Tomball, Montgomery, Cy-Fair, Kingwood, and

University Park campuses.

o Using the "Random Numbers Generator" – a feature of the SPSS statistical package -
  a random sample of 470 participants (or faculty members) was obtained from the
  target population.

o The sample obtained were contacted via emails, which contained a link to an online
  survey hosted by SurveyMonkey.com (see Appendix D), to participate in the Survey.

o Following a reasonable time period, follow-ups emails were sent to those that have not responded (See Appendix E – Reminder or Follow-up email).

The current study used one method or technique to collect the data – online survey. This online survey was by SurveyMonkey.com - a secure password-protected Web site. Harris (1995) supported this method of data collection for situations where the research interest is in evaluating factual information about a particular situation. This survey approach is also recommended by Gutierrez (2000) for gathering a large amount of data from multiple organizations; testing the SERVQUAL instrument; determining individual differences in respondents; revealing a large number of uncontrolled variables that are interacting unpredictably; and collecting a wide range of variables and characteristics. It was appropriate for this study, which measured service quality of academic cloud computing technology of large organizations

Data collection was based on the original SERVQUAL instrument through distributing 470 surveys to randomly selected faculty members from three large community colleges in Texas that have exposure to cloud computing technology. An email invitation was sent with a link to the online survey asking the subject to participate in the study. To begin the survey, the participant clicks on the hyperlink contained in the email or copy/paste the uniform resource locator (URL) on a browser's address bar that displays the secure web site. The site requested for a username and password, which was included in the email invitation. The first page contained the consent to the survey, where the participant clicked on "Agree" button in order to start the survey. The participant clicked on either the "Agree" button to begin the survey or "Esc" button at any time to exit the survey. Measures were articulated to prevent participants from taking the survey more than once.

The survey did not require personally identifying information. Anonymity was guaranteed by instructing participants to avoid placing their name, return address, or any identifying information on the survey. In most studies, the conclusion of the study required data that are not tainted or distorted. For this reason, strict controls over all data collected were maintained by not sharing the responses from any participants. Once the data was collected and downloaded, a Likert-scale type result spreadsheets/database of the survey instruments was generated (see Appendix A).

The rationale for using this type of technique for the current study, was because a Likert scale/database was generally used and common in survey research. Likert scales are recognized as summated-rating or additive scales because the score is generated by adding the number of responses provided (Neuman, 2003). The data collected from parts (A) and (B) of the survey instrument required a scoring system to be developed. Scoring required the assignment of numeric score to each response category for each question (Creswell, 2005). The demographic data (Part C) included the sample population responses to questions pertaining to the faculty, such as age, gender, income, and highest qualifications (see Appendix A). The current study generated descriptive statistics. Descriptive statistics identify trends, variance, range, and standard deviation for the data collected for a variable (Creswell, 2005). The quality and the collection of the data must be consistent. Each participant was given equal time and opportunity to respond to all questions without any undue pressure or persuasion.

In addition to informing the participants of the purpose of the current study, the instructions informed the participants that their participation would be voluntary. The consent of the participant was acknowledged when he or she completed the survey. If a participant did not

complete a survey, the data from that particular survey was not included in the analysis. No face-to-face interviews was conducted, collected, or analyzed in this current study.

The data collection process was appropriate for the research design and problem for the current study because the process needed to involve five interrelated steps: (1) select participants, (2) obtain permission, (3) decide what type or types of data to collect, (4) locate, modify, or develop instruments, and (5) actually collecting the data (Creswell, 2005). The data collected from the participants meeting the current study eligibility requirements was stored on the computer in a locked office for the duration of the study and for a period of 3 years after the study. The completed survey results will be stored in the IBM Statistical Package for the Social Sciences (SPSS) v22 database. The Excel file will be located on a password protected computer which will be stored in the office. After completion of the data collection and entry of the data, the data analyses were conducted by using the data analysis tools found in the IBM's SPSS software. Upon completion of the research, the data shall remain in a secured computer file for 3 years. The data will be scheduled for destruction by spring of 2017, at the end of the archival period by DISKKeeper, software that is used to destroy confidential data.

Data Organization

A codebook was built for this study describing each independent, dependent and other variables used in the data analysis. The responses to the variables were entered into the statistical applications software package - Mplus version7.3 and IBM Statistical Package for the Social Sciences (SPSS) v22 – used for analysis.

Data Analysis Methods

According to Marshall and Rossman (1995), "Data analysis is the process of bringing order, structure, and meaning to the mass of collected data. It is a messy, ambiguous, time-

consuming, creative, and fascinating process" (p.111). The survey responses from 301

participants were analyzed using a mixture of statistical approaches in an effort to provide order,

structure, and meaning to the survey data collected.

Data was scanned for univariate and multivariate outliers, defined as values that are

greater than 3.29 standard deviations from the mean (Stevens, 2009). Three participants were

removed for being multivariate outliers. Another 46 participants were removed from the data

collected for not completing major sections of the survey. A random sample of 470 potential

participants was selected. From those, 301 participants (64%) took part in the study. Data

analysis was conducted on 252 participants (54%) after removing sixteen (16%) percent of those

responses that were incomplete or unusable.

The statistical data were analyzed using descriptive statistics (frequencies and

percentages, mean, standard deviation, skewness, and kurtosis) and inferential statistics (shared

covariance, structural equation modeling (SEM), and ANCOVAs). Descriptive research answers

the questions of who, what, where, when, and how; however, it is not used to create a causal

relationship, where one variable affects another (Gay, 1992). One frequently used form of

descriptive research involves assessing attitudes or opinions toward individuals, organizations,

events, or procedures (Gay, 1992). Inferential statistics is used to make inferences concerning

some unknown aspect of a population from a small random sample drawn from it.
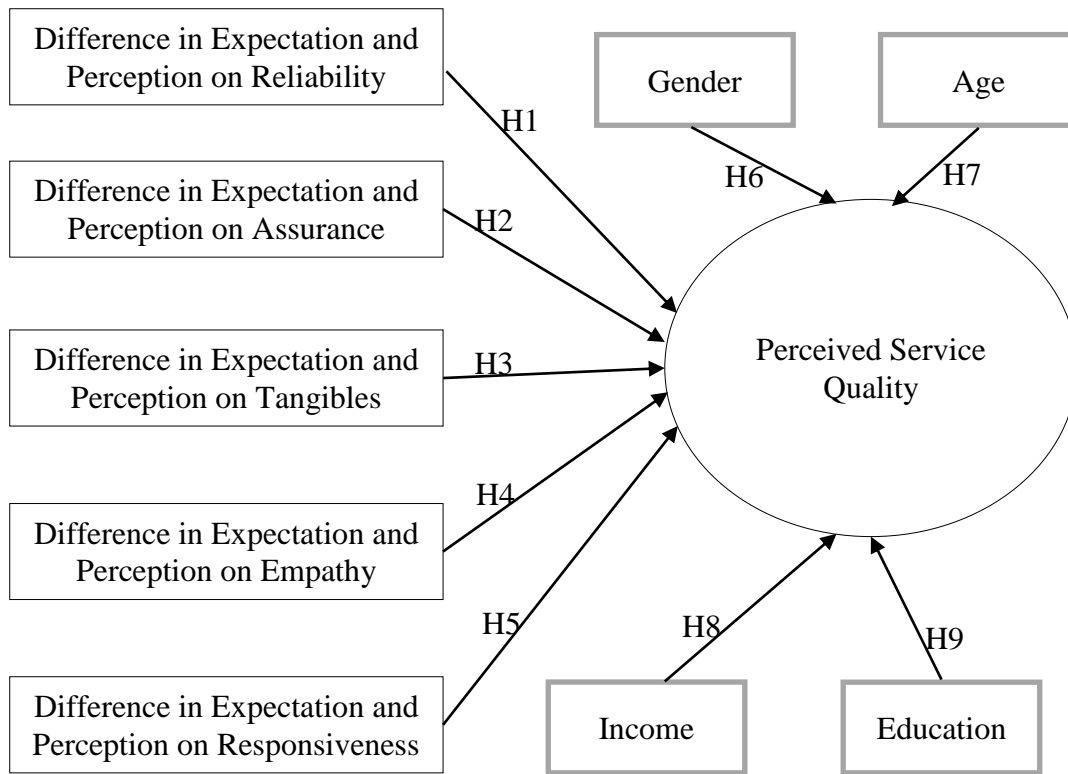
Figure 3. Empirical model being tested in MPlus and SPSS

Prior to assessing the research questions, the model fit of the empirical model (Figure 3) was examined through structural equation modeling (SEM) for goodness-of-fit. To have a good model fit, the model should have a non-significant χ^2 statistic. However, since the χ^2 statistic can be unreliable for larger sample sizes, additional fit indices were also examined for to determine model fit (Kline, 2005). The comparative fit index (CFI) should be above 0.90. The root mean square error of approximation (RMSEA) should be below 0.10. Due to poor model fit, $\chi^2(5) = 32.36$, $p < .001$, CFI = .94, TLI = .88, RMSEA = .15, modification indices were examined to assess how the model can be improved empirically. Modification indices provided ways to empirically improve the model. If the changes make theoretical sense, then the modification indices was tracked to improve the model to fulfill the requirements for a good model fit (Kline,

2011). In MPlus, the statistical program used for the analysis, the items were set in formative

model. Within the formative model, it specifies that the items are not necessarily correlated with

one another. This is the case with these survey variables, where the correlations are all below .30

for most of the pairs of variables (Freeze & Raschke, 2007).

The analysis of the data was reported using the research questions as a foundation.

The analysis plan of hypothesis testing is shown in Table 1. The data was analyzed in relation to

each research question as follows:

1. To examine research question one and the five hypotheses, the structural equation

    modeling (SEM) (a confirmatory factor analysis – CFA) conducted in MPlus for

    perceived quality of service was examined. Perceived quality of service is not a measured

    construct, and thus regression analysis is not possible. Perceived quality of service is a

    first order latent variable made up of the differences between expectation and perception

    of reliability, assurance, tangibles, empathy, and responsiveness. Standardized path

    weights from the model were examined for significance using a z test. These standardized

    paths represent the strength of the factor loading for perceived service quality by each of

    the difference scores. If the item significantly loads onto perceived service quality, then

    that null hypothesis will be rejected.

2. To assess research questions 2a – 2d and four hypotheses, ANCOVAs were conducted.

    ANCOVAs were used to examine the influence of the four independent variables (i.e.,

    age, gender, income, level of education) on the dependent variable, the instructors'

    perceived overall service quality (PSQ) when controlling the difference between

    expectation and perception of reliability (DRL), assurance (DAS), tangibles (DTN),

    empathy (DEM), and responsiveness (DRS). The independent variables, such as

education and income, were divided into "low" and "high" responses based on a median split. The five controlling differences used in the ANCOVAs were: expectation-perception differences in tangibles, reliability, responsiveness, assurance, and empathy. One ANCOVA was conducted for each demographic variable.

Table 1

Analysis Plan of Hypothesis Testing

Number	Hypothesis	Statistical Test
RQ1: Do the difference between instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems?		
H_01	The difference between expectation and perception of reliability will not significantly load onto perceived service quality of cloud computing based systems.	SEM & z-test
H_02	The difference between expectation and perception of assurance will not significantly load onto perceived service quality of cloud computing based systems.	SEM & z-test
H_03	The difference between expectation and perception of tangibles will not significantly load onto perceived service quality of cloud computing based systems.	SEM & z-test
H_04	The difference between expectation and perception of empathy will not significantly load onto perceived service quality of cloud computing based systems.	SEM & z-test
H_05	The difference between expectation and perception of responsiveness will not significantly load onto perceived service quality of cloud computing based systems.	SEM & z-test

RQ2a: Is there a difference in instructors' perceived service quality by gender when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2b: Is there a difference in instructors' perceived service quality by age when controlling the difference between expectation and perception of reliability, assurance, tangibles,

empathy, and responsiveness differences?

RQ2c: Is there a difference in instructors' perceived service quality by income when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2d: Is there a difference in instructors' perceived service quality by level of education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

H_06	Instructors' perceived service quality will not differ by gender among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	ANCOVA
H_07	Instructors' perceived service quality will not differ by age among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	ANCOVA
H_08	Instructors' perceived service quality will not differ by income among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	ANCOVA
H_09	Instructors' perceived service quality will not differ by level of education among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	ANCOVA

Summary

This chapter provided descriptions of the research design, population and sample, instrument, data collection procedures, data organization and the data analysis methods to be

used in the study to answer the research questions. The next section of the study will offer an

objective description and analysis of the findings, results or outcomes of the research.

Chapter 4

Results

Introduction

This chapter reports responses, data analysis, and discussion of the research questions. The main purpose of this study was to measure service quality of academic cloud computing technology of large community colleges in the State of Texas from instructors' perspectives and to determine cloud computing based systems' own performance towards meeting academic institution's expectations. The study also provided a better understanding of faculty needs that may help implement new programs so that purpose and missions of the higher education institutions can be served.

Descriptive Analysis

For hypothesis testing and descriptive statistics, Mplus version7.3 and the IBM Statistical Package for the Social Sciences (SPSS) v22 software data analysis application were used to analyze the data and generate reports. Each of the five hypotheses for research question one and four of research questions 2a – 2d was tested using the appropriate statistical hypothesis testing (see Table 1 above).

Data were collected on a total of 301 participants. Of those participants, 46 were removed for not completing major sections of the survey (i.e., quit the survey early). Composite scores for the difference in expectation and perception on reliability (DRL), assurance (DAS), tangibles (DTN), empathy (DEM) and responsiveness (DRS) were created by taking the differences between the expectation of reliability (ERL), assurance (EAS), tangibles (ETN), empathy (EEM), and responsiveness (ERS) with the perceptions of reliability (PRL), assurance (PAS), tangibles (PTN), empathy (PEM) and responsiveness (PRS) respectively. Univariate outliers,

defined as values that are greater than 3.29 standard deviations from the mean, were examined

for and removed from each of the difference variables. Two individual scores (not the

participants) were removed from DTN, four removed from DRL, one removed from DRS, and

four removed from DAS. Multivariate outliers were assessed for by examining Mahalanobis

Distances created from the five difference variables along with the demographics that were used

in the structural equation modeling (age, education, income, and gender). A critical value of $\chi^2(9)$

= 27.88 at p = .001 was used to identify multivariate outliers (Tabachnick & Fidell, 2012). Three

participants were found to be multivariate outliers and were removed. Thus, data analysis

proceeded with 252 participants.

Many of the participants were from the Dallas County Community College District

(DCCCD; 113, 45%) or the Houston Community College System (HCC; 82, 33%). The age

range of the participants spanned primarily from 30 to 69 years old. Many of the participants had

an income between $51,000 and $70,000 per year (84, 33%). The majority of the participants

had a Master's Degree (163, 64%) and worked as an adjunct faculty/part-time (147, 58%).

Frequencies and percentages for participant demographics are presented in Table 2.

Table 2

Frequencies and Percentages for Participant Demographics

Demographic	n	%
Institution		
Dallas Count Community College District (DCCCD)	113	45
Houston Community College System (HCC)	82	33
Lone Star College System (LSCS)	57	23
Gender		
Female	144	57
Male	108	43
Age		
20-29	7	3

30-39	43	17
40-49	62	25
50-59	72	29
60-69	54	21
70+	14	6
Income		
Below $30,000	38	15
Between $31,000 to $50,000	44	17
Between $51,000 to $70,000	84	33
Between $71,000 to $90,000	37	15
Between $91,000 to $110,000	21	8
$111,000 and above	28	11
Academic Discipline		
Business	22	9
Education	28	11
Engineering	5	2
English	47	19
Math	26	10
Other	61	24
Science	37	15
Technology	26	10
Education		
Associate Degree	3	1
Bachelor's Degree	13	5
Master's Degree	163	64
Doctorate Degree (Ph.D. or Ed.D.)	63	25
Professional degree (MD, DDS)	10	4
Academic rank		
Adjunct faculty/part time	147	58
Full-time faculty	101	40
Other	4	2

Descriptive statistics were conducted on each of the difference scores to check for normality. Normality was defined as having a skew that is less than ±2.00 and a kurtosis of less than ±7.00 (Kline, 2011). Among the difference scores, skew ranged from 0.13 to 1.37, meeting the assumption. Kurtosis ranged from 1.05 to 2.07, also meeting the assumption. Thus normality was met for all five of the differences scores. Table 3 presents the descriptive statistics for the expected, perceived, and differences scores.

Table 3

Descriptive Statistics for Expected, Perceived, and Difference Scores

Score	Min	Max	*M*	*SD*	Skewness	Kurtosis
Expected (E)						
ETN	1.00	7.00	5.27	1.00	-1.03	1.87
ERL	1.00	7.00	5.83	1.37	-1.17	0.86
ERS	1.00	7.00	5.71	1.42	-0.98	0.17
EAS	1.00	7.00	5.71	1.27	-1.29	1.68
EEM	1.00	7.00	5.74	1.33	-1.11	1.09
Perceived (P)						
PTN	1.00	7.00	5.09	1.09	-0.42	0.37
PRL	1.00	7.00	5.69	1.35	-0.89	0.32
PRS	1.00	7.00	5.37	1.47	-0.60	-0.20
PAS	1.00	7.00	5.39	1.40	-0.84	0.51
PEM	1.00	7.00	5.32	1.42	-0.49	-0.23
Difference (E – P)						
DTN	-2.43	2.29	0.15	0.76	0.13	1.05
DRL	-2.25	3.00	0.08	0.81	0.43	1.93
DRS	-2.00	3.40	0.33	0.95	1.37	1.96
DAS	-2.33	3.17	0.33	0.82	1.18	2.07
DEM	-3.00	3.80	0.42	1.04	0.82	1.60

Discussion of Research Questions

This study employed quantitative analysis techniques to examine two research questions. The questions are presented with a summary of results and relevant supporting tables for each question.

Research Question One

RQ1: Do the difference between instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems?

$H_0 1$: The difference between expectation and perception of reliability will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 1$: The difference between expectation and perception of reliability will significantly load onto perceived service quality of cloud computing based systems.

$H_0 2$: The difference between expectation and perception of assurance will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 2$: The difference between expectation and perception of assurance will significantly load onto perceived service quality of cloud computing based systems.

$H_0 3$: The difference between expectation and perception of tangibles will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 3$: The difference between expectation and perception of tangibles will significantly load onto perceived service quality of cloud computing based systems.

$H_0 4$: The difference between expectation and perception of empathy will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 4$: The difference between expectation and perception of empathy will significantly load onto perceived service quality of cloud computing based systems.

$H_0 5$: The difference between expectation and perception of responsiveness will not significantly load onto perceived service quality of cloud computing based systems.

$H_a 5$: The difference between expectation and perception of responsiveness will significantly load onto perceived service quality of cloud computing based systems.

In order to address research question 1 and hypotheses $1 - 5$, structural equation model (a confirmatory factor analysis (CFA)) was conducted to assess if the DTN, DRL, DRS, DAS, and DEM variables loaded onto the single perceived service quality (PSQ) latent construct. The data

was entered into MPlus for analysis. A good model fit was defined as having a CFI and TLI greater than or equal to .90 and an RMSEA less than or equal to .10. A non-significant chi square statistic is preferred, but not necessary (Kline, 2011). The results of the original CFA tested showed a poor model fit for the data, $\chi^2(5) = 32.36$, $p < .001$, CFI = .94, TLI = .88, RMSEA = .15. (The actual p-value in this case is several decimals less than .001). Modification indices were examined for ways to improve the model fit empirically. A shared covariance was added between DEM and DAS. By adding in the additional model constraint, the results provided a good model fit for the data, $\chi^2(4) = 15.01$, $p = .004$, CFI = .98, TLI = .94, RMSEA = .10. Because the good model fit was found, the individual factor loadings for each of the variables was examined in order to address the research questions. The standardized estimates for the factor loadings were examined to determine the significance of each indicator. All indicator variables had a p value that was less than .001, thus showing significance. Because significance was found for each of the variables, null hypotheses $1 - 5$ can all be rejected in favor of the alternative hypotheses. Table 4 presents the results of the confirmatory factor analysis. Table 5 presents model fit information for the original and modified models. Figure 4 also presents the model with indications of the paths.

Table 4

Parameter Estimates for PSQ CFA Model

Variable	Unstandardized estimate	Standard error	Standardized estimate	p
DTN	1.00	-	.51	-
DRL	1.14	0.18	.54	$< .001$
DRS	2.31	0.30	.95	$< .001$

DAS	1.45	0.20	.68	< .001
DEM	1.90	0.25	.71	< .001
DEM with DAS	.15	0.04	.34	< .001

Note. Model: $\chi^2(4) = 15.01$, $p = .004$, CFI = .98, TLI = .94, RMSEA = .10.

Table 5

Model Fit Statistics for Original and Modified Models

Model	χ^2	*df*	*p*	CFI	TLI	RMSEA
Original	32.36	5	.001	.94	.88	.15
Modified	15.01	4	.004	.98	.94	.10
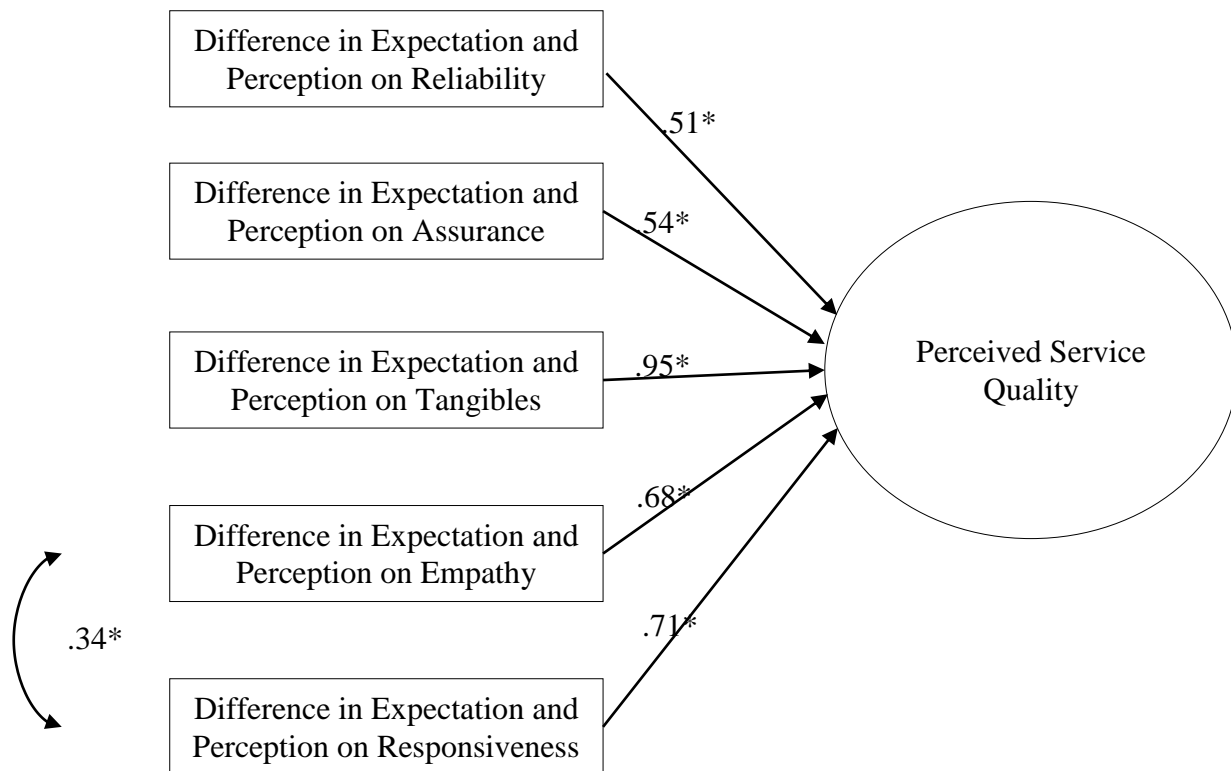
Figure 4. SEM (CFA) Results for PSQ

Research Question Two

RQ2a: Is there a difference in instructors' perceived service quality by gender when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2b: Is there a difference in instructors' perceived service quality by age when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2c: Is there a difference in instructors' perceived service quality by income when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2d: Is there a difference in instructors' perceived service quality by level of education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

$H_0 6$: Instructors' perceived service quality will not differ by gender among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_a 6$: Instructors' perceived service quality will differ by gender among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_0 7$: Instructors' perceived service quality will not differ by age among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_a 7$: Instructors' perceived service quality will differ by age among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_0 8$: Instructors' perceived service quality will not differ by income among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

$H_a 8$: Instructors' perceived service quality will differ by income among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

H_09: Instructors' perceived service quality will not differ by level of education among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

H_a9: Instructors' perceived service quality will differ by level of education among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.

In order to address research question 2, ANCOVAs were conducted to assess if gender, age, income, and education exhibited significant differences in PSQ when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Gender was coded as 0 = female, 1 = male. Age was coded as 0 = 49 and younger, 1 = 50 and older. Education was coded as 0 = Master's or below, 1 = Doctoral degree. Income was coded as 0 = $70,000 or less, 1 = $71,000 or more. These four variables were used in each ANCOVA as independent variables to determine if PSQ differed based upon each when controlling the difference between expectation and perception of DTN, DRL, DRS, DAS, and DEM differences.

ANCOVA

An analysis of covariance (ANCOVA) was conducted to assess if there were differences in perceived service quality by gender when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Prior to analysis, the assumption of normality was assessed with a Shapiro-Wilk test. The results of the test were significant, $p < .001$, violating the assumption. In many cases, the ANCOVA is considered a robust statistic in which assumptions can be violated with relatively minor effects (Howell, 2010). The assumption of equality of variance was assessed with Levene's test. Results

of the test were not significant, $p = .722$, indicating the assumption was met. The results of the

ANCOVA were significant for gender, $F(1, 242) = 3.90$, $p = .050$, partial $\eta^2 = .02$, suggesting

that there was a difference in perceived service quality by gender when controlling the difference

between expectation and perception of reliability, assurance, tangibles, empathy, and

responsiveness differences. Partial eta squared (η^2) represents the estimates of effect size – that

is, an estimate of the magnitude of effect that is relatively independent of sample size (Levine &

Hullett, 2002). The partial eta squared value of .02 indicates that 2% of the total variability in the

dependent variable (PSQ) is accounted for by variation in gender. Results indicated that females

have a higher perceived service quality ($M = 5.10$, $SD = 1.37$) relative to males ($M = 4.89$, $SD =$

1.31) when controlling the difference between expectation and perception of reliability,

assurance, tangibles, empathy, and responsiveness differences. Results of the ANCOVA are

presented in Table 6. Means and standard deviations are presented in Table 7.

Table 6

Results of ANCOVA for Perceived Service Quality by Gender when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences

Source	SS	df	MS	F	p	Partial η^2
Gender	6.48	1	6.48	3.90	.050	.02
Tangibles	4.34	1	4.34	2.61	.107	.01
Reliability	12.48	1	12.48	7.51	.007	.03
Responsiveness	1.95	1	1.95	1.17	.280	.01
Assurance	7.00	1	7.00	4.21	.041	.02
Empathy	168	1	1.68	1.01	.316	.00
Error	392.25	236	1.66			

Table 7

Means and Standard Deviations for Perceived Service Quality by Gender

Gender	Adj. M	SD	n
Females	5.10	1.37	139
Males	4.89	1.31	104

Note. When controlling for the difference between expectation and perception used in the above analysis, any participants not indicating levels of tangibles, reliability, responsiveness, assurance, or empathy were excluded from the analysis. This explains the different values from the demographic descriptive statistics given in Table 2

An analysis of covariance (ANCOVA) was conducted to assess if there were differences in perceived service quality by age when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Prior to analysis, the assumption of normality was assessed with a Shapiro-Wilk test. The results of the test were significant, $p < .001$, violating the assumption. In many cases, the ANCOVA is considered a robust statistic in which assumptions can be violated with relatively minor effects (Howell, 2010). The assumption of equality of variance was assessed with Levene's test. Results of the test were not significant, $p = .219$, indicating the assumption was met. The results of the ANCOVA were not significant for age, $F(1, 242) = 0.01$, $p = .942$, partial $\eta^2 = .00$, suggesting that there was not a difference in perceived service quality by age when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Partial eta squared (η^2) represents the estimates of effect size – that is, an estimate of the magnitude of effect that is relatively independent of sample size (Levine & Hullett, 2002). The partial eta squared value of .00 indicates that 0% of the total variability in the dependent variable (PSQ) is accounted for by variation in age - the effect size is 0. Results of the ANCOVA are presented in Table 8. Means and standard deviations are presented in Table 9.

Table 8

Results of ANCOVA for Perceived Service Quality by Age when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences

Source	SS	df	MS	F	p	Partial η^2
Age	0.01	1	0.01	0.01	.942	.00
Tangibles	4.04	1	4.04	2.39	.123	.01
Reliability	12.52	1	12.52	7.41	.007	.03
Responsiveness	1.62	1	1.62	0.96	.329	.00
Assurance	6.58	1	6.58	3.89	.050	.02
Empathy	1.35	1	1.35	0.80	.373	.00
Error	398.72	236	1.69			

Table 9

Means and Standard Deviations for Perceived Service Quality by Age

Age	Adj. M	SD	n
0-49 years old	4.99	1.27	107
50 years and above	5.03	1.41	136

An analysis of covariance (ANCOVA) was conducted to assess if there were differences in perceived service quality by income when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Prior to analysis, the assumption of normality was assessed with a Shapiro-Wilk test. The results of the test were significant, $p < .001$, violating the assumption. In many cases, the ANCOVA is considered a robust statistic in which assumptions can be violated with relatively minor effects (Howell, 2010). The assumption of equality of variance was assessed with Levene's test. Results of the test were not significant, $p = .724$, indicating the assumption was met. The results of the ANCOVA were not significant for income, $F(1, 236) = 0.15$, $p = .697$, partial $\eta^2 = .00$,

suggesting that there was not a difference in perceived service quality by income when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Partial eta squared (η^2) represents the estimates of effect size – that is, an estimate of the magnitude of effect that is relatively independent of sample size (Levine & Hullett, 2002). The partial eta squared value of .00 indicates that 0% of the total variability in the dependent variable (PSQ) is accounted for by variation in income - an effect size of 0. Results of the ANCOVA are presented in Table 10. Means and standard deviations are presented in Table 11.

Table 10

Results of ANCOVA for Perceived Service Quality by Income when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences

Source	SS	df	MS	F	p	Partial η^2
Income	0.26	1	0.26	0.15	.697	.00
Tangibles	4.02	1	4.02	2.38	.124	.01
Reliability	12.55	1	12.55	7.43	.007	.03
Responsiveness	1.53	1	1.53	0.91	.342	.00
Assurance	6.67	1	6.67	3.95	.048	.02
Empathy	1.38	1	1.38	0.82	.367	.00
Error	398.47	236	1.69			

Table 11

Means and Standard Deviations for Perceived Service Quality by Income

Income	Adj. M	SD	n
0-$70,000	4.99	1.36	160
$71,000 and above	5.06	1.33	83

An analysis of covariance (ANCOVA) was conducted to assess if there were differences in perceived service quality by education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Prior to analysis, the assumption of normality was assessed with a Shapiro-Wilk test. The results of the test were significant, $p < .001$, violating the assumption. In many cases, the ANCOVA is considered a robust statistic in which assumptions can be violated with relatively minor effects (Howell, 2010). The assumption of equality of variance was assessed with Levene's test. Results of the test were not significant, $p = .780$, indicating the assumption was met. The results of the ANCOVA were not significant for education, $F(1, 236) = 3.67$, $p = .057$, partial $\eta^2 = .02$, suggesting that there was not a difference in perceived service quality by education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. Partial eta squared (η^2) represents the estimates of effect size – that is, an estimate of the magnitude of effect that is relatively independent of sample size (Levine & Hullett, 2002). The partial eta squared value of .02 indicates that 2% of the total variability in the dependent variable (PSQ) is accounted for by variation in the level of education. While descriptively, those with a Master's education or below were rating perceived service quality higher ($M = 5.14$, $SD = 1.32$) than those with a doctoral or professional degree ($M = 4.68$, $SD = 1.37$), these were not statistically significant differences as indicated by the ANCOVA. Results of the ANCOVA are presented in Table 12. Means and standard deviations are presented in Table 13.

Table 12

Results of ANCOVA for Perceived Service Quality by Education when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences

Source	SS	df	MS	F	p	Partial η^2
Education	6.10	1	6.10	3.67	.057	.02
Tangibles	4.08	1	4.08	2.45	.119	.01
Reliability	11.02	1	11.02	6.63	.011	.03
Responsiveness	1.34	1	1.34	0.81	.370	.00
Assurance	7.27	1	7.27	4.37	.038	.02
Empathy	0.69	1	0.69	0.41	.522	.00
Error	393.63	236	1.66			

Table 13

Means and Standard Deviations for Perceived Service Quality by Education

Education	Adj. M	SD	n
Master's or below	5.14	1.32	174
Doctoral or Professional Degree	4.68	1.37	69

Summary of Results

Research questions 1 and hypotheses 1 – 5 were examined through conducting a structural equation modeling (SEM) (a confirmatory factor analysis (CFA)). The differences between perceived and expected values of reliability, assurance, tangibles, empathy, and responsiveness were loaded onto the latent construct of perceived service quality. The results of the CFA, after making a slight modification to the model, presented a good model fit for the data. All of the difference variables (reliability, assurance, tangibles, empathy, and responsiveness)

significantly loaded onto the perceived service quality construct. As such, null hypotheses 1 – 5 were all rejected in favor of their alternative hypotheses.

Research questions 2a – 2d and hypotheses 6 – 9 were examined through conducting multiple ANCOVAs. Differences in the perceived service quality construct were examined for by gender, age, income, and education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences. The results of the ANCOVAs showed no significant effects was found for age, $F(1, 242) = 0.01$, $p = .942$, or for income, $F(1, 236) = 0.15$, $p = .697$ or for education, $F(1, 236) = 3.67$, $p = .057$. This means that the null hypotheses for age, income and level of education should be accepted, and we fail to reject. But there were significant differences in perceived service quality by gender. Female participants tended to have significantly higher perceived service quality compared to male participants.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Introduction

The purpose of this study was to measure service quality of academic cloud computing technology of large community colleges in the State of Texas from instructors' perspectives and to determine cloud computing based systems' own performance towards meeting academic institution's expectations. In addition, the study also examined whether instructors' perceived service quality (or satisfaction) varies based on selected demographic characteristics. This chapter presents an analysis and interpretation of the study findings in relation to the two research questions and nine hypotheses, discusses the implications and offers ideas for additional research.

Discussion of Research Findings

Using quantitative research analysis techniques, this study addressed two research questions. Each research question is presented, followed by a discussion of the findings.

Research Question One

The first question was "Do the difference between instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems?" Five hypotheses were used to answer this research question. Table 14 below shows the hypotheses' testing results. The service quality expectations and perceptions on each of five dimensions listed in the 'Faculty Survey Instrument' were used to investigate this question. The standardized estimates for the factor loadings were examined to determine the significance of each indicator. All indicator variables had a *p* value that was less than .001, thus showing significance. Because

significance was found for each of the variables, null hypotheses 1 – 5 can all be rejected in favor of the alternative hypotheses. The difference between expectation and perceived reliability, responsiveness, assurance, tangible, and empathy did significantly load onto perceived service quality. These findings indicate that the cloud computing provider's communication materials and/or suitable infrastructure; dependability; prompt services; trust and confidence; and individualized attention to their customers are important factors impacting instructors' perceived service quality (or satisfaction).

Table 14

Hypotheses' Testing Results

Number	Hypothesis	Result
RQ1: Do the difference between instructors' perception and expectation significantly affect their perceived service quality of cloud computing based systems?		
$H_0 1$	The difference between expectation and perception of reliability will not significantly load onto perceived service quality of cloud computing based systems.	Rejected
$H_0 2$	The difference between expectation and perception of assurance will not significantly load onto perceived service quality of cloud computing based systems.	Rejected
$H_0 3$	The difference between expectation and perception of tangibles will not significantly load onto perceived service quality of cloud computing based systems.	Rejected
$H_0 4$	The difference between expectation and perception of empathy will not significantly load onto perceived service quality of cloud computing based systems.	Rejected
$H_0 5$	The difference between expectation and perception of responsiveness will not significantly load onto perceived service quality of cloud computing based systems.	Rejected
RQ2a: Is there a difference in instructors' perceived service quality by gender when controlling the difference between expectation and perception of reliability, assurance,		

tangibles, empathy, and responsiveness differences?

RQ2b: Is there a difference in instructors' perceived service quality by age when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2c: Is there a difference in instructors' perceived service quality by income when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

RQ2d: Is there a difference in instructors' perceived service quality by level of education when controlling the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences?

H_06	Instructors' perceived service quality will not differ by gender among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	Rejected
H_07	Instructors' perceived service quality will not differ by age among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	Accepted
H_08	Instructors' perceived service quality will not differ by income among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	Accepted
H_09	Instructors' perceived service quality will not differ by level of education among instructors when controlling for the difference between expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness differences.	Accepted

Research Question Two

The research questions 2a – 2d focused on "Is there a difference in instructors' perceived service quality by gender, age, income and education when controlling the difference between

expectation and perception of reliability, assurance, tangibles, empathy, and responsiveness

differences?" Four hypotheses were used to answer these research questions. Table 14 shows the

hypotheses' testing results. But in order to address research question 2, ANCOVAs were

conducted to assess if gender, age, income, and education exhibited significant differences in

PSQ when controlling for the difference between expectation and perception of tangibles (DTN),

reliability (DRL), responsiveness (DRS), assurance (DAS), and empathy (DEM) differences. The

service quality expectations and perceptions on each of five dimensions and demographics listed

in the Faculty Survey Instrument were used to investigate this question. Prior to analysis, the

assumptions of normality were assessed with Shapiro-Wilk tests. The results of these tests were

significant, $p < .001$, violating the assumptions. In many cases, the ANCOVA is considered a

robust statistic in which assumptions can be violated with relatively minor effects (Howell,

2010). The assumptions of equality of variance were assessed with Levene's test. Gender was a

significant predictor of PSQ, $F(1, 242) = 3.90$, $p = .050$, partial $\eta^2 = .02$, suggesting that females

have a higher perceived service quality ($M = 5.10$, $SD = 1.37$) relative to males ($M = 4.89$, $SD =$

1.31) when controlling for the difference between expectation and perception of reliability,

assurance, tangibles, empathy, and responsiveness differences. The results of the ANCOVAs

were not significant for age, income and level of education suggesting that there were not

differences in perceived service quality by age, income and education when controlling for the

difference between expectation and perception of reliability, assurance, tangibles, empathy, and

responsiveness differences. Results of the ANCOVAs are presented in Table 14. This finding

means that demographic variable, gender, is a significant predictor of the instructors' overall

perceived service quality. Searching for statistically significant differences between the factor of

age and the instructors' perceived overall service quality when controlling for the difference

between expectation and perception of tangibles, reliability, responsiveness, assurance, and empathy, it was also found that there was not a difference in perceived service quality by age. In other words, instructors' perceived service quality will not differ by age among instructors. Searching for statistically significant differences between the factor of income and the instructors' perceived overall service quality when controlling for the difference between expectation and perception of tangibles, reliability, responsiveness, assurance, and empathy, it was also found that there was not a difference in perceived service quality by income - instructors' perceived service quality did not differ by income among instructors. Finally, searching for statistically significant differences between the factor of education and the instructors' perceived overall service quality when controlling for the difference between expectation and perception of tangibles, reliability, responsiveness, assurance, and empathy, it was also found that there was not a difference in perceived service quality by the level of education. Instructors that had a Master's degree or below have same perceived service quality with those that have a doctoral or professional degree.

The findings of the measurement among the five dimensions of service quality identified some important implications. It provides a useful direction to key stakeholders of higher education to know that all the five dimensions of SERVQUAL (reliability, responsiveness, tangible, assurance, and empathy) are perceived as vital from the instructors' point of view in their use of cloud computing technology. The results of this study are similar to some of the studies reviewed in chapter 2 and others such as; Babakus and Boller, (1992); Cheng and Tam, (1997); Clewes, (2003); Guolla, (1999); Landrum, Prybutok, Zhang, and Peak, (2009); Markovic, (2005), Al-alak (2009). They are similar because most of the studies found a positive significant relationship between service quality dimensions and customers (students or

instructors)' satisfaction. Other studies that evaluated demographic variables, such as age, gender, education and income, found that some or all of these variables are significant predictors of the overall customers' perceived service quality (or satisfaction).

Recommendations and Implications

The findings of the study add some inputs to the body of knowledge related to technology-based initiatives in higher education sector in Texas. The study attempted to determine if there was any relationship between service quality and instructors' satisfaction. It provided information that may contribute to the understanding of service quality in higher education in Texas. From a theoretical perspective, the research has added to the literature dealing with instructors' satisfaction with cloud computing technology in educational settings. The research also contributes to the general service quality literature by studying the theoretical validity and empirical applicability of the SERVQUAL model.

The important role of measuring service quality in achieving instructors' satisfaction is often modest, misunderstood, or disregarded in higher education because the major focus has always been on students' customer. There is a need for administrators and key stakeholders to be held accountable for effectively meeting or exceeding instructors' service quality expectations. Instructors form perceptions of their service experience each time there is an introduction of any new technology-based initiatives in education. The results of these perceptions motivate the following implications and recommendations for this study.

There is a need for university leaders to take a decisive role in removing barriers to instructors' satisfaction by listening and responding to faculty expectations, continuously measuring their perceptions, implementing a customer-focused mission statement, rewarding

service oriented departments, and revising policies, practices, and procedures that interfere with satisfying faculty.

There is a requirement to eliminate unnecessarily burdensome or overtly bureaucratic policies, practices, and procedures with the cloud computing provider. Instructors' satisfaction will likely increase when they are presented with organizational flexibility, choices, and options in their use of the cloud computing products.

Instructors expect the cloud computing-based systems provider will be caring, give individualized attention and provides its customers confidence. As such, there is a need for the university's executive management team to liaise with faculty in their selection of a provider and continuous monitoring if they expect to satisfy these instructor needs. Playing "lip service" to serving faculty will not suffice, or lead to greater levels of satisfaction.

There is a need for cloud computing service providers to participate in service quality training that promotes friendly and caring service, problem solving, flexibility, and recovery from mistakes, which are critical elements to building instructor satisfaction and stemming defections to competitors.

There is a need to respond to instructor feedback. The simple act of surveying faculty opinions regarding their level of satisfaction with technology-oriented services and programs shows interest in this area. However, if key stakeholders of the college and other providers do not make improvements based on their feedback, it is likely instructor satisfaction will not improve.

The recommendations proposed for this study are based on the findings and conclusions of this study. The empirical evidence arrived at in this study attempted to measure service quality of academic cloud computing technology of large community colleges in the State of Texas from

instructors' perspectives and to determine cloud computing based systems' own performance towards meeting academic institution's expectations. It is recommended that organizations considering adopting new technologies should give serious attention to the perceived service quality of the customer – faculty and not just only students. In addition, not only organization needs empirical data to understand the level of customers' (instructors') satisfaction in any new technology but also the role of demographic variables in evaluating perceived service quality must be considered.

Limitations

The limitations for the study are due mainly to the design of the research and the problems that are typical in studying perceptions. These limitations include but not limited to the following:

The sample size limited the generalizability of the study because the findings were limited to instructors' point of view in their use of cloud computing technology at large community colleges in the State of Texas in the summer 2014. It is likely that the research results from this sample present limited potential for generalization to the population of faculty members of two year colleges. Probably, the research would have been more reliable if a greater size of sample will be used.

Next, the results were limited by the validity and reliability of the survey instrument and the time frame in which the data was gathered. External validity can be threatened by several error-types including a desire by the respondent to impress the researcher or to stress a preference by scoring survey items at either extreme of the scale. Surveys measuring responses to issues perceived as highly controversial or intimate are often susceptible to respondent bias. Survey items perceived as relatively neutral, however, do not threaten external validity. This

survey was an anonymous measure of attitudes towards technology and, therefore, mitigated the probability of respondent bias.

This study may be limited because prior to the analysis, the results of assumptions of normality assessed with a Shapiro-Wilk tests, were significant, violating these assumptions. An assessment of the normality of data is a prerequisite for many statistical tests because normal data is an underlying assumption in parametric testing (Rutherford, 2011). Parametric statistical analysis assumes a certain distribution of the data, usually the normal distribution. According Kirk (1995), Tabachnick and Fidell (2012), the assumption of normally distributed data is made for the purpose of carrying out significance tests. If the assumption of normality is violated, interpretation and inference may not be reliable or valid. Wilcox (1998) raised the profile of the normality assumption and argued strongly that even slight deviations from the normal distribution can have substantial consequences on the outcome of the analysis. Therefore, it is important to check for this assumption before proceeding with any relevant statistical procedures. But there is general consensus that violations of the normality assumption do not seriously affect the probabilities needed for statistical decision making (Hays, 1994; Kirk, 1995; Maxwell & Delaney, 2004; Winer, Brown & Michel, 1991)). In addition, statistical texts report ANCOVA (or ANOVA) as being robust with respect to violations of this assumption especially when the experimental condition sample distributions are symmetrical and the sample sizes are equal and greater than 12 (Clinch and Keselman, 1982; Tan, 1982). Ghasemi and Zahediasl (2012) have argued that with large enough sample sizes (> 30 or 40), the violation of the normality assumption should not cause major problems. This implies that we can use parametric procedures even when the data are not normally distributed (Elliott & Woodward, 2007).

Additionally, the data for this study were collected using an online, self-reported survey instrument. Participation was voluntary or optional. As with any voluntary survey, the potential for non-response bias always exists. Members of the sample may choose not to respond to the survey for a variety of reasons including a lack of motivation or interest, too busy, or other personal and/or work-related reasons. Furthermore, survey respondents may choose not to answer one or more survey items for a number of reasons, including the following: (a) the item is not relevant to their particular situation, (b) the options available to the respondent do not represent the respondent's true attitude or opinions, (c) the respondent does not understand the meaning of the survey item, or (d) completion of the item may embarrass the respondent or bring him/her discomfort (Erdos, 1970; Mangione, 1995). Item non-response results in incomplete data that can adversely impact the reliability of the findings. For this survey, there were some responses with missing values.

Recommendations for Further Study

The current study attempted to investigate instructors' perception regarding the service quality provided by cloud computing based system in large community (or two year) colleges in Texas as expected. Additionally, the study also examined whether instructors' perceived service quality (or satisfaction) varies based on selected demographic characteristics. Hence, it would be beneficial for future research to consider the following suggestions:

1. Further studies using the same methodology for the same population to examine the long-term implications of service quality improvement efforts.

2. Expansion of the study to include all two year colleges and not just large community colleges in the state to establish competitive benchmarks, track defections to other

clouding computing providers caused by poor service delivery, and promotes a statewide

service quality measurement and instructors satisfaction.

3. Evaluation can be made on the most common service quality measurement instruments in

   higher education. A comparative study will also be useful in this domain.

4. Additional exploratory, qualitative, and empirical research on the impact of instructor

   satisfaction vis-à-vis the wide variety of instructor demographic variables.

5. Further studies of the many types of service encounters, including service failures and

   recoveries, present in higher education.

6. An extension and testing of a model to measure internal customer satisfaction between

   service providers and institutional departments.

This study has concentrated on the instructor's perception of service quality. Future

research should focus on the perceptions of service quality from other stakeholders' perspectives

(such as administrative staff, academic staff, students' families, etc.). A comprehensive study

would help the key stakeholders to review the overall service quality in the higher education

sector.

Conclusions

This study of instructor perceptions of service quality and perceived service quality (or

satisfaction) of cloud computing technology in large community colleges in the State of Texas

yielded support for the model tested, and expanded on previous service quality research in

business and higher education. This study was conducted in the summer 2014 with 301

participants. All subjects were instructors of two-year large community colleges in the State of

Texas who have used cloud computing technology. There were two major research questions

with nine hypotheses presented in this study. All the five hypotheses associated with RQ1 were

rejected; three of RQ2 were accepted and only one was rejected. The results of the hypotheses tests are presented in Table 14. The results indicated that the differences between the expectation and perception on all five SERVQUAL dimensions load to the instructors' perceived service quality; gender but not age, income or education has significant effect on instructors' overall perceived service quality.

It is likely that instructors based their continued use of cloud computing technology at the higher educational institutions, in part, on how well the cloud computing provider's programs and services meet their expectations (Plank & Chiagouris, 1997). When instructors are dissatisfied with a cloud computing provider's services, they are more likely to deflect to competitive provider, if they have a choice (Plank & Chiagouris, 1997). Some academicians have argued that institutional efforts to measure service quality and satisfaction of students, staff and faculty have fallen short (Lewis & Smith, 1989). In an effort to remain competitive, it is imperative that colleges and universities measure the quality of the services they provide in an effort to improve on them. Oftentimes, institutions measure things that may not be important to their primary customers – students and instructors. Other times you find measurement for students' satisfaction and none for faculty or instructors.

Instructors' perceptions of the quality of their service experiences in technology and others should be assessed. Each time an instructor experiences some occurrence of an institution's service – within or outside, that service is judged against their expectations (Parasuraman, Zeithaml & Berry 1985, 1988, 1991). In an increasingly competitive higher education arena, research indicates that service quality is an important determinant of customer (instructor) satisfaction (Young & Varbel, 1997). Institutions should be held accountable for effectively meeting or exceeding instructors' expectations of the quality of services it provides.

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Appendices

Appendix A

Survey Instrument

Dear fellow faculty members, you are invited to complete and return this 10 minutes survey as a faculty member of two year community college. Completions and return is your consent to participate in this survey after having read and understood the consent form. The researcher requests that you submit the survey by 30 March, 2014.

Part A: SERVICE QUALITY EXPECTATIONS

DIRECTIONS: The following 5 sections relate to your expectations of the service you would expect to receive from an excellent cloud computing based technology services (such as web-based e-mail, online instruction software and/or other IT services delivered via the Internet), from the providers. For each statement, please show the extent of your agreement with each feature described. Circling a "1" means that you strongly disagree with that statement, circling a "7" means you strongly agree. If your feelings are less strong, circle one of the numbers in the middle.

Section 1. Service Quality Expectation on Tangibles (ETN)

Please rate your expectation on appearance of the providers' communication materials and/or suitable infrastructure, which includes software and hardware:

Item		Strongly Agree				Strongly Disagree		
ETN1	The organization and structure of online content will be easy to follow.	7	6	5	4	3	2	1
ETN2	It will be easy for me to complete a transaction through my online account's Web site.	7	6	5	4	3	2	1
ETN3	Using the provider's Web site will require a lot of effort.	7	6	5	4	3	2	1
ETN4	The Cloud computing provider will provide wide ranges of service packages.	7	6	5	4	3	2	1
ETN5	The Cloud computing provider will provide services with the features I want.	7	6	5	4	3	2	1
ETN6	The Cloud computing provider will provide most of the service functions that I need.	7	6	5	4	3	2	1
ETN7	All my service needs will be included in the menu and tab options.	7	6	5	4	3	2	1

Section 2. Service Quality Expectation on Reliability (ERL)

Please rate your expectation on the ability of cloud computing-based systems to provide accurate information and perform the promised service dependably and accurately:

Item		Strongly Agree				Strongly Disagree		
ERL1	An excellent cloud computing-based technology provider will perform services correctly the first time.	7	6	5	4	3	2	1
ERL2	When the provider promises to do something by a certain time, they	7	6	5	4	3	2	1

will do so.

ERL3	The cloud computing provider will keep my records accurately.	7	6	5	4	3	2	1
ERL4	The cloud computing provider will insist on an error free records.	7	6	5	4	3	2	1

Section 3. Service Quality Expectation on Responsiveness (ERS)

Please rate your expectation on the ability of cloud computing-based systems provider willingness to help customers and provide prompt service:

Item		Strongly Agree					Strongly Disagree	
ERS1	Cloud computing provider's support staffs will give me prompt service.	7	6	5	4	3	2	1
ERS2	The support team of the cloud computing provider will give prompt responses to my request by email or other means.	7	6	5	4	3	2	1
ERS3	The provider's support staff will never be too busy to respond to users' requests.	7	6	5	4	3	2	1
ERS4	The provider will quickly resolve problems I encounter.	7	6	5	4	3	2	1
ERS5	The cloud computing provider will properly handle any problems that arise.	7	6	5	4	3	2	1

Section 4. Service Quality Expectation on Assurance (EAS)

Please rate your expectation on the ability of cloud computing-based systems to convey trust and confidence:

Item		Strongly Agree					Strongly Disagree	
EAS1	The support staffs will have the knowledge to answer my questions.	7	6	5	4	3	2	1
EAS2	The cloud computing provider will comply with my requests.	7	6	5	4	3	2	1
EAS3	The Provider will not misuse my personal information.	7	6	5	4	3	2	1
EAS4	I should feel safe in my online communications.	7	6	5	4	3	2	1
EAS5	It will be secured to provide sensitive information (e.g. posting grades) for online communications.	7	6	5	4	3	2	1
EAS6	I feel that the risk associated with online communications to be low.	7	6	5	4	3	2	1

Section 5. Service Quality Expectation on Empathy (EEM)

Please rate your expectation on the ability of cloud computing-based systems to provide caring and individual attention:

Item		Strongly Agree						Strongly Disagree
EEM1	The cloud computing provider will give individual attention to the customer.	7	6	5	4	3	2	1
EEM2	The support team will give personal attention to customers.	7	6	5	4	3	2	1
EEM3	The cloud computing provider will understand specifics needs of its customers.	7	6	5	4	3	2	1
EEM4	The cloud computing provider will have customer's interest at heart.	7	6	5	4	3	2	1
EEM5	The cloud computing provider will have operating hours that are convenient to all customers.	7	6	5	4	3	2	1

Part B: SERVICE QUALITY PERCEPTIONS

DIRECTIONS: The following 6 sections relate to your perceptions about services you receive from a cloud computing based technology provider (such as web-based e-mail, online instruction software and/or other IT services delivered via the Internet). For each statement, please show the extent of your agreement with each feature described. Circling a "1" means that you strongly disagree with that statement, circling a "7" means you strongly agree. If your feelings are less strong, circle one of the numbers in the middle.

Section 1. Service Quality Perception on Tangible (PTN)

Please rate your perception on the appearance of the providers' communication materials and/or suitable infrastructure, which includes software and hardware:

Item		Strongly Agree						Strongly Disagree
PTN1	The organization and structure of online content are easy to follow.	7	6	5	4	3	2	1
PTN2	It is easy for me to complete a transaction through my online account's Web site.	7	6	5	4	3	2	1
PTN3	Using the provider's Web site requires a lot of effort.	7	6	5	4	3	2	1
PTN4	The Cloud computing provider provides wide ranges of service packages.	7	6	5	4	3	2	1
PTN5	The Cloud computing provider provides services with the features I want.	7	6	5	4	3	2	1
PTN6	The provider provides most of the service functions that I need.	7	6	5	4	3	2	1
PTN7	All my service needs are included in the menu and tab options.	7	6	5	4	3	2	1

Section 2. Service Quality Perception on Reliability (PRL)

Please rate your perception on the ability of cloud computing-based systems to provide accurate information and perform the promised service dependably and accurately:

Item		Strongly Agree		Strongly Disagree

PRL1	An excellent cloud computing-based technology provider performs services correctly the first time.	7	6	5	4	3	2	1
PRL2	When the provider promises to do something by a certain time, it does so.	7	6	5	4	3	2	1
PRL3	The cloud computing provider keeps my records accurately.	7	6	5	4	3	2	1
PRL4	The provider insists on an error free records.	7	6	5	4	3	2	1

Section 3. Service Quality Perception on Responsiveness (PRS)

Please rate your perception on the ability of cloud computing-based systems provider willingness to help customers and provide prompt service:

Item		Strongly Agree					Strongly Disagree	
PRS1	Cloud computing provider's support staffs give me prompt service.	7	6	5	4	3	2	1
PRS2	I receive prompt responses to my requests by e-mail or other means.	7	6	5	4	3	2	1
PRS3	The provider's support staffs are never be too busy to respond to users' requests.	7	6	5	4	3	2	1
PRS4	The provider quickly resolves problems I encounter	7	6	5	4	3	2	1
PRS5	The cloud computing provider properly handles any problems that arise.	7	6	5	4	3	2	1

Section 4. Service Quality Perception on Assurance (PAS)

Please rate your perception on the ability of cloud computing-based systems to convey trust and confidence:

Item		Strongly Agree					Strongly Disagree	
PAS1	The support staffs have the knowledge to answer my questions.	7	6	5	4	3	2	1
PAS2	The cloud computing provider complies with my requests.	7	6	5	4	3	2	1
PAS3	The provider did not misuse my personal information.	7	6	5	4	3	2	1
PAS4	I feel safe in my online communications.	7	6	5	4	3	2	1
PAS5	I felt secure in providing sensitive information (e.g. posting grades) for online communications.	7	6	5	4	3	2	1
PAS6	I felt the risk associated with online communications is low	7	6	5	4	3	2	1

Section 5. Service Quality Perception on Empathy (PEM)

Please rate your perception on the ability of cloud computing-based systems to provide caring and individual attention:

Item		Strongly Agree					Strongly Disagree	
PEM1	The cloud computing provider gives individual attention to the customer.	7	6	5	4	3	2	1
PEM2	The support team gives personal attention to customers.	7	6	5	4	3	2	1

PEM3	The cloud computing provider understands specifics needs of its customers.	7 6 5 4 3 2 1
PEM4	The cloud computing provider has customer's interest at heart.	7 6 5 4 3 2 1
PEM5	Operating hours are convenient to all customers.	7 6 5 4 3 2 1

Section 6. Perceived Service Quality (PSQ)

Please rate how the quality of service provided by the cloud computing provider has met your expectations:

Item		Excellent	Poor
PSQ1	Overall, how would you rate the quality of service provided by the cloud computing provider?	7 6 5 4 3	2 1

Part C. Demographic Information

Please answer the following demographic questions.

1. Name of your academic Institution: _____(pull down menu)

2. What is your gender?   [ ] Male   [ ] Female

3. What is your age?
[ ] 20 - 29   [ ] 30 - 39   [ ] 40 - 49   [ ] 50 - 59   [ ] 60 - 69   [ ] 70 or over

4. What is your yearly income?
[ ] Below $30,000   [ ] Between $31,000 to $50,000
[ ] Between $51,000 to $70,000   [ ] Between $71,000 to $90,000
[ ] Between $91,000 to $110,000   [ ] $111,000 and above

5. Select the option that best represents your academic discipline.
[ ] English   [ ] Math [ ] Science   [ ] Business [ ] Education [ ] Technology [ ] Engineering
        [ ] Other

6. What is your highest educational degree attained?
[ ] Associate Degree   [ ] Bachelor's Degree   [ ] Master's Degree
[ ] Professional degree (MD, DDS)   [ ] Doctorate Degree (Ph.D. or Ed.D.)   [ ] Other

7. What is your academic rank at the College?
 [ ] Full-time faculty   [ ] Adjunct faculty/Part-time   [ ] Other

Appendix B

IRB Approval Letter from Nova Southeastern University

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

NSU

MEMORANDUM

To: Eges Egedigwe

From: Ling Wang, Ph.D.
Institutional Review Board

Date: August 30, 2013

Re: *Service Quality and Perceived Value of Cloud Computing-Based Service Encounters: Evaluation of Instructor Perceived Service Quality in Higher Education in Texas*

IRB Approval Number: wang08151302

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

Appendix C

Sample Gatekeeper Letter

Appendix C: Sample Gatekeeper Letter to Obtain an Approval from a College Representative

From:	Eges Egedigwe
Sent:	Monday, September 16, 2013 7:30 p.m.
To:	Jimmy Doe Jones, VP of Instruction, yrobinson@dcccd.edu
Subject:	Survey of Instructors in Community Colleges Who Use Cloud Computing based Technology

Dear XXXXXXX [Human Studies Council department or contact person at the college]:

I am a graduate student of Computer Information Sciences at Nova Southeastern University. I am working on a research project to measure service quality of academic cloud computing based technology of large community colleges in the State of Texas from instructors' perspectives and to determine cloud computing based systems' own performance towards meeting academic institution's expectations. The study will take place during fall of 2013, for which I, the principal investigator (PI), will administer online survey at your institution and other community colleges in the state of Texas.

This project involves recruiting faculty members of this organization and the principal investigator will administer questionnaires via email to them to measure instructor's perception regarding the service quality provided by cloud computing based system in large community colleges in Texas.

All of the information that will be collected from individuals will be done with duly informed consent from the participating faculty members and the organizational members can refuse participation with no negative consequences for said individual. Participation in the survey is completely voluntary and all the responses will be kept confidential. No personally identifiable information will be associated with the participants' responses to any reports of these data.

I ask for the organization's permission to contact faculty members of this college. The Nova Southeastern University's Institutional Review Board (IRB) has approved this survey. Should you have any comments or questions, please feel free to contact them at (954) 262-5369 (Toll Free: 866-499-0790 or Email: IRB@nsu.nova.edu). You can also contact me at egedigwe@nova.edu or 972-860-8316.

Sincerely,

Eges Egedigwe, Student, Nova Southeastern University (NSU)

Appendix D

Sample E-mail Request to Participate in Internet Survey

Subject: Request for Dissertation Survey Participation - Academic Cloud Computing

Hello,

I am a doctoral student at Nova Southeastern University working on my doctoral degree entitled *Service Quality and Perceived Value of Cloud Computing-Based Service Encounters: Evaluation of Instructor Perceived Service Quality in Higher Education in Texas.* I am inviting you to complete and return a 10 - 15 minute's survey as a faculty member of a two year college.

The purpose of this empirical study is to investigate the relationship between instructors' views (**expectation and perception**) and overall service quality received on their use of cloud computing based technology in large community colleges in the State of Texas.

The SurveyMonkey© website below will be used to gather data and information to complete the study. The estimated time for completing the survey is approximately 10 – 15 minutes. Your participation will involve the completion of two survey instruments and a demographic survey questionnaire. Here is a link to your survey (you can also copy and paste the link into your Internet browser):

Survey link: https://www.surveymonkey.com/s/8QDW5FV

This link is uniquely tied to this survey and your email address. Please do not forward this message.
Some facts about the survey:

- Completing this survey indicates your voluntary participation in the study. But all of your responses will be kept confidential. No personally identifiable information will be associated with your responses to any reports of these data. The Nova Southeastern University's Institutional Review Board (IRB) has approved this survey. Should you have any comments or questions, please feel free to contact them at (954) 262-5369 (Toll Free: 866-499-0790 or Email: IRB@nsu.nova.edu). You can also contact me at 972-860-8316 or email me at egedigwe@nova.edu or eges@dcccd.edu.
- The researcher requests that you submit the survey by 25 October, 2014, if you can.
- The results of the research study may be published. The results of the study will be collected and analyzed in aggregate format.

Thank you for your consideration and willingness to participate in this study.

Sincerely,
Eges Egedigwe, egedigwe@nova.edu
Doctoral Student
Nova Southeastern University (NSU)
Graduate School of Computer and Information Sciences

Appendix E

Reminder/Follow-Up Email

Subject: Reminder: **Please Complete the** *Academic Cloud Computing* **Survey Today**

Hello,

Please take a few minutes today to complete this survey, if you have not already done that. Can't do it today? Add a reminder to your calendar. The survey will remain open through Monday, November 3 or until a sizeable number is attained.

Here is a link to the survey: https://www.surveymonkey.com/s/8QDW5FV

I apologize if you received this survey request more than once. Thank you in advance for participating.

Thank you for your consideration and willingness to participate in this study.

Sincerely,
Eges Egedigwe, egedigwe@nova.edu
Doctoral Student
Nova Southeastern University (NSU)
Graduate School of Computer and Information Sciences

Appendix F

Adult Informed Consent

APPENDIX F: ADULT INFORMED CONSENT

AUTHORIZATION TO USE AND DISCLOSE INFORMATION

Consent Form for Participation in the Research Study Entitled "Service Quality and Perceived Value of Cloud Computing-Based Service Encounters: Evaluation of Instructor Perceived Service Quality in Higher Education in Texas"

Funding Source: None.

IRB protocol #: **wang08151302**

Principal investigator(s)	Co-investigator(s)
Eges Egedigwe, MS	Peixiang Liu, Ph.D.
P. O. Box 570684	3301 College Avenue
Dallas, Texas 75357-0684	Fort-Lauderdale, Florida 33314
(972) 860-8316 or 214.552.1093	(954) 262-2088
Email: egedigwe@nova.edu	Email: lpei@nova.edu

For questions/concerns about your research rights, contact:
Human Research Oversight Board (Institutional Review Board or IRB)
Nova Southeastern University
(954) 262-5369/Toll Free: 866-499-0790
IRB@nsu.nova.edu

Site Information (if applicable): **All college campuses**

What is the study about?
The purpose of this study is to measure service quality of academic cloud computing technology of large community colleges in the State of Texas from instructors' perspectives and to determine cloud computing based systems' own performance towards meeting academic institution's expectations.

Why are you asking me?
This is to invite you to participate in an online faculty survey to examine instructors' perception regarding the service quality provided by cloud computing based system in large community colleges in Texas. Your feedback will be very important in influencing the direction of information technology in education in the State of Texas and our nation, and in assisting key stakeholders of higher education to understand and evaluate the suitability of a particular technology, such as cloud computing. The sample will consist of at least three hundred (300) or more community college faculty members in Texas and the anticipated response rate is sixty seven percent (67%) or more.

What will I be doing if I agree to be in the study?

This survey is done over the Internet using a drop down list and check box format. As a faculty member you have received this survey so that you can provide your feedback. The survey will take approximately 10 - 15 minutes to complete and can be done in more than one sitting if you re-enter the survey from the link below. Here is a link to your survey:

https://www.surveymonkey.com/s/8QDW5FV

Please note that your survey responses will be confidential and will be treated anonymously. You will never be personally identified at any point in the process of this faculty survey.

Is there any audio or video recording?
N/A

What are the dangers to me?
Level of risk is minimal or none because no personally identifiable information will be associated with the participants' responses to any reports of these data. If you have questions at any time about the study or its procedures, you may contact Human Research Oversight Board (Institutional Review Board or IRB) of Nova Southeastern University, at (954) 262-5369/Toll Free: 866-499-0790 or IRB@nsu.nova.edu

Are there any benefits for taking part in this research study?
There are no direct benefits. But the overall goal or objective of this study is to assist key stakeholders, such as instructors, administrators or information technology (IT) professionals of higher education to understand and evaluate the suitability of a particular technology, such as cloud computing, in terms of its ability to provide quality education service before implementing new technology or upgrading the current. The results of the improvement effort will certainly benefit the students as well.

Will I get paid for being in the study? Will it cost me anything?
There are no costs to you or payments made for participating in this study. The only cost for the participant is the time it takes to complete the survey.

How will you keep my information private?
Please note that your survey responses will be confidential and will be treated anonymously. You will never be personally identified at any point in the process of this study. There is no personally identifiable information on the survey form itself. With respect to SurveyMonkey, anonymous responses will be collected through the use of the "Web Link Collector." This method does not track names or emails. We will not save the IP addresses in the Analyze section. As responses come in, each survey will be marked as a "Normal Response" in the Response Type field. There will be no name or email associated with it.

Use of Student/Academic Information:
N/A

What if I do not want to participate or I want to leave the study?
Your participation in this research survey is totally voluntary, and declining to participate will involve no penalty or loss of benefits. Choosing not to participate will not affect your employment or professional standing in any way. If you choose, you may withdraw your

participation at any time. If you choose to participate, you may decline to answer any question that you are not comfortable answering. If you choose to withdraw, any information collected about you **before** the date you leave the study will be kept in the research records for 36 months from the conclusion of the study and may be used as a part of the research. Alternatively, you may request that it not be used

Other Considerations:
If significant new information relating to the study becomes available, which may relate to your willingness to continue to participate, this information will be provided to you by the investigators.

By clicking below I freely provide consent and acknowledge my rights as a voluntary research participant as outlined above and summarized as follows:

Voluntary Consent by Participant:
- this study has been explained to you
- you have read this document or it has been read to you
- your questions about this research study have been answered
- you have been told that you may ask the researchers any study related questions in the future or contact them in the event of a research-related injury
- you have been told that you may ask Institutional Review Board (IRB) personnel questions about your study rights
- you are entitled to a copy of this form after you complete the survey and you voluntarily agree to participate in the study entitled "Service Quality and Perceived Value of Cloud Computing-Based Service Encounters: Evaluation of Instructor Perceived Service Quality in Higher Education in Texas"

Here again is the link to your survey:

https://www.surveymonkey.com/s/8QDW5FV

Thank you in advance for your participation!

Appendix G

Retention, Storage and Destruction of Human Subjects Research Records

APPENDIX G: DATA RETENTION, STORAGE AND DESTRUCTION

Retention, Storage and Destruction of Human Subjects Research Records

The data collected from the participants meeting the current study eligibility requirements will be stored on the computer in a locked office for the duration of the study and for a period of 3 years after the study. The completed survey results will be stored in SPSS and MPlus for Windows - statistics data file. The Excel file will be located on a password protected computer, which will also be stored in the office. After completion of the data collection and entry of the data, the data analysis will be conducted using the data analysis tools found in SPSS and MPlus for Windows. Upon completion of the research, the data shall remain in a secured computer file for 3 years. The data will be scheduled for destruction by spring of 2017, at the end of the archival period by DISKKeeper, software that is used to destroy confidential data.

Appendix H

The SERVQUAL Dimensions and Items

The SERVQUAL Dimensions and Items

Quality dimension	Expectations (E_i)	Perceptions (P_i)
Tangibles	Excellent companies will have modern-looking equipment.	XYZ has modern-looking equipment
	The physical facilities at excellent companies will be visually appealing	XYZ's physical facilities are visually appealing
	Employees of excellent companies will be neat in appearance	XYZ's employees are neat in appearance
	Materials associated with the service (such as pamphlets or statements) will be visually appealing in an excellent company	Materials associated with the service (such as pamphlets or statements) are visually appealing at XYZ
Reliability	When excellent companies promise to do something by a certain time, they will do so	When XYZ promises to do something by a certain time, it does so
	When customers have a problem, excellent companies will show a sincere interest in solving it	When you have a problem, XYZ shows a sincere interest in solving it
	Excellent companies will perform the service right the first time	XYZ performs its service right the first time
	Excellent companies will provide their services at the time they promise to do so	XYZ provides its services at the time it promises to do so
	Excellent companies will insist on error-free records	XYZ insists on error-free records
Responsiveness	Employees of excellent companies will tell customers exactly when services will be performed	Employees of XYZ tell you exactly when the service will be performed
	Employees of excellent companies will give prompt service to customers	Employees of XYZ give you prompt service
	Employees of excellent companies will always be willing to help customers	Employees of XYZ are always willing to help you
	Employees of excellent companies will never be too busy to respond to customer requests	Employees of XYZ are never too busy to respond to your requests
Assurance	The behavior of employees of excellent companies will instill confidence in customers	The behavior of XYZ's employees instills confidence in you
	Customers of excellent companies will feel safe in their transactions	You feel safe in your transactions with XYZ
	Employees of excellent companies will be consistently courteous with customers	Employees of XYZ are consistently courteous with you
		Employees of XYZ have the

	Employees of excellent companies will have the knowledge to answer customer questions	knowledge to answer your questions
Empathy	Excellent companies will give customers individual attention	XYZ gives you individual attention
	Excellent companies will have operating hours convenient to all their customers	XYZ has operating hours convenient to you
	Excellent companies will have employees who give customers personal attention	XYZ has employees who give you personal Attention
	Excellent companies will have the customers' best interests at heart	XYZ has your best interests at heart
	The employees of excellent companies will understand the specific needs of their customers	Employees of XYZ understand your specific needs

Adapted after Parasuraman, Zeithaml, and Berry (1991b, pp. 446-449)'s 'Refinement and Reassessment of the SERVQUAL Scale.'

Appendix I

IRB Approval Letter from Dallas County Community College District (DCCCD)

Office of Institutional Research
Dallas County Community College District

From: Dallas County Community College District
       Institutional Review Board
       Dr. Richard K. Plott, Chair
       1601 South Lamar Street
       Dallas, Texas 75215-1816
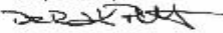   214.378.1834 Office
       richardplott@dcccd.edu

To: Mr. Eges Egedigwe
       Doctoral Candidate
       Capella University

RE: DCCCD IRB Approval with Contingency

Mr. Eges Egedigwe,

Thank you for submitting the required documentation for review by the Dallas County Community College District – Institutional Review Board. After careful consideration of this request, the committee has given approval with contingency for the research to be conducted according to the guidelines proposed in the application.

All colleges within the DCCCD will honor the decision of the IRB Committee; however, each college may vary in the resources available for you to utilize at their location and you will need to check with each college Institutional Research office for clearance to administer the survey. Thank you and best wishes throughout your candidacy.

Respectfully,

Dr. Richard K. Plott,
IRB Committee Chair

1

Appendix J

IRB Approval Letter from Houston College System (HCS)

HCC

HOUSTON COMMUNITY COLLEGE

Institutional Review Board

Eges Egedigwe
Nova Southern University
PO Box 570684
Dallas, TX 75357

July 31, 2014

Dear Eges Egedigwe:

This is to inform you that your research proposal

"Service Quality and Perceived Value of Cloud Computing-Based Service Encounters:
Evaluation of Instructor Perceived Service Quality in Higher Education in Texas"

has been reviewed and is approved with the caveats listed below. All data collection and
analysis are subject to the legal and procedural requirements of Houston Community College
and other local, state and federal regulations. Approval by the HCC Institutional Review Board
does not mean that HCC implicitly or explicitly endorses research projects.

Please review the contents of this letter and address the caveats listed below in writing. Then
sign the enclosed acceptance statement and return a copy to me by mail or by email to
irb@hccs.edu

CAVEATS

Section I
You have listed as the HCC Sponsor the HCC IRB Director. The IRB does not serve as HCC
sponsors. You will need to identify another HCC staff member if you are in need of a Sponsor.
Please be sure to contact the potential sponsor and obtain their agreement to perform these
activities.

Section III
Item 3 Recruitment of Subjects
Please clarify how email addresses of faculty members will be identified.

The effective dates are August 1, 2014 through July 31, 2015. Extensions may be granted, but
must be requested in writing.

HCC

HOUSTON COMMUNITY COLLEGE

Institutional Review Board

If you have further questions, please contact me.

Cordially,

Martha Oburn, PhD
Chair, HCC IRB
Houston Community College

cc: Dr. Zachary Hodges, Acting Vice Chancellor of Academic Affairs

Appendix K

IRB Approval Letter from Lone Star College System (LSC)

LONE STAR
COLLEGE
SYSTEM

Institutional Review Board

August 7, 2014

Eges Egedigwe
IRB Protocol 2014232

Dear Mr. Egedigwe:

The research project application for your protocol titled, *"Service quality and perceived value of cloud computing-based service encounters: evaluation of instructor perceived service quality in higher education in Texas"*, has been reviewed by the Lone Star College System (LSCS) Institutional Review Board (IRB). The outcome of the review is as indicated below.

<div align="center">Approved: Expedited 45 CFR 46.102 (2)(i)</div>

This approval will be valid for 12 months after the date of this letter. If the study extends beyond this period it will be subject to continuing review and will require the submission of a supplemental application at that time.

Please note that any changes to the protocol or procedures for this project after the initial review must be promptly submitted to the LSCS IRB for review. In addition, any adverse events should be reported to the LSCS IRB Office as soon as possible.

The LSCS IRB requests that you share the results of this research project with the IRB office when you have completed it. The data from your study could be very useful to grant writers and to others in the LSCS system. You will be given complete credit for its authorship.

This letter constitutes the official written response of the LSCS Institutional Review Board. Thank you, and best of luck on your study!

April M Odell

April M. Odell
Administrator, Institutional Review Board

5000 Research Forest Drive
The Woodlands, TX 77381-4356
832.813.6500 LoneStar.edu