A CASE STUDY OF A HIGHER EDUCATION IT DEPARTMENT ADOPTING PUBLIC CLOUD COMPUTING

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Abstract

Higher education depends on information technology (IT). In response to greater computing and storage demands, and anywhere and anytime access from any device with smaller budgets, universities are turning toward public cloud computing technologies like Office 365. This case study examined one IT department’s progression through the adoption of Office 365. The research question guiding this study was: How did an IT department at a southeastern university progress through the adoption of a public cloud computing technology? There were five key themes, which appear in the order in which the participants progressed through the Office 365 implementation: perceived needs lead to the selection of Office 365; lack of Office 365 knowledge causes concerns; introducing change and generating awareness; feelings of loss of control; and user adoption of Office 365 drives change. This study has three recommendations for practice: public cloud computing creates opportunities to evaluate support models, IT department experiences support the development of a cloud strategy framework, and evaluate IT skillsets needed to support cloud computing. Three areas for future research are assess the fears and concerns of public cloud computing adoption at additional institutions, compare the changes in structure and support in IT departments after the adoption of public cloud computing, and compare and contrast cloud computing strategy models toward establishing a standard. Overall, this research may help higher educational institutions to plan for best practices relating to the adoption of public cloud computing technologies.

Keywords: public cloud computing; Office 365; higher education; information technology; diffusion of innovation; best effort support
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Chapter 1: Introduction

During the first years of the 20th century, manufacturers began dismantling their steam engines, water wheels, and electric generators in favor of purchasing their power from the newly formed electric companies (Carr, 2005). In 2005, Nicholas Carr asserted that the same was happening for information technology (IT), as computing was becoming a service that users could purchase from a provider rather than an on-site facility (Muhic & Johansson, 2014). More than 12 years after Carr’s article, technology is in the midst of a transformation to cloud computing. The technical details of cloud computing transitions are well documented; however, the impact on the staff of a traditional IT department has received less attention (Behrend, Wiebe, London, & Johnson, 2011; Fatima & Parveen, 2017; Jaeger, Lin, & Grimes, 2008; Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011). The purpose of this qualitative case study was to explore the progression of an IT department through the successful adoption of a public cloud computing technology at a southeastern university.

This section provides the background of the problem, rationale and significance of the problem, research problem and question, definition of key terms, and theoretical framework of the study. This section delineates the four main components of the diffusion of innovation theory. It demonstrates how these components allowed the researcher to investigate thoroughly how they affect each other during the adoption of public cloud computing in an IT department. The resulting knowledge may inform leaders of IT organizations in higher education on key factors that influence the successful adoption of public cloud computing technologies to support their decision-making processes while implementing public cloud computing technologies (Medlin, 2001). Public cloud computing differs from private cloud computing, in that private clouds serve one customer, and public clouds serve the general public in a shared
environment (Kalyvas, Overly, & Karlyn, 2013). The researcher employed a case study methodology to understand the progression through the adoption of public cloud computing within the bounded context of a single IT department in higher education. The data sources were interviews, observations, and documents such as project plans, requests for proposal, and documents used for communication to campus (Yin, 2003).

The adoption of public cloud computing technologies in higher education is a recent phenomenon, and its impact on higher education IT departments has not received adequate study (Behrend et al., 2011; Lim, Gronlund, & Andersson, 2015). As institutions seek to implement this innovation, understanding how an IT department progressed through the adoption is important for the planning of future implementations (Abdollahzadegan, Hussin, Razak, Moshfegh Gohary, & Amini, 2013; Stieninger, Nedbal, Wetzlinger, Wagner, & Erskine, 2014). Institutions must consider how they will select, implement, and support the innovation of public cloud computing technologies, which will undoubtedly have a lasting impact on traditional IT departments in higher education (Carraway, Cato, Chapple, Dugas, et al., 2015; Takai, 2012).

Higher education institutions have successfully embraced the implementation of private cloud technologies by utilizing virtualization technologies to consolidate resources within the campus data center (Bedrossian et al., 2014; Sligh, 2010). Virtualization allows for efficiencies in cost and performance, and it provides agility and reliability that a physical server lack (Bedrossian et al., 2014; Saleem, 2017). Moving to the public cloud provides the opportunity for even greater opportunities, including greater capacity, resilience, and agility (Bischel, 2015). Moving from private cloud computing to public cloud computing takes a concentrated effort and has significant implications for IT staff, involving a shift in mindset and a change from the management of technology to the management of services (Bischel, 2015). The IT staff’s
perceptions and beliefs are critical to the success of the implementation of public cloud computing technologies (Carraway, Cato, Chapple, Dugas, et al., 2015).

**Context and Background**

Technology provides higher education with the ability to support the core mission and goals of the university (Bischel, 2015). Technology is no longer an add-on in higher education, but truly a part of the foundation that keeps the enterprise running (Bischel, 2015). Interruptions in technology can significantly impact the operations of the entire university. Therefore, IT organizations are constantly seeking new ways to ensure that technology is available, reliable, dependable, and secure (Grama, 2014; Sligh, 2010).

IT departments have shifted their focus from simply maintaining systems to being change agents by helping customers to understand how technology can help them to achieve their goals (Bischel, 2015; Carraway, Cato, Chapple, Crosswell, et al., 2015). IT departments must cultivate support teams that perform with customer service in mind, encompassing both superior communication skills and soft skills (Bischel, 2015; Carraway, Cato, Chapple, Dugas, et al., 2015). Decisions to adopt cloud solutions are occurring at every level of the university, often without IT organizations’ input, resulting in missed opportunities to leverage IT expertise in those decisions (Carraway, Cato, Chapple, Dugas, et al., 2015; Khajeh-Hosseini, Greenwood, Smith, & Sommerville, 2012). Cultural and social shifts are difficult in any organization, and it is important that IT leaders and staff members make an intentional effort to adapt to the changes public cloud computing technologies are bringing to campus (Carraway et al., 2016).

Public cloud computing technologies provide constant and rapid change due to the intense competition between vendors and the ease of adoption for customers (Carraway et al., 2016). Providing support requires a shift in how IT organizations operate, in which a large part
is blending institutional knowledge with vendor knowledge to be agile and responsive to rapidly changing technologies and demands (Carraway et al., 2016). Therefore, the researcher pursued an understanding of how an IT department at a southeastern university progressed through the adoption of a public cloud computing technology.

**Rationale**

The rationale for this study was the researcher’s interest in understanding how an IT department progressed through the adoption of a public cloud computing technology to inform future public cloud computing adoption (Bischel, 2015; Khajeh-Hosseini et al., 2012; Lin & Chen, 2012). There has been a recent shift from inclusion of IT departments as knowledge experts to relying solely on vendors, sometimes resulting in the ultimate and complete exclusion of the IT department (Khajeh-Hosseini et al., 2012). Bischel (2015) reported that chief information officers (CIOs) believe there will be a shift from focusing on managing infrastructure and technical resources to a service delivery model, where the focus is managing services, vendors, and outsourced contracts. New roles have developed, and they will need to continue to evolve to support this shift, including increased support services, vendor and contract management, data classification, risk and compliance, and project management (Bischel, 2015; Carraway, Cato, Chapple, Dugas, et al., 2015; Grama, 2014).

This study builds on previous research by the EDUCAUSE Center for Applied Research and studies focusing on how IT professionals understand cloud computing, as well as their concerns surrounding cloud adoption (Carraway et al., 2016; Carraway, Cato, Chapple, Dugas, et al., 2015; Lin & Chen, 2012; Sligh, 2010). Rogers’s (2003) diffusion of innovation theory guided this study, as it asserts that the innovation process includes not only the decision to adopt an innovation, but also implementation as a core component. The implementation can involve
individuals from the organization who may include both champions and opponents of the innovation (Rogers, 2003). Therefore, looking at the IT members of an organization is key to understanding how an IT department progresses through the adoption of a public cloud computing technology (Lin & Chen, 2012). To be successful with the implementation of the innovation, Rogers (2003) believed that mutual adaptation must occur, in which both the organization and innovation change to support successful implementation. The findings from this study can inform higher education leadership and IT department staff who adopt public cloud computing (Lin & Chen, 2012).

**Significance of the Problem**

The education system in the United States continues to face challenges in creating personalized learning environments and resources that are engaging and relevant to students and that expand outside the confines of their institution (Brown, 2014; U.S. Department of Education, 2010). Organizations that have difficulty keeping up with the demands for technology may find that employees will seek out and implement public cloud solutions without obtaining the proper permission (Swamy, 2013), and the attractiveness of a new, seductive technology may lead to implementations that do little to improve learning outcomes (Aziz, 2010). Additionally, if bureaucratic processes delay the purchasing of critical infrastructure resources, employees will seek free and off-premises solutions such as cloud computing services from Amazon, Google, or other a variety of other providers (Swamy, 2013).

There is mounting concern over the exclusion of IT departments from the selection and implementation of public cloud computing technologies (Carraway, Cato, Chapple, Dugas, et al., 2015; Khajeh-Hosseini et al., 2012; Schaefer & Woo, 2010). Additionally, there are concerns from within the IT department that positions may disappear as more technologies move off
campus (Carraway, Cato, Chapple, Dugas, et al., 2015). Higher education institutions should make use of public cloud computing technologies, as they provide benefits such as accelerated IT delivery, increased capabilities, and efficiency and innovation (Schaefer & Woo, 2010; Sligh, 2010). Many higher education institutions are also facing continued budgetary constraints and stricter financial oversight (Khan, 2016; Sligh, 2010). Takai (2012) developed a cloud computing strategy for the Department of Defense to enable decreased technology costs through the use of cloud services while increasing secure information sharing and collaboration, thus enhancing effectiveness. Higher education IT departments must achieve increased efficiency and agility by transforming how they acquire, operate, and manage technology as they respond to demands and requirements (Takai, 2012).

The rise of cloud computing is likely to reshape and reduce dependencies on IT departments (Berman et al., 2015; Yanosky, 2010). Cloud computing is the latest trend that moves either part or all of IT operations to the public cloud, providing a flexible and extremely scalable platform (Dhar, 2012). It is important to create a shared vision and a collective understanding of cloud computing so that IT staff can become change agents for their institutions (Berman et al., 2015). Managers need to see IT as a strategic partner in enabling the rapid adoption and use of cloud services that provides a perspective on integration, security, and architecture, and that contributes its vast experience leading technology efforts (Berman et al., 2015).

Less than 10 years ago, many saw server virtualization as the latest innovative technology, and it caused IT professionals to ask questions on how virtualization technology can support the organization, how virtualization technology will impact business operations, how it will impact the current staff, and what is the best way to provide professional development for
current staff (Sligh, 2010). Today the most innovative technology is public cloud computing, and all the above questions still apply and more (DaSilva, Truman, Desouza, & Lindic, 2013). Due to the continued trend of rapidly expanding cloud computing offerings, it is important to investigate how an IT department progressed through the adoption of public cloud computing technology.

Studying how an IT department progressed through the adoption of a public cloud computing technology allows other researchers to build upon this research, enhancing the knowledge and support for the changing culture and demand on IT department staff (Carraway et al., 2016). At this time, the most detailed research on cloud computing opportunities and challenges for the IT organization is by the EDUCAUSE Center for Applied Research, ECAR, which is a working group consisting of members of the higher education community who volunteer their time (Carraway et al., 2016; Carraway, Cato, Chapple, Dugas, et al., 2105). There are seven ECAR working group papers on preparing the IT organization for the cloud, and they provide a foundation and jumping off point for more academic research (Carraway, Cato, Chapple, Crosswell, et al., 2015).

As such, findings on how an IT department progressed through the implementation of a public cloud computing technology will help IT senior leadership, IT staff, and senior higher education administrators to plan more fully for the culture, operational, and organizational changes that accompany the shift from a technological organization to a service organization. The data from this study can assist IT staff in preparing for and understanding the requirements to support constant and rapid change effectively and to prepare for additional user needs directly relating to working in a public cloud computing model (Carraway et al., 2016).

**Research Problem and Research Question**
This study examined how an IT department progressed through the adoption of public cloud computing technologies at a university located in the southeastern United States. The public cloud computing technology for this study was Office 365, and the study was retrospective in nature. This study also examined and described the IT staff’s perceptions relating to the adoption of cloud computing technologies.

Higher education IT is in the midst of an innovation that is quickly diffusing throughout universities. Cloud computing provides economies of scale, and it is a flexible, scalable, and resilient technology platform, which may lead to on-premises data centers becoming obsolete (Bedrossian et al., 2014; Jaeger et al., 2008). Cloud computing offers computing as a service with delivery to customers over the Internet from large-scale data centers or clouds, shifting away from computing as a product that is owned by the university (Abdollahzadegan et al., 2013; Carr, 2005). Cloud computing models can start as small as free offerings like Gmail and Dropbox, and they can extend up through customer relationship management systems like Salesforce.com (DaSilva et al., 2013). As more cloud computing offerings hit the market, cloud offerings that claim not to require any IT services, contracts, or fees can easily lead to the bypassing of IT departments (Bedrossian et al., 2014; DaSilva et al., 2013; Khan, 2016).

Traditional IT departments could cease to serve the roles of data center architects and administrators, and they could potentially become redundant without the proper planning (Bedrossian et al., 2014; DaSilva et al., 2013). This research is necessary, as cloud computing provides an opportunity to evaluate how IT organizations adapt and grow to support this industry-changing innovation (Carraway, Cato, Chapple, Dugas, et al., 2015).

Studies on cloud computing have focused on areas such as policy change, the business models of the cloud providers, and community college students’ adoption of cloud computing
technology (Behrend et al., 2011; DaSilva et al., 2013; Jaeger et al., 2008). However, there is minimal literature on how cloud computing adoption impacts traditional IT departments. Few studies have addressed the strategies IT leaders have utilized to adopt cloud computing technologies with a desire to leverage existing on-premises resources to meet initiatives and demands (Alfifi, 2015; DeBary, 2017; Green, 2018; Khan, 2016; Oliveira, Thomas, & Espadanal, 2014).

Understanding on how to prepare and organize an IT department for the adoption of cloud computing is virtually absent from the literature. While the technical aspects of cloud computing fall to the technical experts, customer questions often receive less attention (Marston et al., 2011). The aim of this study is to contribute to the understanding of the complexities of transitioning from traditional on-premises data centers and platforms to public cloud computing technologies, as well as to inform university administrators of what they need to consider to transition to a public cloud computing technology environment effectively and efficiently. To frame this study, the researcher developed one research question:

1. How did an IT department at a southeastern university progress through the adoption of a public cloud computing technology?

Definitions of Key Terminology

Term 1 – Cloud computing – The National Institute of Standards and Technology (2011) described cloud computing as a shared pool of configurable computing resources, which can include servers, storage, applications, networks and applications that can be quickly deployed providing ubiquitous, on-demand access.

Term 2 – Infrastructure as a service (IaaS) is a form of cloud computing where the provision and management of the computing infrastructure takes place over the Internet (Aleem
& Sprott, 2012; Lin & Chen, 2012). An organization can choose to outsource hardware such as networking components, storage, and servers.

Term 3 – *Platform as a service (PaaS)* – allows customers to deploy their own applications on a cloud infrastructure (Berman et al., 2015).

Term 4 – *Private cloud* – pooling resources within an organization, but not leveraging shared hardware or data centers (Bedrossian et al., 2014).

Term 5 – *Public cloud* – service providers offer software, platforms, and/or infrastructure for use by the general public on hardware in the provider’s data center that the service provider maintains (Bedrossian et al., 2014).

Term 6 – *Software as a service (SaaS)* – applications the supplier manages on a cloud infrastructure and offers for customer use (Berman et al., 2015).

Term 7 – *Virtualization* – allows for a reduction in physical computers by running multiple virtual machines on one physical machine, the host (Saleem, 2017).

**Theoretical Framework**

The theoretical lens for this study was the diffusion of innovation theory by Rogers (2003).

Diffusion is a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system. When new ideas are invented, diffused, and adopted or rejected, leading to certain consequences, social change occurs. (Rogers, 2003, p. 6)

The social system acts as a boundary within which an innovation diffuses and provides a structure that can predict behavior with some degree of accuracy (Rogers, 2003). The structure of a social system can support or hamper the diffusion of an innovation (Rogers, 2003). The
social system will help to develop the consequences for an innovation, including desirable, direct and indirect, anticipated and unanticipated, and these consequences will ultimately change the social system (Rogers, 2003).

Rogers’s (2003) theory has four main components: the innovation, communication channels, time, and a social system. Diffusion is a process in which the social system communicates the innovation over certain channels and over time (Rogers, 2003). Rogers believed that diffusion will lead to an altered structure and function of the social system (Figure 1). Utilizing an exploratory case study with this lens will allow the researcher to understand the relationships between the four components more thoroughly as they continually impact each other and cause change within the organization (Yin, 2003).
The innovation. During the diffusion process, variables such as the desire for the particular innovation, involving the adopters in the decision-making process, the structure and culture of the social system, and the efficacy of the communication system can impact the rate of adoption (Watson, 2007). Characteristics of the innovation as perceived by individuals such as relative advantage, compatibility, complexity, trialability, and observability can also impact the adoption rate (Rogers, 2003). Relative advantage and compatibility can contribute greatly to understanding an innovation’s rate of adoption (Rogers, 2003).

The innovation under consideration is Office 365 and the factors that influence its successful implementation. Speeding up the rate of diffusion of an innovation is a common
problem for organizations, and the pace of adoption for universities can depend on factors such as institutional readiness, budget, and culture (Bedrossian et al., 2014). Many innovations require significant time to pass from innovation to wide adoption (Rogers, 2003). In the case of public cloud computing adoption, trialability might be the attribute that moves adoption forward at a quicker pace. Institutions will tend to adopt innovations they can pilot more quickly than innovations they cannot test (Rogers, 2003). Institutions can adopt public cloud computing incrementally, which provides the opportunity to learn while doing (Bedrossian et al., 2014).

Institutions can also mold public cloud computing to fit their particular needs, and not as a particular vendor prescribes (Bedrossian et al., 2014). This molding of public cloud computing aligns with Rogers’s (2003) term of reinvention, where innovation becomes a series of continuous evolutionary reboots, as each participant in the process can absorb what was done before, and participants can place their own twists on the next step in the process, project, or product (Rogers, 2003). Some innovations do not lend themselves to reinvention, such as the QWERTY keyboard, but others do, which provides adopters an opportunity to play an active role in implementing innovations to fit their unique situation (Rogers, 2003).

**The communication.** Diffusion is communicating the innovation over time across social channels that include the various members of a social system (Rogers, 2003). The communication can happen between individuals with direct exposure to the innovation and individuals without exposure to the innovation to reach a mutual understanding. Rogers (2003) cited a 1955 diffusion study on water boiling in a Peruvian village by Wellen, in which the change agent did not take into consideration the social system. This resulted in the innovation not being adopted, leading to a continued loss of life.
With public cloud computing, most of the initial communication comes from the vendor who is offering the solution (Bedrossian et al., 2014; DaSilva et al., 2013; Khan, 2016). Since the solution has an off-site location, and it is in the technological environment of the vendor, initial communications go straight to the end user, often bypassing IT (Bedrossian et al., 2014; DaSilva et al., 2013; Khan, 2016). The end user in higher education can range from students and faculty to staff and administrators (Bedrossian et al., 2014). It has become more common to bypass IT in the communications, and to involve IT only when setup or integration with campus resources is necessary (Bedrossian et al., 2014; DaSilva et al., 2013; Khan, 2016). IT staff are a critical part of the social channel, and without communication and inclusion, mutual understanding and social change may not occur (Bedrossian et al., 2014; DaSilva et al., 2013; Khan, 2016).

Even when an innovation seems superior, or it could prevent the loss of life, it is not necessarily diffuse enough for widespread adoption (Rogers, 2003). Consider the QWERTY keyboard, which developed when typewriters had to strike the paper, and if the typist struck letters that were adjacent on the keyboard too closely together, they could get tangled (Rogers, 2003). A new keyboard layout emerged with the keys arranged in a more efficient distribution between commonly used vowels and consonants to replace the QWERTY keyboard; however, the innovation was not widely successful due to a vested interest in the old design by manufacturers, typists, and sales outlets (Rogers, 2003).

**Time.** The time dimension can apply to three particular areas: (a) the innovation-decision process for an individual to progress from first awareness through adoption or rejection of the innovation, (b) how early or late an individual adopts the innovation compared to other members of the social system, and (c) an innovation’s rate of adoption by the whole social
system (Rogers, 2003). There are five steps in the decision-innovation process: (a) knowledge, (b) persuasion, (c) decision, (d) implementation, and (e) confirmation. These steps occur in the same time-ordered sequence (Rogers, 2003). Individuals and social systems will vary in the time they require to pass through the innovation-decision process, with some requiring years (Rogers, 2003).

Rogers (2003) specified five adopter categories: (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. These adopter categories help to classify members of a social system based on their innovativeness. The relative speed with which the members of a social system adopt an innovation determines the rate of adoption (Rogers, 2003).

Social system. The social system is a group of interrelated units who are engaged in working toward a common goal or solving an issue (Rogers, 2003). Well-developed formal social structures often have a hierarchy in which those at the top thrust their decisions or orders upon those lower in the structure (Rogers, 2003). Informal structures also exist that impact the communication patterns and decision processes (Rogers, 2003). There are norms within the hierarchy of higher education social structures, and it is necessary to consider them when trying to influence the adoption of an innovation (Carraway, Cato, Chapple, Dugas, et al., 2015; Schaefer & Woo, 2010). Change agents are people who can influence other people’s innovation-decision-making process in the direction they deem desirable (Rogers, 2003).

Critics of diffusion of innovation theory. In 1971, Rogers and Shoemaker recognized that what we know about the diffusion of innovation is unnecessarily limited due to pro-innovation bias (Rogers, 2003). Rogers (2003) defined a pro-innovation bias as the belief that everyone should adopt an innovation with no rejection at a rapid pace with no modification to its original format. This bias could lead researchers to ignore innovations that others reject,
discontinue, or reinvent, or to disregard programs to prevent the advent of negative innovations, intentional or not, such as cigarettes and vaping (Rogers, 2003). Critics of diffusion research, Downs and Mohr (1976), also recognized the pro-innovation bias, believing that innovation is a characteristic we want to possess, and therefore one having associations with positive values and words like “motherhood” and “patriotism” (Rogers, 2003).

A case study conducted in 1989 by Belasco overcame pro-innovation bias by seeking to understand why the government installed system of pumps and pipes to deliver pure water to Egyptian villages (Rogers, 2003). The government believed villagers would prefer the clean water to contaminated canal water (Rogers, 2003). Belasco studied the innovation and interviewed the villagers, finding that the water system was overextended, and it often had low pressure (Rogers, 2003). Additionally, there was a valve on the pumps, and the villagers could not get running water (Rogers, 2003). The villagers sometimes broke the valve to get running water, which wasted water and taxed the overextended system even further (Rogers, 2003). Some villagers believed the pump water tasted like chemicals, and others believed it negatively impacted their sex drive (Rogers, 2003). Belasco determined that this technological innovation did not consider the villagers’ needs or consider the behaviors of the intended consumers (Rogers, 2003). Rogers (2003) believed that it is possible to overcome pro-innovation bias by considering the people’s perceptions of an innovation instead of relying solely on the innovator’s ideas.

**Rationale.** Rogers’s (2003) theory is appropriate for this study, as it asserts that the innovation process includes not only the decision to adopt an innovation, but also implementation as a core component. The implementation can involve individuals from the organization, who may include both champions and opponents of the innovation (Rogers, 2003).
Therefore, looking at the IT members of an organization is key to understanding how the IT department progressed through the adoption of Office 365 (Bedrossian et al., 2014; DaSilva et al., 2013; Khan, 2016). To be successful with the implementation of the innovation, Rogers (2003) believed that mutual adaptation occurs in which both the organization and innovation change to support successful implementation. Not only would the adoption of public cloud computing in higher education incorporate the main processes of the diffusion of innovation theory, but it would also tightly embrace each perceived attribute of innovation from relative advantage through observability.

**Application of diffusion of innovation theory.** Rogers’s (2003) diffusion of innovation theory is helpful for university administrators and faculty in understanding the behavioral, social, and organizational variables relating to the adoption of an innovation (Medlin, 2001). Rogers’s foundational research provides a framework for this study, which explores how an IT department in higher education progressed through the adoption of Office 365 and the department’s influence on the innovation diffusion and adoption process. Recognizing the important role IT staff members play in the adoption and success of a technology innovation is critical, and the diffusion of innovation theory ensures that they, in their complete social system, are thoroughly included, leading to more opportunities for using technology innovatively and appropriately to support the university’s mission (Medlin, 2001; Khan, 2016).

The purpose of this qualitative case study is to explore the progression of an IT department through the adoption of a public cloud computing technology at a southeastern university. The public cloud computing technology is Office 365, and the study was retrospective in nature. The participants of this study were IT staff members with between five and 30 years’ experience at the university. Chapter 2 follows with a literature review to ground
the study in the existing literature. Chapter 2 moves through the historical aspects of technology innovations in higher education to the current technological innovation of public cloud computing technologies. With limited literature available on how IT departments in higher education progress through the adoption of public cloud computing technologies, the literature review includes other studies that have measured technology implementations to support this study. Last, Chapter 2 discusses the components of cloud computing, as well as considerations for constructing a university-wide cloud strategy.
Chapter 2: Literature Review

The purpose of this qualitative case study is to explore the progression of an IT department through the adoption of a public cloud computing technology at a southeastern university. The literature review consists of four sections. The first section contains information on technology in higher education, and it focuses on the use of online learning with mobile technology. The second section addresses barriers to implementation, such as time constraints and lack of professional development. It then addresses the role of the institution and teacher in implementing technology into teaching and learning. The third section includes information on technology innovations, including social media and bring your own device (BYOD), to illustrate how technology brings new learning opportunities for students at universities. The last section discusses cloud computing, including concerns over the implementation of public cloud computing technologies, and it concludes with information on developing cloud computing university strategies.

Current research on the adoption of cloud computing has focused on computing frameworks, security, pricing, and implementation, but it has rarely focused on the adoption of cloud computing in education or the impact on technology teams and users promoting or accepting the changes themselves (Tashkandi & Al-Jabri, 2015). Understanding how the IT department progressed through the adoption of a public cloud computing technology in higher education will assist in promoting IT as a valuable guide, making it more likely that business units will seek out IT for advice before deciding to adopt and deploy a cloud service (Carraway, Cato, Chapple, Dugas, et al., 2015). The author adopted the diffusion of innovation theory (Rogers, 2003) to investigate the factors that influenced a successful implementation of public cloud computing in a higher education institution.
The researcher conducted the literature review for this study using online scholarly databases available through Northeastern University and Google Scholar. The researcher located most of the scholarly articles using ProQuest and ScienceDirect.

**Technology in Education**

IT lies at the foundation of most institutional undertakings (Brown, 2014). IT has expanded from providing technology infrastructure and services to serving as a change agent for advances in teaching and learning (Brown, 2014). When an IT department becomes a partner instead of a cost center, there is greater innovation and responsiveness to technology adoption (Swamy, 2013). Institutions must provide methods for ensuring the infusion of technology into the classroom, and ensuring that it has a positive influence on student learning. Educational technology, regardless of its physical location, requires thoughtful planning for the curriculum and university, as Hap Aziz (2010) suggested in his assessment of the five key components of integrating technology into education:

- **Considered implementation.** The implementation of any technology needs consideration. By this, Aziz (2010) meant that there is a constant assessment of the technology, process, and acceptance and its intended and unintended consequences to ensure the applicability of a solution to a use case. Implementing technology for the sake of implementing technology is a complete waste of resources. Considered implementation requires a strong IT leader to guide and ensure the best integration and use of technology.

- **Appropriate tools, techniques, or processes.** Aziz (2010) stated that many see technology as the silver bullet to address shortcomings in education. Educators have spent years creating techniques and processes in teaching and learning that result in
positive outcomes. As technology continues to change at very high rates, and free or low-cost cloud offerings proliferate, educators will need to take the time to evaluate the appropriate technology (tool, technique, or process) to add the desired value.

- Facilitate the application of senses, memory, and cognition. Aziz (2010) generalized the concept of learning as a transformative process of acquiring new knowledge that one internalizes and mixes with past experiences, allowing the individual to present new skills in new ways. Technology can act as a facilitator to take human capabilities to the next level, with instant access to the thoughts of great thinkers and videos of places humans have never been. The use of virtual reality in education and beyond has become commonplace, providing experiences that many thought impossible until recently. The learner is in more control of what he or she accesses and when, facilitating a more comprehensive learning process and application of knowledge.

- Enhance teaching practices. Skilled instructors know both the material and instructional methodologies. Technology should assist instructors in bridging learner gaps by being able to impact all learning styles.

- Improve learning outcomes. Evaluating learner outcomes ties back to considered implementation and the fact that educational institutions need to evaluate whether the technology has achieved the intended goal. Embracing innovation and new technologies requires constant assessment of their impact, simplicity, and adoption rates to identify and address any shortcomings in the technology or its recommended use (Aziz, 2010).

Colleges and universities face many challenges ranging from enrollment pressures and increased reporting responsibilities to technology-enabled teaching and learning supporting an
enhanced student experience and engagement (Klopfer, Osterweil, Groff, & Haas, 2009). Aziz’s (2010) five key components of education technology fully support the responsibility of colleges and universities to ensure that maximum dollars go to teaching and learning, thus minimizing back-end technology costs. Considered implementation is the first component and the most critical one to ensure the selection, implementation, and review of the proper technology. Technology enables efficiencies and cost-saving benefits such as going paperless, reducing redundant data entry, and identifying and providing one single source of data to feed decision-making systems. Cloud computing technology can further create efficiencies; in some cases, it also promotes cost savings through the reduction of on-premises hardware, of cooling and energy requirements, and of campus real estate for data centers (Jones, Irani, Sivarajah, & Love, 2017).

**Online Learning (e-learning)**

Learning in higher education remains unbundled from the traditional offerings, and it includes online learning, tutorials from the Kahn Academy, iTunes University, massive open online courses, and more (Brown, 2014). Online learning continues to grow at a double-digit rate. The state of the U.S. economy has contributed to this growth, as students try to achieve their education as cost-effectively as possible. Throughout the history of online learning, the connectedness of the student to the instructor and classmates is a significant issue that has received frequent study. Joyce and Brown (2009) cited the extent to which a student feels connected as playing a significant role in how well the student performs in the class.

Joyce and Brown (2009) asserted that educators should continually assess and cater to online learners’ needs to ensure positive academic impact and student satisfaction, as issues of isolation and pedagogy style influence results. The integration of cloud technologies into online classes could, over time, create new ways of working independently and collaboratively while
engaging the student in learning activities utilizing a personalized set of resources (Brown, 2014). Learning should continue to move outside the classroom and traditional contexts, providing multiple options for enhancing personal, situated, and collaborative learning, and creating lifelong learning environments not limited in time or space (Naismith, Lonsdale, Vavoula, & Sharples, 2004).

**Mobile learning (m-learning)**

While many devices function as mobile devices, including laptops, tablet computers, and netbooks, Keegan (2005) posited that a mobile device should be truly mobile and easy to carry on one’s person, in a handbag, or in a pocket. Traxler (2007) took this one step further, adding that users should habitually carry the device like a cell phone or iPod, allowing for anywhere, anytime access to information.

Koole (as cited in Marinagi, Skourlas, and Belsis, 2013), identified m-learning as the intersection of three items: the device or technology, characteristics of the student, and social aspects. The number of devices has grown exponentially over the past decade. Smartphones can provide more functionality, along with the ability to enhance connectivity with classmates and instructors. It is not uncharacteristic for a student to bring multiple mobile devices to school and to utilize them at the same time. It is socially acceptable to have multiple devices and to use them for learning, with the expectation of access from anywhere (Raza, Adenola, Nafarieh, & Robertson, 2015). We are moving toward a model where students will learn, to a small or large extent, away from the institution that will award their degree (Brown, 2014).

Crow, Santos, LeBaron, McFadden, and Osborne (2010) identified three criteria as necessary for faculty to move from e-learning to m-learning: familiarity, awareness of opportunities, and institutional support. Familiarity can range from being comfortable using a
mobile device to an awareness of the ability to integrate the device into teaching (Crow et al., 2010). Faculty members face a changing landscape when moving away from a face-to-face, strictly lecture type of instruction to more innovative, connected methods (Crow et al., 2010). There is a need for support from the institution through professional development, training, and peer modeling to help faculty to integrate m-learning into their instructional practice (Crow et al., 2010). There is a great opportunity for IT to become a strategic partner in supporting and sustaining public cloud computing technologies for teaching and learning (Brown, 2014; Kiryakova, 2017).

Adding to the criteria for successful faculty integration of technology, Hashemi, Azizinezhad, Najafi, and Nesari (2011) cited three items relevant to students’ acceptance of mobile technologies for learning: ownership of the device, multiple device ownership, and association of the device with a specific activity. Students use student-owned devices more often than devices they borrow; and access improves if there is more than one device to extend useful battery life (Hashemi et al., 2011). With the use of cloud-hosted applications, students can create a personalized use of the mobile technology, which can impact their learning choices (Abel, Brown, & Suess, 2013).

People use mobile devices such as smartphones, tablets, and even gaming devices in their everyday lives, and most learners are comfortable using them, as they are engaging and easy to use, resulting in a natural curiosity on their impact in higher education learning to ignite a student’s interest, collaborate, and to promote success (Al-Samarraie & Saeed, 2018; Hashemi et al., 2011). Society is information-driven, and mobile technology coupled with public cloud computing technologies provides students with the opportunity for spontaneous, context-driven, personalized learning (Al-Samarraie & Saeed, 2018; Shih & Mills, 2007). Learners no longer
need ties to software, hardware, or location; instead, they receive the knowledge and skills necessary to navigate a rapidly changing world successfully (Sharples, 2000). Coupling mobile technologies with cloud computing creates an architecture that is flexible and agile, and that can assist in keeping the student connected and engaged (Abel et al., 2013; Al-Samarraie & Saeed, 2018).

Students are accustomed to collaborating utilizing cloud-hosted social networking software and their mobile devices. This collaboration can lead to enhanced and increased learning through extra interaction. Engaging learners and increasing their motivation through tools they utilize in their daily lives can be the extra connection some students need to succeed. Caudill (2007) supported this approach to learning, as it provides freedom of choice by minimizing the issues of time and location, thereby simplifying the learning platform for the learner.

**Student adoption of m-learning.** Cheon, Lee, Crooks, and Song (2012) investigated the current state of students’ perceptions towards mobile learning in higher education. They wanted to know what factors were important to students in adopting m-learning and the relationships between the factors. They surveyed 189 students enrolled in a computer and IT course, and 177 responded with complete information. They developed and tested nine hypotheses ranging from attitudes toward m-learning to perceived ease of use and usefulness of m-learning. The results showed that students’ attitudes toward m-learning influenced their intentions to adopt m-learning.

On the other hand, Liu, Li, and Carlson (2010) cited the usefulness of the mobile device in m-learning as a key factor in influencing college student adoption of m-learning. In response to questions about the activities they preferred in their courses, students’ highest preference was
utilizing their mobile device to access course information (Cheon et al., 2012). The study also found that students’ self-efficacy had a direct relationship with the functions they were performing on their mobile devices, and students were more prepared for m-learning than their instructors (Cheon et al., 2012).

Kyei-Blankson, Keengwe, and Blankson (2009) revealed that students expect their teachers to integrate technology into the classroom at a greater level than they use technology. Students expected the incorporation of multimedia presentations, word processors, course management systems, asynchronous communication, social media tools, synchronous communication, statistical programs, social networking tools, user-generated content tools, and social bookmarking (Kyei-Blankson et al., 2009). The student study captured that 84% of instructors used multimedia programs in their courses, while only 27.3% reported that instructors used synchronous communication tools such as chat sessions in their courses (Kyei-Blankson et al., 2009). The familiarity students have with mobile devices, specifically for chat or texting, makes them ideal for integration into classroom learning with little to no learning curve (Najami & Lee, 2010).

Ease of use is an important fact in the adoption of m-learning (Liu et al., 2010). One student in the study by Kyei-Blankson et al. (2009) stated that the instructor took too much class time trying to figure out the technology. Another student in their study reported expecting the teacher to be knowledgeable about the various technology tools. It is also important for students to be knowledgeable with technology. When discussing the need to make pedagogical changes, Kyei-Blankson et al. identified that noteworthy changes, modifications, or improvements to classroom instructional approaches should not take place without a thorough understanding of students’ technology skills to ensure they do not become alienated in the process.
The students’ perceptions that utilizing their mobile device helped to meet their educational goals and that the faculty were not ready to adopt m-learning played a role in the adoption of the technology. Mobile devices often have limited screen size, limited storage, and short battery life. Connectivity can also play a role if the institution does not have pervasive wireless, or if the student has a limited data plan. The devices’ usefulness for completing tasks that will help to accomplish educational tasks also factors into student adoption. Cheon et al. (2012) found that ease of use and usefulness had significant relationships with attitude towards m-learning adoption.

**Digital natives – Learner changes.** In 2001, Prensky observed that the U.S. education system is mired in the past, and it is not designed to connect with and teach the students of today. In the current world, students have continuous exposure to digital content. Prensky (2001) coined the term *digital natives* to describe students who grew up using technology. Those who did not grow up using technology, but came into it later in life, Prensky described as *digital immigrants*. Dingli and Seychell (2015) likened a digital native’s mobile and wireless technological freedom to the freedom that comes from cutting the umbilical cord. The implications for colleges are many as learners change how they learn.

Contemporary students are used to receiving information quickly and often from multiple sources. They are always on, always connected. It is their mobile devices that helped to bring about this paradigm shift. Students no longer need to be tethered to learning in one physical location (classroom, library, laboratory); instead, they possess multiple wireless devices capable of acting with the full functionality of a computer for accessing online content across the world (Dingli & Seychell, 2015). Cloud computing introduces the opportunity for running applications and storing data online, which means students have even more learning opportunities, regardless
of the technology device they own or use (Dingli & Seychell, 2015). Alternatively, when in a classroom where the information stream is singular, often a feeling of disconnectedness prevails, and the learning opportunities may be less than optimal. Dingli and Seychell (2015) suggested that it is necessary to stop asking where computers are and to shift attention to how to use computers and other devices.

**Overcoming Barriers to Implementation**

Kopcha (2012) conducted a case study examining elementary school teachers’ perceptions of the barriers to technology integration after receiving 2 years of situated professional development, noting mentoring as a constructive bridge to prepare teachers to overcome gaps for effective learning by the use of technology in instruction. The teachers in the study began with full-time mentoring, and, over a 2-year period, they transitioned to teacher-led learning communities (Kopcha, 2012). In addition to examining the perceptions of teachers regarding barriers to technology integration after the 2-year period, Kopcha also sought to understand whether those perceptions changed after moving toward learning communities, what instructional practices teachers integrated into teaching, and teachers’ viewpoints on previously perceived barriers in the aftermath of the process.

As Kopcha (2012) reviewed the literature, he compiled a list of the most common barriers to technology implementation; he used them as criteria to evaluate whether there was a reduction in barriers to technology integration. These barriers included (a) technology not working properly, (b) a lack of administrative vision, (c) teacher beliefs about the usefulness of technology, (d) time restrictions, and (e) lack of professional development (Kopcha, 2012). Kopcha’s study revealed that teacher beliefs about technology underwent positive influence from their mentors’ visions for using technology and assistance in keeping the technology working;
when the mentors were skilled and positive, the teachers felt more inclined to use and confident in their abilities to integrate technology.

The one barrier that did not show improvement was the perception of time, as too many teachers are not prepared for the integration of technology in their lessons, resulting in needing additional time to become effective in the classroom (Kopcha, 2012). The in-classroom training was effective at building and sustaining technology skills and the instructional practices of the faculty, thereby reducing the perceived barrier of technology not working properly.

**Role of the Institution**

Providing the proper technology infrastructure is only part of the process for accommodating mobile technologies and m-learning. To maximize educational learning, academic and IT leaders need to be clear about the approach and goals of embracing technology in the classroom, as well as the professional development and rollout of the solutions (Attaran, Attaran, & Celik, 2017; Voogt & Knezek, 2008). Students are bringing in their devices, and they expect to be able to use them for personal, recreational, and educational purposes (Kiyakova, 2017). Simultaneously, wireless technology has matured over the last 10 years, presenting constantly evolving challenges to institutions. Moving from being an additional, nice-to-have option, technology has become a robust, reliable, and secure requirement. Institutions have risen to this challenge, and, for the most part, they provide ubiquitous wireless access.

More knowledge about how faculty are taking advantage of the robust infrastructure as well as the devices the students bring to campus each day is necessary. Indeed, Idrus and Ismail (2010) asserted that technology is no longer an issue, but the ability to embrace it to inspire and encourage students through effective teaching is what matters most. They further noted that it is
not only important to develop content for use on mobile devices, but also to design content that is transportable across multiple systems and devices (Idrus & Ismail, 2010).

A shift has been occurring from simply incorporating the technology into existing lessons to creating new, innovative ways of engaging the learner, both before and after formal instruction. This can take the form of podcasts, preclass reading or activities, and real-time quizzes with immediate feedback (Idrus & Ismail, 2010). Increasingly, the expectation is that a new type of educator will emerge as one who is both experienced in teaching with technology and open to integrating the use of mobile technologies (Idrus & Ismail, 2010).

**Role of the Teacher**

The National Educational Technology Standards for Students (NETS-S) provides educators with criteria to consider for effective implementation of technology in public education. One of the criteria is creating innovation and providing opportunities for students to explore real-world issues collaboratively (ISTE, 2013). In utilizing a virtual environment, students are increasingly able to use their mobile devices to work collaboratively and to contribute to the learning process for all.

The second set of criteria in NETS-S is creating an environment in which students can explore issues and material in a way that supports their particular learning styles, and providing them with both formative and summative assessments to inform teaching and learning (ISTE, 2013). Black and Wiliam (1998) defined formative assessment as “encompassing all those activities undertaken by teachers, and by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged” (p. 7). As such, these assessments give feedback to students regarding their strengths and weaknesses instead of merely providing a letter or number grade.
From there, students can receive additional instructional assistance in specific and targeted areas and opportunities for improvement. Formative assessment also encourages students to perform self-assessments and to take an active role in their learning (Black & Wiliam, 1998). Students need to receive timely and quality feedback; however, the feedback also needs to encourage reflection and improvement in any weak areas.

The third set of criteria NETS-S listed includes the ability to model effective use of technology by being fluent in current technologies (ISTE, 2013). Often, students are ahead of faculty when it comes to using technology. Mobile phones are no exception; however, faculty are more likely to stay current with mobile phones as they become embedded in everyday life. Simply using mobile phones to collaborate and to communicate relevant information can go a long way in supporting student learning and success. Indeed, when faculty use technological devices such as mobile phones, a learning opportunity arises for them to model proper etiquette and responsible social interactions (ISTE, 2013). They can also promote global awareness through technological interactions with others from different cultures. For example, a student could follow an author from another country on Twitter to create new connections and understandings.

Last, faculty members need to engage actively in professional growth opportunities, either on their own or through professional development opportunities at their institutions, to remain current and effective in integrating technology into teaching processes (ISTE, 2013). As faculty members get more versed in technology and integrate it into their classrooms, students can become more engaged and develop their technology leadership skills. Faculty need to evaluate and reflect on current research and professional practice on a regular basis to make
effective use of existing and emerging digital tools and resources in support of student learning” (ISTE, 2013, p. 2).

**Technology Innovations**

**Social media.** Social networking sites (SNSs) are creating new opportunities for higher education. SNSs are media with which students are familiar before they enter the college environment. Students can use this approach to research their teachers, classmates, clubs, and sports teams, so there is already comfort from the student side of the equation, turning the attention to faculty and staff to understand the fundamental changes taking place across the campus (Salaway, 2008). Indeed, this trend affects persistence rates in higher education, which are increasingly worthy of attention from faculty and administrators. Research has revealed that the more an institution can create a connected culture utilizing the cloud tools students are using in their daily lives, the more successful the college or university will be in integrating cloud-based tools that receive wide acceptance from students and in global contexts. While many instructors may see SNSs as a distraction in classrooms, students are actively leveraging SNS platforms to discuss course work, connect with their classmates outside the promoted and supported channels, and arrange study groups, indirectly affecting the teaching and learning process (Salaway, 2008). These cloud tools help students to learn wherever they choose; they provide students with support in assessing how they are doing and a clear path for where they need to go next.

The first EDUCAUSE Center for Analysis and Research (ECAR) Study of Undergraduate Students and IT took place in 2006, with each subsequent year building upon the findings from the previous year. The 2008 study dedicated two comprehensive chapters to SNSs. It revealed that 85.2% of 27,317 respondents were using SNSs (primarily Facebook) daily to
interact with friends. According to the study, age plays a role in using SNSs, with younger students paving the way. About 50% of the respondents indicated they were using SNSs to communicate with classmates about coursework. The number shrank to 5.5% of respondents using SNSs to communicate with instructors. Students in focus groups had some reservations about teachers being in their SNS space, while others liked communicating with teachers the same manner they use for friends and classmates. The study also found that there is a difference in how younger and older students handle the risks associated with using an SNS. Younger students revealed more about themselves, but they placed greater restrictions on who could see what; older students revealed less and used fewer restrictions. In summary, supporting the personal learning styles of students by championing the use of technologies they are already using provides a natural foundation for ongoing development, ultimately incorporating the various technology offerings into enhanced educational practices, ranging from Facebook to Instagram to Snapchat.

The Center for Learning and Performance Technologies, under Jane Hart, has conducted surveys for the past 11 years of learning professionals worldwide to create the top 100 and 200 learning tools from an educator’s point of view. In 2010, she received 585 responses, and in 2017, she received 2,174 responses, indicating an increased interest in cloud applications and social media as learning tools.

In 2017, Hart listed familiar sites such as Facebook, Twitter, YouTube, LinkedIn, Skype Dropbox, and Google Search as among the top 15 tools for learning. What the survey does not report, however, is how students are using these tools for learning. In 2010, Hart stated a recurring theme: learning professionals want to exploit the tools that they and their students are utilizing daily. She also asserted that most of the top 100 tools for learning are social in nature,
and they promote communication and connection between individuals, along with sharing of ideas and experiences and finally supporting the cocreation of content (Hart, 2010). This sentiment holds true today, and its relevance grows as more learning takes place remotely and on mobile devices, utilizing applications in the cloud.

In 2010, Hart listed common messages in the quotes she received from instructors utilizing social media in their classes. They included: students begin communicating with each other from the first day of class and know what their peers look like from their pictures; students are familiar with social networks so it is easy for them; and social networks really create learning communities that enhance learning. Hoffman (2009) believed that social networking, when thoughtfully implemented to support expected student learning outcomes, can offer substantial advantages for distance learning. The same could be said for the advantages of face-to-face learning, as it allows students to interact with each other and with the instructor.

In another study, Gikas and Grant (2013) found three major recurring themes in studies of mobile learning and social media, namely engaging learners through perpetual connectivity, nurturing collaboration, and enabling true learning on the move. In this context, constant connectivity is something college students have come to expect; research has found that it helps students to stay engaged in their coursework both in and out of the classroom, to become creators of content, and to receive timely, formative feedback from their instructors (Gikas & Grant, 2013). Gikas and Grant (2013) aligned with the concept that access to cloud computing through students’ personal devices facilitates engagement through constant connectivity and individual style. Students can elect to receive notifications as much or as little as they want to tie them to their learning processes. Relating to this, Clark (2010) was more specific, stating that feedback
is formative when thoughtful questioning and scaffolded instruction stimulates further inquiry, which narrows the gap between the current level of knowledge and the desired level.

The ability to type real-time messages, take and share pictures, and create videos allows students to contribute authentically in real time with their classmates (Gikas & Grant, 2013). Students can take their mobile devices, combine them with any social software or SNS, and create new avenues to communicate and collaborate beyond the classroom with their classmates or with others around the world (Gikas & Grant, 2013). Students often start and lead discussions based on small posts about one topic or another, which some have termed “user-led education” (Cobcroft, Towers, Smith, & Bruns, 2006, p. 6). Students view this collaboration as normal and expected, often conducting it while they are multitasking on various other activities.

**Bring your own device (BYOD).** BYOD refers to the use of personally owned devices to enhance learning both inside and outside the classroom. Frand (2000) asserted that students are younger than the evolution of devices in educational processes, and they are more comfortable working and learning on a touch device or keyboard than writing in a notebook, as well as reading from a computer screen than a paper textbook (Frand, 2000). Frand stated this over 18 years ago, yet it rings even truer today with the mobility of technology devices and the volume of affordable devices on the market. Students entering the job market, whether in 2000 or 2020, need to have be able to solve problems, often with very little information (Frand, 2000).

The proliferation of personal devices underscores a query made by Alexander (2004), who posed the question “How are the wireless, mobile technologies affecting the learning environment, pedagogy, and campus life” (p. 29). In the early to mid-2000s, when Alexander was researching this topic, wireless was not as pervasive as it is now; often people carried devices that were wireless, but that lacked any type of wireless connectivity. Even with this
limitation, students were well on their way to becoming content or knowledge creators and not just consumers. The devices allowed them to capture and create data in context, and not after the fact, in some computer lab or at home, which was the model decades before.

When considering the complexities of the learning process, it is important to note that Alexander (2004) asserted that people make deeper emotional connections to devices they can carry, held close to the body with the screen hidden from prying eyes. There is a call for a new educational paradigm that takes into consideration the transparency of technology in the daily lives of the current generation of learners (Najami & Lee, 2010). The faculty and students are on different levels when it comes to the ownership of mobile devices. Jones-Kavalier and Flannigan (2006) noted the discrepancy of digitally literate students outpacing instructors due to their ability to adapt and excel technologically. Students continue to bring these types of mobile devices to class, and they often receive instructions to turn off mobile devices or remove them from sight instead of using them as viable learning tools. This reality is placing additional pressure on instructors, who feel they are competing rather than collaborating with the digital world coming head on from the likes of Google and Microsoft, so they need to prepare and respond differently (Alexander, 2004).

Similarly, in 2005, Wagner wrote, “As mobile connectedness continues to sweep across the landscape, the value of deploying mobile technologies in the service of learning and teaching seems to be both self-evident and unavoidable” (p. 42). Wagner (2005) listed three variables important to moving forward support for mobile learning: (a) increased availability of wireless networks, (b) consumers’ demands for better mobile experiences, and (c) anytime, anywhere connections. These three variables are becoming increasingly relevant as the campus becomes more connected, and because students increasingly expect wireless connectivity throughout
campuses, often possess newer model mobile devices, and are always connected. Faculty in this process may well be behind.

Research has revealed that increased integration of mobile technologies can allow greater accessibility, from on and off campus, to information, thereby providing students with context-specific information at the correct teachable moment (Ting, 2013). Technology innovation is constant, and mobile devices are becoming more capable and universal. Cloud applications are creating a connectedness in the learning process that had previously been absent. In this context, Norris and Soloway (2011) reported that web surfing has decreased while app utilization use has increased, providing students with one-click access to the information they desire. Students are immersed in a digital culture, and as consumers, they know what information they are looking for, and they use an app to get there. The apps will often deliver the content in mobile format for smaller screens; otherwise, may smartphones and devices allow for two-finger zooming for easier viewing.

For many people, the line between work, home, and school has become blurred as people expect to, and others expect them to, be able to work, learn, and study at whatever time and whatever place they want with no limitations (Johnson et al., 2013). Mobile technology devices have expanded from the laptop and cellphone to include a variety of tablets, making a robust portable device affordable and commonplace, and facilitating this anywhere learning and working dynamic (Johnson et al., 2013). To prepare students to be productive in their communities, it has become increasingly important for educational institutions to embrace technological advances and to embed student-owned technology into the learning process (Summak, Samancioğlu, & Bağlibel, 2010). The fast-paced development of these technological opportunities presents new demands and challenges for educators, school leaders, and IT
personnel. As Norris and Soloway (2011) observed, there were predictions that by 2015, U.S. students from first grade to 12th grade would be 1:1 with devices inside the classroom connected to the Internet, with mobile computing devices the size of smartphones. Faculty increasingly welcome mobile devices into classrooms, yet many still instruct their students to turn them off. Common adages like “sage on the stage” to “guide on the side” and “I teach” to “we learn” suggest a shift in thinking toward a model of adopting these interactive tools. Lambert and Cuper (2008) highlighted that there are tensions between students, who are comfortable at adapting to a digital world, and educators, who struggle to keep up with an ever-changing technology landscape.

If integration is to occur, it is essential to provide faculty with the opportunity to learn how to integrate BYOD technology and public cloud computing technologies into their classrooms. When faculty are not part of the process, the mobile devices can become a distraction to learning instead of a tool for learning (Piehler, 2013). A determining factor in the integration of computers into teaching and learning can be the teacher’s pedagogical belief about how technology fits or does not fit within his or her curriculum (Mueller, Wood, Willoughby, Ross, & Specht, 2008). Understanding the impact of BYOD from a teacher’s perspective can assist institutions in decision making and planning professional development opportunities. Access to content, because of the presence of carefully integrated tools of technology that is pedagogically linked, can dynamically enhance the learning process, allowing students to follow links and dig deeper into topics of interest or things they are finding challenging to comprehend. E-text books represent a significant example of a use for mobile technology. Indeed, there will soon be a 1:1 ratio for students to bring their own mobile devices into the classroom. Due to the
cost effectiveness of smartphones, Norris and Soloway (2011) believed that smartphones, not laptops or tablets, will be the preferred method of digital learning.

**Cloud Computing on Campus**

The high rate at which IT technology changes occur places a great deal of pressure on an organization’s infrastructure, personnel, and budget (Sultan, 2010). Few people associate flexibility and agility with campus IT due to the necessary dedication of time to administrative computing and network infrastructure (Brown, 2014). Continuous upgrades of software and hardware place time burdens on IT staff and lead to considerable downtime for faculty, staff, and students. Cloud computing provides the ability to respond quickly with the proper set of resources to address each need with scalability and different cost options, including keeping pace with the rapid developments in digital technologies so that colleges and universities can better attract students and faculty (Sultan, 2010). Two trends that have been influencing the need to balance demands and risks are the rapid rate of application development in the cloud computing environment and the quick rate of adoption by faculty, staff, and students (Carraway, Cato, Chapple, Dugas, et al., 2015). Thompson (2018) described it as a push-pull type of technology and implementation, meaning that employees and cloud vendors are pushing or pulling organizations into forced adoptions of cloud technologies, creating the problem of being reactive rather than proactive.

Cloud vendors will often provide services free for a period of time, which allows users to engage without proper vetting or input from IT. The offers are attractive for services that provide convenience, mobility, social interaction, and collaboration, which can be powerful motivators (Carraway, Cato, Chapple, Dugas, et al., 2015). The central IT department, which maintains the enterprise infrastructure and applications, must ensure that the application adoptions take place
in a cost-effective and secure manner, while trying to keep up with the changing world of technology.

**Cloud concerns.** Yanosky (2010) asserted that the rise in consumer mobile devices, faster networks, and increased service would prompt a decline in the reliance on a central IT department. Yanosky projected that colleges and universities would have to devise new ways of supporting faculty, staff, and students while simultaneously looking out for the university’s best interests. IT would need to become a valued partner providing quality leadership instead of focusing on providing a myriad of services.

As computing environments have become more and more complex, IT professionals have become increasingly fluent in assessing user needs, establishing priorities, integrating disparate systems, and understanding business functions across the university (Yanosky, 2010). When personal computers emerged, business units anticipated independence from relying on central IT services. However, new services such as the sharing of files, printers, and other resources created more complex integrations, leading to user frustration and prompting the expansion of IT units, resulting in greater influence across the university. The introduction of new security issues and increased contract negotiations came with access to the Internet, websites, and web-enabled applications. The relevance of a central IT department is growing, and it continues to be critical to the university in its roles of providing IT governance, setting standards, and supporting major data centers on campus.

With the introduction of cloud-based applications, control began to shift away from the central IT department to users. Many institutions moved their e-mail systems to the cloud, with learning management systems following closely behind. Office productivity tools, collaboration software, storage sites, and raw compute power services are available at little to no cost to
anyone with an Internet connection. Students and faculty are already using many of these cloud offerings in their daily personal lives (Erçan, 2010). These new services are often available on proprietary technology, making integration with legacy systems and management difficult. With this, central IT often does not know who is conducting institutional business through these new resources, resulting in an erosion of strategy and control over the network, contracts, and major applications that is foundational to the success of higher education (Yanosky, 2010). Indeed, as Yanosky (2010) further asserted, cloud-empowered business and academic units will gain new controls beyond IT independence, potentially reallocating budget funding when central IT-delivered services become contracted business services.

Users will eventually discover the unknown reliability and viability of cloud service providers, along with the limited ability to integrate them into internal resources. Specific local needs often conflict with enterprise needs when customization is necessary, creating a struggle between IT and the user group (Yanosky, 2010). IT will need to balance security concerns with the need to advance the institution through the use of powerful new cloud-based services. Cloud computing will bring with it increased complexities that may not even be clear yet, and central IT will have to resolve them. Yanosky (2010) warned that IT will need to adapt and grow to absorb these changes and to promote business value rather than protecting a legacy.

**Outsourcing.** “Cloud computing is an evolution of outsourcing” (Muhic & Johansson, 2014, p. 554). Pardeshi (2014) asserted that adopting cloud services is adopting a form of outsourcing. The act of delegating IT decision-making rights, processes, services, and activities to an external partner, who develops, manages, and administers these activities according to defined service level agreements contained in a contractual agreement, is IT outsourcing, according to Dhar and Balakrishan (2006). Many IT service providers provide attractive
proposals, technologies, and advanced business models to stimulate top management to move to outsourcing as a sensible, low-cost alternative to on-premises solutions and staffing (Dhar, 2012). Outsourcing vendors readily embrace cloud computing as a vehicle to offer new tools and technologies with asset-free provisioning of technical resources (Dhar, 2012).

Outsourcing and public cloud computing adoption provides organizations with the ability to focus on core business activities and innovation (Dhar, 2012). The movement of legacy applications provides institutions with an opportunity to develop strategic applications that they can deploy rapidly to gain a competitive advantage (Dhar, 2012). Sultan (2010) explained that there is a shifting of responsibility to external providers for the management of software and hardware infrastructures that should result in cost savings due to a reduction in IT staff.

When there is an issue with systems locally on premises, the normal response is to rely on the knowledge and expertise of IT (Khajeh-Hosseini, Sommerville, & Sriram, 2010). When systems migrate to the cloud, and IT support subsequently reduces, there is a loss of expertise, causing uncertainty over obtaining proper support (Khajeh-Hosseini et al., 2010). Cloud providers will have many customers competing for the same level of support. The current process of demanding that central IT makes your system a priority will end, requiring a culture change on campus (Khajeh-Hosseini et al., 2010). Some IT staff will move over to become members of the cloud provider’s organization, and the IT staff who remain will need to adapt to the new set of skills necessary for cloud computing, including being more analytical, data-driven, and innovative (Hudaib, 2014; Thompson, 2018).

Economies of scale are achievable through cloud computing when different subscribers share highly scalable hardware and software resources (Marston et al., 2011). An added layer of
agility is also achievable through the ability to scale these resources up and down as demand changes:

Cloud computing is based on the time-sharing model we leveraged years ago before we could afford our own computers. The idea is to share computing power among many companies and people, thereby reducing the cost of that computing power to those who leverage it. The value of time share and the core value of cloud computing are pretty much the same, only the resources these days are much better and more cost effective. Moreover, you can mix and match them to form solutions, which were not possible with the traditional time-sharing model. (Linthicum, 2010, p. 8)

To examine the cost effectiveness of cloud computing, this next section of this review discusses the dynamics of cost in this environment.

**Cost.** The motivation for cloud computing adoption comes predominately from a cost perspective as organizations realize that capital investments in technology often go underutilized (Marston et al., 2011). Maintenance and service costs are also draining to budgets. Gonzalez et al. (2005) indicated that as much as two thirds of the average corporate IT budget goes to routine maintenance and support. Researchers have asserted that cloud computing will lower IT costs while providing technology expertise that does not have to be in house (Dhar, 2012; Gonzalez et al., 2005).

Sultan (2010) highlighted the potential of the cloud computing technology to reduce the cost of IT by removing the expense and hassle of having to install and maintain applications locally and migrating to a pay-as-you-go approach. With the reduction of an on-premises infrastructure, a significant proportion of the costs of running an IT infrastructure will reduce, and institutions can minimize the high costs of electricity consumption, particularly for cooling
(Sultan, 2010). Sultan further claimed that cloud computing would likely reduce expenditures in infrastructure and support, as well as potentially reducing labor-related costs, given that fewer staff members would be necessary to run a cloud infrastructure. Bouyer and Arasteh (2014) concurred with the possibility of a reduction in staff, and also redeploying staff to other priorities as an option. Ercan (2010) asserted that cloud computing offerings automatically reduce the cost of organization expenses, as students, staff, and faculty have on-demand, economical access through web pages to more powerful and dynamic resources than those available on campus. Ercan considered migration to cloud computing as a gradual move away from software licensing costs and hardware and maintenance costs, while providing greater flexibility for resource selection to the university.

While Maresova, Sobeslav, and Krejcar (2017) listed reductions in infrastructure, such as hardware and software, maintenance, energy savings, and staff reductions, they also cited nonquantifiable additional costs such as addressing resistance to change, transition to the vendor, and data loss/theft risks. Maresova et al. also listed unquantifiable benefits that could lead to cost savings, including freeing up staff time to dedicate to other key projects, improvement of systems to make them more reliable and resilient, and increased collaboration with those IT supports.

Seethmraju (2015) studied a group of organizations adopting an enterprise resource planning (ERP) solution, but these organizations held a different view. None in the case study believed that IT costs would go down, and three of the four organizations believed that their operating costs would go up after initial adoption. “The perceived benefits of lower IT costs though was a factor in the adoption for all the case study firms who were also pragmatic about the eventual increase of these costs in the long-run” (Seethmraju, 2015, p. 485). All the
organizations in the case study identified their inability to attract and retain qualified IT professionals as a reason to move away from an on-premises ERP solution. While vendors stressed that there were no long-term contracts or subscription fees, the organizations in Seethmraju’s study realized the potential difficulties and associated indirect costs that would result from switching vendors, also known as vendor lock-in, which the following section discusses.

**Vendor lock-in.** Cloud offerings are not interoperable, and the management of data differs amongst providers. Vendor lock-in, due to lack of interoperability between cloud providers, is possible with cloud computing due to the difficulties in moving large amounts of data or services and other technical barriers (Gonzalez-Martinez, Bote-Lorenzo, Gomez-Sanchez, & Cano-Parra, 2015). Vendors may require certain types of hardware, operating systems, or databases, which may make the cost of switching to another provider prohibitive (Tashkandi & Al-Jabri, 2015). Ercan (2010) highlighted the opportunity for flexibility and adaptability that cloud computing provides, while recognizing that different cloud service providers use different interfaces, architectures, and implementations for their customers, making it difficult to switch or potentially necessary to have more than one service provider.

Bouyer and Arasteh (2014) found evidence contrary to having more than one service provider, and they listed advantages of cloud computing such as minimizing costs and reduction of information security risks with the specific introduction of Cisco Cloud Intelligent Network and Cisco Cloud Security. Reliance upon one cloud service provider, in these cases Cisco, although innocuous at first, can lead to vendor lock-in. Another benefit Bouyer and Arasteh listed is access to centralized information stores, which they stated can lead to increased, consistent reporting. Aligning, cleansing, and importing the data from one or many systems to a
cloud service provider is no small task, and for that reason, and other similar scenarios, it can lead to vendor lock-in, as well as data security concerns.

**Data security.** Boja, Pocatilu, and Toma (2013) framed data security from two perspectives: concerns and benefits. Locating both software and data on remote servers, not administered by the central IT department, creates concerns for the security of the data as well as loss due to a hardware failure or a disaster (Boja et al., 2013). On the other hand, they asserted that, because the physical location of the data is often secret, it makes it harder for a malicious person to gain access. Raza et al. (2015) asserted the opposite, stating that if there were an increase of data from multiple cloud customers stored in a single location, it would increase the attention of hackers, who may want to gain access to large volumes of potentially lucrative data. If hackers gain access and compromise the server, it is easy and quick to replace it due to the virtualization in cloud computing (Boja et al., 2013). However, virtualization introduces new vulnerabilities, and cloud providers could create configuration and security conflicts between their environments and their customers’ environments as they both strive to secure their infrastructures, potentially using different mechanisms (Maresova et al., 2017).

Combining data into cloud computing reduces the number of servers on campus, which can lead to a reduction in shadow IT systems that users create to store and report on data that are important to them (Boja et al., 2013). With the reduced number of servers as access points to data, Boja et al. (2013) asserted that monitoring data access becomes easier and more streamlined. On the other hand, Maresova et al. (2017) reported that central IT administrators would no longer have total control over the hardware and software, which implies a reduction in control over data, coupled with universities having cloud solutions from multiple vendors (Swamy, 2013).
The transfer of existing campus services and applications from central IT administration to a cloud service provider is a complex process, which brings significant risks that are often difficult to anticipate or quantify (Maresova et al., 2017). Often, the cloud offering will require integration with campus data and systems, again incurring risks, coupled with indirect costs in terms of resources necessary to build and monitor the integration, changes in workflows, alterations of internal relationships, and retraining of staff members (Maresova et al., 2017).

Central IT staff members may be resistant to a change to cloud computing due to a lack of understanding or the fear of loss of their jobs (Maresova et al., 2017; Raza et al., 2015). Unintentionally, this fear potentially increases the risk of data loss, as employees navigate their way through the transition. It may also, without the proper security measures, provide an increased opportunity for data theft, with the increased number of cloud vendor employees, including the cloud service providers’ system administrators, involved in the handling data (Maresova et al., 2017; Swamy, 2013). In addition to the extra employees in the data equation, faculty members, while trying to be agile and innovative in their teaching practices, might inadvertently circumvent the formal checks and balances of data management, presenting risks and challenges for the university (Swamy, 2013).

*Change management.* Universities will need to employ change management, which is a component of compliance, whether their hosting is on or off campus (Raza et al., 2015). The vendor should handle requests for changes and improvements in an auditable fashion, and surprisingly, vendors appear very willing to make requested changes to enhance their offerings going forward (Seethmraju, 2015). Part of the reason for this flexibility in requesting changes is that customers now have more freedom to change cloud service providers if the services are not
satisfactory, although considering vendor lock-in concerns, this might not be as feasible as one would hope (Seethmraju, 2015).

When issues with hardware housed on campus develop, the IT department can deploy a team to fix it regardless of the time of day while following established change management processes for resolution. If the hardware is off the premises, the organization will need to wait, and it will have to depend on the cloud vendor to resolve the problem, with the potential of the vendor ignoring change management (Raza et al., 2015). IT professionals may fearfully view cloud computing as something that will reduce the effectiveness of their change management processes and procedures, resulting in a loss of control over data, increased response times, and possibly loss of jobs, which makes it critical for an organization to form a cloud strategy.

**Cloud strategy.** Universities will achieve better outcomes when the central IT department is a driving force, enabling and simplifying the adoption of cloud computing (Carraway, Cato, Chapple, Dugas, et al., 2015). Central IT needs to position the university for the transition to cloud computing and to act as a change agent for the future rather than an anchor slowing progress (Babcock, 2010). There needs to be a change in the approach and delivery of technologies between IT and academic departments to support students and faculty properly as connected learners and instructors (Abel et al., 2013). To support this change in academic technology, CIOs need to engage with their organizations to create both short-term and long-term strategies to take advantage of the benefits of cloud computing (Abel et al., 2013; Dhar, 2012; Marston et al., 2011). CIOs should also seek support from top-level management and stakeholders, given that business and academic units are increasingly adopting and transitioning to cloud computing, often without input from central IT (Carraway, Cato, Chapple, Dugas, et al., 2015).
At a university, adoption often begins with the individual for personal use, grows to adoption by a business unit, and eventually expands to adoption by the institution (Abel et al., 2013; Carraway, Cato, Chapple, Dugas, et al., 2015). In an IT department, general adoption of cloud computing often begins with a simple experimentation, and it evolves to adoption on a case-by-case basis depending on the identified requirements (Carraway, Cato, Chapple, Dugas, et al., 2015). Carraway, Cato, Chapple, Dugas, et al. (2015) identified some common progressive strategies for cloud adoption: cloud aware and not yet prepared to take on cloud computing, cloud experimentation begins by deploying some cloud computing, opportunistic cloud actively seeks cloud computing to meet new business requirements, and cloud first utilizing cloud computing to satisfy most computing needs (Carraway, Cato, Chapple, Dugas, et al., 2015).

Regardless of the strategy it chooses, there will be an impact on the central IT organization, and it will need to evolve into the new role of cloud enabler (Babcock, 2010; Carraway, Cato, Chapple, Dugas, et al., 2015). Collaboration with other areas of the university is essential, including legal for contracts and policy, purchasing for the incorporation of IT into the procurement process, and data stewards and information security for permission regarding the use, transmission, and storage sensitive data. Instead of becoming a barrier to adoption of cloud computing, the central IT department must seek to make the process transparent to campus stakeholders to streamline and support the adoption process (Carraway, Cato, Chapple, Dugas, et al., 2015). This transparency is necessary because students, faculty, and staff are often the drivers of change through demand for a product or service or through lack of use of an offering from central IT (Carraway, Cato, Chapple, Dugas, et al., 2015).

University employees will no longer be end users with little choice who had to accept what central IT provided; instead, they will be choosers of their technology (Babcock, 2010;
Carr, 2009). As the driving force shifts from the traditional technology experts on campus to students, faculty, and staff, a shift in roles and skills in the central IT department will be necessary (Carraway, Cato, Chapple, Dugas, et al., 2015). There will be an increased need for business analysts to collect user requirements given that cloud computing solutions are less customizable than on-premises solutions (Carraway, Cato, Chapple, Dugas, et al., 2015). The central IT department will now need to request involvement in discussions surrounding technology on campus, creating a position of IT Liaison to serve as a strategic partner. Project managers will also be critical, because integration and coordination between campus and the vendor will grow incrementally with cloud computing (Carraway, Cato, Chapple, Dugas, et al., 2015).

A vendor manager, a new position, will own the management of ongoing relationships between the customer and the vendor. The vendor manager will coordinate with other roles across the institution, ensuring compliance with the rights and responsibilities in the contract (Carraway, Cato, Chapple, Dugas, et al., 2015). Two other additional new positions could be cloud architect and integration specialist, responsible for designing solutions that integrate both on-premises solutions and the myriad of cloud computing solutions that institutions have begun to adopt, with a focus on security and auditing (Carraway, Cato, Chapple, Dugas, et al., 2015).

Regardless of the approach to reorganization or changes in roles, cloud computing will impose new complexities on central IT staff as they attempt to harness all its capabilities (Babcock, 2010). In this context, Marston et al. (2011) recommended forming a cloud group or committee, distinct from the current central IT staff, to reduce the chances of current practices influencing the group’s evaluation and to review new developments in cloud computing continuously. Cloud computing can empower central IT departments to enable users to obtain
the applications they need at a faster pace, without requiring a significant budget or staffing increase, thus delivering a competitive advantage to the university (Babcock, 2010; Marston et al., 2011).

To transition successfully from traditional on-premises technology infrastructure to cloud computing, a well-defined strategy and a well-thought-out architecture are necessary (Marston et al., 2011; Pardeshi, 2014). Pardeshi (2014) identified five phases for inclusion in a cloud strategy:

- Cloud preparation includes identifying the user requirements and feasibility of the project.
- The analysis phase takes users, software, and hardware requirements into consideration to help to decide what stays on campus, what can move to the cloud, and how that should happen.
- Migrating to the selected cloud platform involves selecting and contracting with a vendor and integrating the cloud solution with campus resources.
- Concluding the cloud migration includes providing training to users and migrating data and applications to the cloud vendor.
- The final phase includes contact management, vendor management, ongoing maintenance, and user support, which institutions should plan in advance and assign to specific personnel.

Pardeshi (2014) recommended this phased strategy, given that it can provide the optimal balance between keeping things on the premises and outsourcing to a cloud vendor.

This delicate balance between keeping technology on premises and outsourcing to a cloud vendor requires integration skills and a new flexibility and agility from the central IT staff.
(Abel et al., 2013; Pardeshi, 2014). Carr (2005) noted that the biggest impediment to cloud computing adoption would be attitudinal and not technological. Pardeshi (2014) recommended identifying the challenges unique to the institution and preparing the organization for the migration to cloud computing as important components of the cloud strategy. These recommendations from Pardeshi align with those of Babcock (2010), who asserted that, for the central IT department to remain a leader in moving a university forward to take advantage of all the benefits cloud computing can offer, it must be coequal with the end user in moving forward initiatives in the cloud computing revolution. Marston et al. (2011) explained that cloud computing is here to stay, and that while it would be helpful to be able to predict the future, the fluidity and uncertainty that surround cloud computing make it difficult and necessary to create a roadmap that involves all relevant stakeholders.

**Summary**

The purpose of this qualitative case study is to explore the progression of an IT department through the adoption of a public cloud computing technology at a southeastern university. Higher education IT is in the process of adopting an innovation known as cloud computing. Decisions to adopt public cloud computing technologies are taking place at multiple levels of the university, often without the input of the IT organization, resulting in missed opportunities to leverage IT expertise in those decisions as well as synergies across the university. There is a mounting concern over the exclusion of IT departments in the selection and implementation of public cloud computing technologies.

Many innovative technologies, including personal computers, the Internet, mobile computing, online learning, and server virtualization, are challenging IT professionals to think differently. Universities must keep up with how learners prefer to learn to keep up enrollment
and graduation rates. As much as universities need and want to include technology into teaching and learning, there are often barriers to implementing new technologies (Kopcha, 2012).

Some concerns over adopting cloud computing include fear of outsourcing by the central IT department, inaccurate expectations of cost reductions, vendor lock-in, and finally data security and loss of control, as information storage is now off premises under the control of the cloud computing vendor. Keeping these cloud concerns in mind, CIOs need to engage with their organizations to create both long-term and short-term strategies for the adoption of cloud computing. This study on the impact and changes of cloud computing on an IT department can benefit organizational leadership, CIOs, central IT staff members, deans, department chairs, and faculty based on the conclusions it draws and the implications for technology in higher education.

Chapter 3 focuses on the methodology for this study as well as the research approach, paradigm, and tradition, and it is organized by identifying the participants and the procedures the researcher utilized to solicit their participation, sample interview questions, and specific data collection, storage and analysis steps. It addresses ethical considerations, as well as the trustworthiness and credibility of the data. The chapter concludes with a discussion of researcher bias and the potential limitations of this study.
Chapter 3: Methodology

The purpose of this qualitative case study was to explore the progression of an IT department through the adoption of a public cloud computing technology at a southeastern university. The public cloud computing technology identified for this study was Office 365 and was retrospective in nature. The research question explored for this study was: How did an IT department at a southeastern university progress through the adoption of a public cloud computing technology? Chapter three focuses on the methodology used in this study as well as the research approach, paradigm and tradition. The participants and the procedures the researcher utilized to solicit participation, a sample of the interview questions, and specific data collection, storage and analysis steps conducted are detailed. Ethical considerations, trustworthiness, and credibility of the data collected are addressed. The chapter concludes with a discussion of researcher bias and potential limitations of the study.

Qualitative Research Approach

Broadly defined, qualitative research involves situating the researcher into the natural setting of the phenomenon being studied in an attempt to make sense through the use of interviews, field notes, conversations, pictures, memos and recordings making the world visible in a different way (Denzin and Lincoln, 2011). Miles, Huberman & Saldaña (2014) listed a main feature of well-collected qualitative data, focusing on naturally occurring, regular events to provide an accurate portrait of lived experiences.

Creswell (2008) listed the characteristics of qualitative research including the need to listen to participants’ views in research, the need to ask open-ended questions in the participant’s environment, and the need to understand the role research has in advocating for making individuals’ lives better. With these characteristics in mind, coupled with the research question,
the researcher chose to perform a qualitative study for this investigation. Miles et al. (2014) asserted that qualitative data emphasizes participants’ lived experiences, making it an essential tool for understanding the meaning individuals place on processes, events, and structures in their lives.

Denzin and Lincoln (2011) asserted that qualitative researchers stress that the inquiry for qualitative research can be shaped through the socially constructed nature of the phenomena and the close relationship between the researcher and subject of the study. Miles et al. (2014) and Stake (2010) highlighted the importance of the feature of “thick descriptions” which are gathered from a real context and which reveal complexities and connections to research literature with which readers can identify.

**Relevance to Theory**

The application of Rogers (2003) diffusion of innovation theory also informed the choice of a qualitative study approach. Rogers (2003) asserted that the diffusion of an innovation will lead to an altered structure and function of a social system. Utilizing a qualitative study approach allowed this researcher to more thoroughly understand the relationships between the four components of the diffusion of innovation theory: innovation, communication channels, time, and the social system. Quantitative and positivist approaches are limited when studying processes and relationships. The social structure of the case was bounded in the IT department at a southeastern university. Rogers (2003) describes diffusion as an alteration, or social change, in the function and structure of a social system. The use of a qualitative study approach was fundamental to discovering firsthand accounts through interviews of how the members of an IT department at a southeastern university described and interpreted the progression through the adoption of a public cloud computing technology.
Paradigm

For the purpose of this study, exploring the progression of an IT department through the adoption of a public cloud computing technology, this qualitative inquiry fell within the constructivist-interpretivist paradigm. Constructivist-interpretivists generally contend that the mind of an individual is deeply involved in the construction of reality, and that reality is not a single truth or entity (Ponterotto, 2005). The constructivist-interpretivist also maintains that deep reflection is necessary to bring meaning to light and that this can be achieved through interactions between the researcher and participant (Ponterotto, 2005). This paradigm supported the researcher’s intention to develop new knowledge based on a thoughtful inquiry that explored the perspectives and points of view of the members of an IT department who progressed through the adoption of a public cloud computing solution.

Research Tradition

The researcher conducted a single case study, classified as an intrinsic case study, to explore the progression of the adoption of a public cloud computing technology in an IT department at a southeastern university (Yin, 2018). Yin (2018) and Stake (1994) described a single case study as an in-depth exploration of a unique, bounded system within its real-world context; in this study, the unique bounded system was the IT department at a southeastern university who had moved into a public cloud computing model from a previous on-site, traditional approach to campus technology. Understanding the contemporary phenomenon of public cloud computing adoption in higher education requires an in-depth examination of the perspectives and experiences of the IT department given that their members have shared this transitional phenomena and accompanying beliefs and language over time (Creswell, 2008; Yin, 2018). While IT departments at universities possess many of the same characteristics, they are
never exactly the same, which supports the assertion by Miles et al. (2014) that researchers must bend their methodology to suit the uniqueness of their case and then assemble and analyze the data they have collected in the field.

An intrinsic case study was chosen because a specific group, the IT department, was itself of primary interest in this research study. As public cloud computing adoption continues to grow the researcher deemed it important to understand it from the IT department’s point of view rather than seeking insight into public cloud computing.

Miles et al. (2014) suggested that researchers should aim to capture “an individual or social process, a mechanism, or a structure” (p. 7) that lies at the core of an event to provide a casual description of the underlying forces at work. Human relationships and societies cause researchers to contend with the many different conventions, practices, institutions and structures that people employ and which make qualitative studies more complex than quantitative data collection and analysis. To support this complexity, the researcher gathered data from multiple sources, triangulated through interviews with IT staff members employed in diverse roles, an analysis of documents related to the Office 365 adoption provided by the participants, and individual observations of processes and tools utilized in the adoption of Office 365 (Yin, 2018).

Participants and Access

For the purposes of this research study, the unit of analysis was the IT Department within a higher education institution in the southeast. The intrinsically bounded context of the IT department can be viewed as a representative or typical case and will allow the researcher to develop a deeper understanding of how the IT department progressed through the adoption of Office 365 (Merriam, 1998; Yin, 2018). Merriam (1998) asserted that the most effective sampling strategy is purposeful, non-probabilistic, non-random, given that the researcher wanted
to explore, and gain insights as opposed to answering how many, how much, or how often. The researcher aimed to select the most information-rich sample from which the most knowledge could be gained.

The site that was purposively chosen for the case study was a four-year public university located in the southeast. The researcher selected Heusser University (pseudonym) which provides high-quality programs at the baccalaureate and master’s level as well as a growing number of doctoral programs. Nearly 16,500 students were enrolled at the time of the study, with distance education and international numbers on the rise. The IT department had recently transitioned from a reporting structure under the Academic Affairs department to the Business Affairs department, and it had a relatively new Chief Information Officer.

Purposeful sampling with maximum variation was utilized to select 13 participants from 18 volunteers. Maximum variation was achieved by examination of attributes including work role, years of experience and gender. This sampling strategy allowed the researcher to focus on those who were involved in the implementation and adoption of Office 365 and to acquire sample as diverse as possible. See Chapter 4 for details regarding the sample chosen and individual descriptions.

**Recruitment and Access**

Following the approval from the Northeastern Institutional Review Board (IRB) and a senior level administrator at the research site, the researcher contacted, via email, all members of the IT department at Heusser University requesting that they participate in the study. The email (Appendix A) succinctly described the purpose of the study and the time commitment required from the participants -- approximately 45 minutes to one hour. The email also requested the respondents provide the researcher any documentation the participant believed would be useful.
in obtaining relevant information regarding the planning and implementation of Office 365. Lastly, it was requested that the participant permit the researcher the opportunity to observe them for approximately 10-15 minutes in the workplace setting while interacting or administering Office 365. Participation was voluntary throughout the process and all participants signed and received a copy of an Informed Consent document (Appendix B) after the researcher had verbally discussed the study with them and answered all questions they had regarding participation. The participants were provided a $15 Starbucks gift card as a gratitude honorarium for their assistance in this project. One participant declined the gift card.

**Procedures**

Once IRB approval was obtained (Appendix B), a recruitment email was sent to all members of the IT department at the selected case site. The email outlined the parameters and scope of the study (Appendix A). It included the study purpose, informed the participant that participation was voluntary, and they could withdraw at any time, and requested documents they believed would be pertinent to this research study. Members of the IT department who volunteered to participate emailed the researcher at her NEU email address. The researcher then replied and asked for availability and preferred location for the interview.

**Data Collection**

Yin (2018) identified six sources of evidence most commonly used in case studies as documentation, interviews, physical artifacts, direct-observation, participant-observation, and archival records. This research study included interviews, documentation, and direct observations for ample triangulation. The researcher consistently used pseudonyms for the participants to fully comply with confidentiality during the data collection process and will continue to use in any subsequent publications or use of the material collected.
Yin (2018) lists four principles of data collection: 1. Use multiple sources of evidence, 2. Create a case study database for organizing and documenting data collected, 3. Maintain a chain of evidence for construct validity, and 4. Exercise care if using social media to collect data. This study implemented all principles except the last as no social media sources were utilized to collect data. The primary sources of data for this research study were interviews and observations.

**Interviews.** Interviews were conducted one-on-one with each participant and lasted from 45 minutes to one hour. The researcher took brief notes during the interview as well as audiotaped using an iPad and iPhone for backup. The audio files were transcribed into Word using the Temi transcription service and pseudonyms and other de-identifying labels were used for participant information. The researcher asked for the participant’s permission before beginning to audiotape. The interviews took place in either the participants or researchers office. The researcher asked each participant to sign a consent form to participate in the study. The researcher conveyed the purpose of the study, the time the interview would take, the plans for use of the research results, and access to a summary when the research is complete (Creswell, 2008). The interview protocol consisted of 24 open ended questions (Appendix C) providing the researcher the ability to ask further probing questions when more information was deemed necessary.

One of the key skills of a researcher is good listening during the interview. This researcher aimed to listen and understand while following the interview question list with some flexibility following the conversational lead of the participant and resembling guided conversations (Creswell, 2008; Yin, 2018). If during the interview more detail was needed on a question, the researcher elicited more information often using a “how” question instead of a
“why” which could have created defensiveness on the part of the participant (Yin, 2018). The researcher probed to obtain more in-depth answers as to provide clarity by soliciting greater detail (Creswell, 2008). The researcher concluded the interview by thanking the participant and provided an assurance of the confidentiality of responses.

The researcher transcribed each interview within one week and provided it back to the participant for verification along with any additional questions. After the first two interviews were conducted, the researcher revisited the interview questions and made some modifications and additions to better glean information about the planning, implementation and adoption of Office 365 from the participants. The interviews were conducted over a time period of two months in either the researcher’s or participant’s office.

Observation. The researcher scheduled brief 20-minute periods of observation of the IT department participants in their workplace as they interacted with Office 365 to observe challenges and forms of adaptation. The researcher observed and took notes as the participants interacted with different applications and tools within Office 365 utilizing iPhones, iPads and desktop computers. The interactions were varied and depended on the participant’s role within the IT department. Observations of the IT group in action provided information that complemented the interviews, added new dimensions for understanding the adoption and use of Office 365, and were conducted in each participant’s office (Yin, 2018). The observations were transcribed into a table format within one week of the observation to preserve the best recollection of the notes by the researcher.

Documents. Yin (2018) asserted that a valuable source of information in qualitative research is in documents which can be paper or electronic and public or private records. Meeting agendas and minutes, memos, emails, letters, formal studies or evaluations and personal
documents such as notes or diaries are all good sources of document data (Yin, 2018). Yin (2018) listed the more important use of documentation as the corroboration or augmentation of evidence from other sources. Yin (2018) cautioned the researcher to critically look for the underlying objectives in each document or communication in order to reduce the likelihood of being misled or misinterpreting the documentary evidence as the document was not produced for the purposes of the case study. Documents provided to the researcher included emails, project plans, lessons learned and a request for proposal. The researcher examined the documents for accuracy and applicability to the research study after the initial coding had been completed for the interviews and observations. The documents were stored electronically in the cloud Google drive of the researcher with password protection. Notes were taken on each document and utilized during data analysis.

Data Storage

All electronic files were stored on the researcher’s home computer and in Google Cloud accessible only to the researcher through two-factor authentication. All recorded interview files were stored on a password protected iPad and iPhone. Once the transcription of each audio file was completed, it was deleted from the iPad and iPhone. Paper copies of documents obtained and used during the research process were scanned and stored on the researcher’s home computer and stored in a locked file cabinet, accessible only by the researcher. All handwritten notes were placed in a locked file cabinet in the researcher’s home, to which only the researcher has access. Lastly, prior to data analysis, each participant had the opportunity to perform member checking of the transcripts via email to correct or amend data collected during the interview process.

Data Analysis
Although Yin (2018) is the primary seminal author providing the roadmap of procedures and design with which this case study will follow, data analysis guidance will also be provided by Thomas (2006) and Merriam (1998). Inductive data analysis primarily refers to the detailed readings of raw data to create themes and concepts as identified by the researcher’s interpretations will be utilized for this study (Thomas, 2006). The researcher began by reading through each interview transcript and the notes taken during the interview process simultaneously as interviews were conducted (Merriam, 1998). This was helpful and informative as ongoing analysis provided illuminating data informing the rest of the research process (Merriam, 1998). The researcher read through the documents a second time creating high level themes and then lower-level themes, known as in vivo coding, and developed categories based on the evaluation and interpretation of the raw data. The researcher made decisions about what was more important and what was less important while rereading and coding the raw data (Thomas, 2006). The outcome of the inductive analysis was the development of categories that summarize the raw data and identifies themes (Thomas, 2006).

Utilizing inductive coding, specific text segments were used to identify categories (Thomas, 2006) and comments were placed in columns of an Excel spreadsheet. This was done first for the interviews with each participant having their own color and column in the spreadsheet. This process was repeated for the observations. The researcher then proceeded through the categories reducing any overlap and redundancy to represent only the most important categories (Thomas, 2006). The researcher combined and eliminated categories to ultimately provide a category labels used to refer to each, category descriptions to denote the meaning of the category, and text to illustrate the meaning of each category (Thomas, 2006). Lastly, the
researcher reviewed the documents provided to confirm the categories created by the analysis of the interviews and observations.

Once the spreadsheet was complete, the researcher had large copies printed at a local printing company to better view the data. Each category was hung on the walls in her office to have a continuous view of the data. Whiteboards were used to created mind maps of the data to visually represent the connections between the data (Figure 3.1). From the mind map, five themes and fourteen subthemes were created delineating the progression of the IT department through the adoption of Office 365.

![Figure 3.1. Initial Mind Map During Data Analysis](image)

**Ethical Considerations**

Researchers must adhere to strict ethical standards. In the case of qualitative studies, ethical dilemmas can emerge during the collection of data regarding openness to contrary evidence, ensuring accuracy, and avoiding deception (Yin, 2018). The researcher-participant relationship is of the utmost importance, and the participants must be protected from harm, be provided with identity protection and privacy, and be presented with accurate informed consent forms (Yin, 2018).
Prior to conducting the interviews, the researcher obtained informed consent from the participants. Modeled after Yin’s (2018) human subjects protection guidelines, the following was included in the informed consent process: (a) The purpose of the study and formally requesting they volunteer for the study; (b) Discussion of their ability to withdraw from the study at any time and all data collected from them will be destroyed; (c) Explanation of the measures that will be taken to protect their privacy and confidentiality; and (d) Risks of participating in the study will be detailed and questions addressed.

**Trustworthiness**

Yin (2018) listed triangulation as a method for enhancing trustworthiness and construct validity. Triangulation imposes a greater burden on the researcher however can answer questions such as how the researcher can eliminate bias and how the researcher can be considered a valid instrument for a study by utilizing multiple sources to confirm the emerging findings (Merriam, 1998; Yin, 2018). Interviews, documents and direct observation were utilized in this study to construct plausible findings.

In addition to triangulation, the researcher used member checks along the course of data collection and analysis. Merriam (1998) described member checking as going back to those from whom the data was gleaned and verifying the results are plausible. Finally, a colleague was solicited to review themes and quotes without any identifying information for confirmability (Miles et al., 2014).

**Credibility.** Yin (2018) listed desired skills of a researcher to include the ability to ask good questions, the capacity to be an unbiased listener, adaptability and flexibility, and a strong comprehension of the issue being studied. This researcher reviewed each interview transcript immediately after it was completed in order to assess why facts appeared as they did and to
continually identify where there was room for more evidence collection. Adaptability and flexibility were critical for identifying new data and evidence. Listening involves more than hearing, and this researcher included observing the participant for visual information and created an emotional connection with the participant (Yin, 2018). Lastly, the researcher possesses a good understanding of public cloud computing, she understands the purpose of the study, and possesses a thirst for learning more and providing information that will be useful to others as they seek to implement public cloud computing solutions.

**Transferability.** Ponterotto (2006) presented the essence of a thick description as promoting a “thick interpretation” through the provision of details that connect parts and pieces similar how a tree trunk is connected to its branches and the branches to their leaves. This research provided thick descriptions that conveyed linkages between themes and categories and presented them in such a way that the reader could determine whether they apply to their institution. There may be many or few pieces of the thick description which describe or interpret the observations, interactions and data collected to support a connection to another university. It is these pieces of connection and understanding that allow for transferability.

**Potential Researcher Bias**

“Today’s students are immersed in a variety of technologies from a young age. As such, they have been described as “wired” or “digitized” but even these tags are outdated almost upon arrival” (Lambert & Cuper, 2008, p. 264). As an implementer of technology on higher education campuses, my perception is that people managing technology are almost certainly always a step behind the students, which creates tensions inter-institutionally as faculty and administrators attempt to constantly remain up to date with transformations in computing. As Lambert and Cuper (2008) stated, “Ironically, such familiarity and comfort with all things digital present
challenges for educators who struggle to keep up with an ever-changing technology context and students who no longer process information primarily in a sequential manner” (p. 264).

Indeed, in this context, the State Educational Technology Directors Association (SETDA, n.d.), a not-for-profit 501(c)3 launched in 2001 by state education agency leaders who represent emerging and interests and needs in technology use for teaching and learning, described a 21st Century learning environment as “well-equipped with computer hardware, software, electronic whiteboards and rich digital and online curricular resources” (p. 1). Additionally, SETDA asserted: “The 21st Century Classroom not only has modern tools, equipment and content but it includes a teacher trained to use the tools effectively with innovative teaching approaches that integrates the interactivity and engaging content technology brings to curriculum” (p. 1). By simply placing technology on a campus, the expectation is that it will be used effectively. The transitions to higher levels of technological implementation, however, are highly complex, a phenomenon this researcher has observed directly.

The difference today is that the technology on campus is not only placed there by the institution, but it is brought in in a complex myriad of channels by the faculty, staff, and students. Cell phones, smart phones, and tablets are among the devices carried by most on campus who are accessing applications hosted in the cloud. With this influx of technology on campus, I see my role as Chief Information Officer (CIO) changing to reflect a needed influence on the institution’s mission and strategic vision instead of focusing on purely technical issues. From my direct experience, the CIO is constantly faced with budget reductions and concerns. I view the adoption of public cloud computing technologies as an opportunity to free up existing staff members and resources to better serve faculty, staff, and students with more innovation and research. I fully understand this is a fundamental cultural shift from the way many institutions
have been offering services and support. I have directly observed and understand the need to retool or change skill requirements to meet this disruptive technology innovation head-on.

**My Background.** I began my career in the corporate world over 25 years ago. I made the move into higher education about 17 years ago when I became an adjunct instructor of data communications and introduction to networking classes at a community college. I became all too familiar with the stress technology can cause when it does not function properly in the classroom. Although I was skilled in the use of technology, when technology in the classroom failed, it caused a loss of my valuable instruction time and threatened my credibility with the students, who were quite tech-savvy. I believe simply being skilled in a technology does not necessarily guarantee proper integration into teaching and learning, a phenomenon I directly experienced. Bridging this technology-pedagogy-instruction gap thus becomes the responsibility of the institution.

After three years of teaching, I moved to the IT department full-time as a network analyst. Having just been appointed as a faculty member, I was hyper-aware that we needed to provide better classroom technology for teaching. To this day, I maintain the memory of how it feels to be unfamiliar with a technology and to have a technology application fail while in front of a class. In my position as CIO at my institution, I want to enhance the agility for all users we serve through IT support. I believe I have an even greater responsibility to ensure that technology works, and that the institution is prepared to use it.

**Positionality.** Positionality can involve one’s culture, religion, sex, race, gender, social standing, and economic status, among many other things that all influence one’s perceptions. Briscoe’s (2005) concept of “other” is essential here, and it begs the question: Should the person who is researching and representing the experiences of others be a member of that group or a
member of another constituency? We all bring unique experiences to all that we do, and those experiences can impact our perceptions of situations and the perceptions that others have of us. I opine that it can be helpful to be a member of the group/subject being researched. At the same time, not being a member of the group can give insight that might otherwise not have been realized. Briscoe (2005) wrote: “The greater the number of interpretations, the fuller our understanding of other’s experiences will become” (p. 35). Therefore, serving simultaneously as an insider and an outsider can enrich the qualitative research process.

In addition to being a teacher and holding a leadership role in the field of information technology, my role as a researcher simultaneously gives me insight, and perhaps a modicum of additional bias, into how I feel technology can and should be used at an institution. Looking around the room at every meeting, almost every person is glued to a laptop, iPad, tablet, or smartphone. It is easy to get distracted with the myriad of devices and levels of connectivity we all have, all the time. Couple the devices with the vast array of available cloud computing technology solutions and it makes for an interesting mix of decisions surrounding what we can offer and at what adoption rate.

I have many lenses from which to view public cloud computing technology and its impact to faculty, staff and students. As a student, I often wondered why I did not have a greater exposure to the technologies I would be using when I graduated. As a faculty member, I have been in front of a classroom where technology was not at the level the students demanded. It created a tension between their expectations and what I could deliver. As a CIO, I have budgetary and security considerations which could delay or prevent the adoption of a technology solution impacting teaching and learning. While I have always been and continue to be a strong advocate for appropriate technology use on campus, I believe these lenses will help to formulate
comprehensive research questions through the integration of my various roles and experiences. I will need to exercise care not to incorporate my opinions or beliefs into the research I conduct.

**Limitations**

Limitations for this study exist and need to be addressed. One limitation of this study was that faculty and students were not included in this study. This narrowed the scope of the results to a limited population and to the limited experiences of the IT department. This study risked failing to include IT departments from other schools in the southeast or other geographical locations in the United States.

The second limitation of this study was the composition of the IT staff included in the sample. The skillsets of the IT department can vary and without including all members of the IT department it is not possible to represent all perspectives. Lastly, incorporating members from the distributed IT groups that exist on campus could have added another dimension to the findings in this study, which would temper the limitations.

**Conclusion**

The use of a qualitative methodology to explore the progression of an IT department through the adoption of public cloud computing in a higher education institution located in the southeast provided the opportunity to take a deeper dive into the experiences of the IT staff members as they progressed through the adoption of Office 365 and provided insight for future public cloud computing implementations. Including IT staff members from different groups within the IT department, genders, and lengths of IT experience provided valuable information from various perspectives which added another level to the data that is available regarding the implementation of public cloud computing technologies in higher education.
Chapter four will detail and describe the analysis and findings from the interviews, document and direct observation.
CHAPTER 4: Findings

Introduction

The purpose of this qualitative case study was to explore the progression of an IT department through the adoption of a public cloud computing technology at a southeastern university. The study was designed to capture and identify themes extracted from participant accounts, observations and documents of how they experienced and progressed through the adoption of Office 365, a public cloud computing technology. Data collection for this study was guided by the following research question: How did an IT department at a southeastern university progress through the adoption of a public cloud computing technology?

This chapter focuses on the findings based on participant interviews, observations, and document analysis. The five identified themes are presented in the order in which the participants progressed through the Office 365 implementation: 1) Perceived Needs Lead to Selection of Office 365, 2) Lack of Office 365 Knowledge Causes Concerns, 3) Introducing Change and Generating Awareness, 4) Feelings of Loss of Control, and 5) User Adoption of Office 365 Drives Change. The chapter is organized into two sections. First, an introductory section describes the setting and participants. Next, a detailed description of the findings from the data analysis are presented. The setting and the participants in this study have been assigned pseudonyms for confidentiality.

Description of Case

Campus Description

Heusser University recently celebrated a milestone anniversary and is experiencing growth in undergraduate and graduate programs and enrollment. The campus continues to undergo major development as evidenced by the many construction projects including a new
Science Technology Engineering and Math (STEM) building and new student housing. The capital projects underway total almost half a billion dollars in investment by the university. Heusser’s retention rate is above 80% and graduation rates hover around 80%, ranking high amongst their peers.

Entering onto the campus, visitors, university personnel and students alike are greeted with manicured grounds, brick buildings, and the university mascot centered in the main traffic circle. During graduation, students donned in their cap and gowns flock to this location for memorable pictures. Due to the sprawling campus, you may notice students riding bicycles and long boards, to get around, possibly heading downtown to attend a free concert series in the warmer months. If biking, long boarding, and trips downtown do not keep the campus active, campus also offers a state-of-the-art recreation center with indoor track and swimming pool. A focal point on campus is a long beautiful walkway from the front of campus to the student housing with brick pavers and light posts adorned with banners that contain statements of encouragement for students. Progressing down the pathway, one might notice that student groups have used chalk to write invitations of meetings and messages that raise awareness on important topics.

**IT description**

IT is a department within one of the major divisions of Heusser University and is led by a Chief Information Officer. IT consists of six primary functional areas with around 100 full-time employees and additionally employs between 50 and 80 student employees, interns, and temporary workers each semester serving students, faculty and staff. IT has a Help Desk presence in the university library with walk-up areas that are always active so faculty, staff and students can stop by for assistance. Open until midnight, IT is ready to accommodate the late-
night study efforts of the students as well. Table 4.1 lists the breakdown of the IT department by organizational area.

<table>
<thead>
<tr>
<th>Primary Area</th>
<th>Sub-Areas</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office of the Chief Information Officer</td>
<td>Chief Information Officer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Leadership Team</td>
<td>6</td>
</tr>
<tr>
<td>Client Support (CS)</td>
<td>Client Solutions</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Help Desk</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Integrated Educational Technologies</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Learning Management Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Training and Communications</td>
<td>4</td>
</tr>
<tr>
<td>Enterprise Applications (EA)</td>
<td>Application Development</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Student Information Systems (SIS)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Application Support</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Operational Reporting</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Web Support</td>
<td>2</td>
</tr>
<tr>
<td>Network and Infrastructure (NI)</td>
<td>Compliance</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Network</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Enterprise Infrastructure</td>
<td>10</td>
</tr>
<tr>
<td>IT Security (ITSec)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Project Management (PM)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Business Services (BS)</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.1. Information Technology Department and Organizational Areas

Participants

Eighteen IT members volunteered to participate, including 6 females and 12 males.

Three volunteers had less than three years’ experience in IT and expressed they had little to no involvement with the implementation of Office 365. Two volunteers migrated into IT from another division and were not involved with the Office 365 implementation. Therefore, these five volunteers were not included in the findings. The remaining 13 volunteers served in various roles throughout the Office 365 implementation process and were included in the research study.

Participants selected their own pseudonym utilized in the study. The characteristics of each participant are presented in Table 4.2. Six participants had between 5 and 15 years of experience in the IT department; Six participants had between 16 and 25 years of experience in the IT
department; and, lastly, one participant had greater than 26 years of experience in the IT
department.

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Area</th>
<th>Years in IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bella Dog</td>
<td>Male</td>
<td>Enterprise Applications</td>
<td>5 – 15</td>
</tr>
<tr>
<td>Camel Wednesday</td>
<td>Male</td>
<td>Enterprise Applications</td>
<td>5 – 15</td>
</tr>
<tr>
<td>Chet Squirrel</td>
<td>Male</td>
<td>IT Security</td>
<td>5 – 15</td>
</tr>
<tr>
<td>Dylan Anderson</td>
<td>Male</td>
<td>Network &amp; Infrastructure</td>
<td>16 – 25</td>
</tr>
<tr>
<td>Gemma Miller</td>
<td>Female</td>
<td>Business Services</td>
<td>16 – 25</td>
</tr>
<tr>
<td>Hawkeye Packet</td>
<td>Male</td>
<td>Network &amp; Infrastructure</td>
<td>5 – 15</td>
</tr>
<tr>
<td>Jean Paul</td>
<td>Male</td>
<td>Project Management</td>
<td>5 – 15</td>
</tr>
<tr>
<td>Linda Pickens</td>
<td>Female</td>
<td>Client Support</td>
<td>16 – 25</td>
</tr>
<tr>
<td>Lola Pitt</td>
<td>Female</td>
<td>Network &amp; Infrastructure</td>
<td>16 – 26</td>
</tr>
<tr>
<td>Perry Seuss</td>
<td>Male</td>
<td>Network &amp; Infrastructure</td>
<td>26 or greater</td>
</tr>
<tr>
<td>Shad Maloney</td>
<td>Male</td>
<td>Network &amp; Infrastructure</td>
<td>16 – 25</td>
</tr>
<tr>
<td>Sue Sunshine</td>
<td>Female</td>
<td>Client Support</td>
<td>16 – 25</td>
</tr>
<tr>
<td>Tom Samsung</td>
<td>Male</td>
<td>Network &amp; Infrastructure</td>
<td>5 – 15</td>
</tr>
</tbody>
</table>

Table 4.2. Participant Attributes

**Bella Dog**

Bella has worked in ITS for greater than ten years. He has worked in different roles
throughout his tenure, including the positions of custom application development and integrator
of vendor systems. Bella was involved in the selection of Office 365, helped develop the
communication plan for the Office 365 implementation, and evaluated the integrations with other
university systems necessary for the implementation of Office 365. Bella speaks softly and
when he speaks about the collaborative nature of Office 365, he uses phrases like “This was just
incredible” and “Really love that.”

**Camel Wednesday**

Camel has worked in IT over fifteen years and currently serves as a programmer. Camel
was part of the pilot group; however, his recall of the Office 365 implementation was limited. At
times during the observation, he was unclear of how to utilize the new functionality within Office 365. Camel expressed an eagerness for his continued exposure to the new applications within Office 365 though participation in future IT brown bag sessions - a place and time where new technologies are discussed.

**Chet Squirrel**

Chet has been with IT for almost ten years in the information security area. Chet was responsible for implementing the security applications contained within Office 365. Chet spoke in a reserved manner about the continuous implementation of new security tools and functionality provided in Office 365 and was careful to not display any confidential information as we progressed through the observation.

**Dylan Anderson**

Dylan has worked for IT for over fifteen years. Dylan was involved in selecting vendor services for migrating the on-premise email infrastructure to Office 365 in the cloud. He manages the staff who is responsible for administering many Office 365 applications and any integrations required with other university applications. In addition to his managerial responsibilities, Dylan is responsible for the licensing and administration of Office 365 and often interfaces with Microsoft Support.

**Gemma Miller**

Gemma has been a part of the IT department for close to twenty years. She works in the Business Services area and was involved in the Office 365 implementation from the budget and finance perspective. Gemma focused on negotiating the licensing fees for Office 365 and ensuring students had access to the software necessary to support their academic success. Many
of Gemma’s responses highlighted her focus on providing premier support and services to all students.

**Hawkeye Packet**

Hawkeye has worked in IT for over five years in network and infrastructure services. Hawkeye was charged with replacing the on-premise Exchange email environment by the Chief Information Officer at the university. Hawkeye desired to make the transition as simple as possible for the university while providing the required services and adding resiliency in the event of a natural disaster.

**Jean Paul**

Jean has been with IT for almost 15 years and works in the project management area. Jean was the project manager on the Office 365 implementation and was by far the most knowledgeable about the selection and implementation process. Although all participants were asked to provide documents relevant to the progression of the adoption of Office 365, Jean provided the most robust documentation of all participants which supported participant experiences as they were expressed to the researcher.

**Linda Pickens**

Linda has worked in IT for close to 20 years as a programmer. Linda was part of the pilot group and was directed to use the Office 365 applications for collaboration and documentation as required for her role. She was very soft spoken and described her early interactions with Office 365 as being intimidating. Linda recalled that IT was asked to test and provide feedback on Office 365, but she was not sure of the process. Linda shared positive experiences with Office 365, and she continues to adopt applications within Office 365 for use in her daily work tasks.
Lola Pitt

Lola has been with the university just over 15 years and serves as one of the Office 365 administrators. Lola was part of the pilot group and was involved with implementing almost all the applications within Office 365. Her involvement with the implementation grew as campus users started to adopt applications that required her support and administration services. Lola strives to be knowledgeable and responsive to campus needs. However, she expressed that Microsoft Support has not lived up to her expectations.

Perry Seuss

Perry has been with IT for over 26 years. Perry was involved in the pilot group for IT and served on the early adopters’ team that was formed to look at the new Office 365 applications. Although this group no longer formally exists, he continues to work with the Office 365 administrators to learn new applications and integrate some into his work practices as evidenced during the observation.

Shad Moloney

Shad has worked in IT for over 21 years - as a Systems Analyst role for 10 years and in computer operations role for 11 years. Shad was part of the pilot group with his involvement in the implementation growing after the initial migration to the Office 365 cloud platform. Shad thought the pilot group eased IT into Office 365 and recalled that no major issues were encountered. He described his daily responsibilities increasing during the implementation because work processes changed, with some becoming very cumbersome, such as the application of licensing to accounts.
**Sue Sunshine**

Sue has worked in IT for almost 20 years and explained she has held several positions within IT. Now she is in the client services area. Sue was very involved in the selection and planning for the implementation of Office 365. Sue relayed that the university had several requirements about data that needed to be met before a tool could be selected and implemented. Sue’s focus for the implementation was ensuring a standard configuration for Office 365 installations which would make it easier to support coupled with a consistent message to campus to ease the transition to Office 365.

**Tom Samsung**

Tom has worked for IT for just shy of 15 years and serves as one of the Office 365 administrators. As an administrator for Office 365, Tom was very involved in the migration of the local on-premise email infrastructure to Office 365 in the cloud. Tom expresses that his responsibilities have increased as Office 365 is more of a hybrid system that requires him to manage systems both on-premise and in the cloud. Tom is responsible for the ongoing administration of Office 365 and has had many negative experiences with Microsoft Support.

**Findings**

Semi-structured interview questions provided for a thoughtful interaction between the participant and the researcher. Thick descriptions were obtained during the interview process as the participants vividly and explicitly described their experiences through the progression of the Office 365 implementation. The second data collection method in this study was an observation of each participant interacting with an aspect of Office 365 in a location of the individual’s choosing. Both the interviews and observations were coded, utilizing an iterative process to identify superordinate and subtheme themes. The last form of data collection included
documents. Documents were used to further provide evidence on the identified superordinate
and subtheme themes. Data from the interviews, observations and documents are represented in
the following findings.

An analysis of data collected yielded five superordinate themes and fourteen subthemes. Following an analysis plan of an in vivo coding by first reading through of all transcripts as they were completed. This initial coding was followed by a second level of reading with addition of handwritten codes. Next, the data was organized by code in an excel spreadsheet. At this point in the analysis, any overlap in codes was remove, and, if needed, a new code was created. Categories were developed based on the evaluation and interpretation of the raw data in each code. Then each category was reviewed to develop the category/theme name based on the data in each code. Each participant column in the spreadsheet was given a different color to ease participant identification. All superordinate themes were developed from equivalent or similar statements made by at least 10 of the 13 participants. Supporting evidence consisted of verbatim quotes, perceptions and reflections from the participants as well as observational field notes and document analysis notes. In each thematic section, an introduction, evidence, and conclusion are provided. A final summation for all superordinate themes concludes the section. The five superordinate themes are presented in the order the participants experienced the Office 365 implementation with a brief description of the data that was included in that theme.

- Perceived Needs Led to Selection of Office 365 - Requirements to migrate to public cloud computing
- Lack of Office 365 Knowledge Causes Concerns - Fear of the Unknown & Vendor Assistance in Office 365 Implementation
- Introducing Change and Generating Awareness - Planning for Implementation
• Feelings of Loss of Control - Constant Release of Office 365 Applications and Microsoft Dependency

• User Adoption of Office 365 Applications Drives Change - Collaboration grows and Support Models Shift

The superordinate themes emerging from the analysis of data, presented according to the participants’ experiences, were: 1) Perceived Needs Led to Selection of Office 365, 2) Lack of Office 365 Knowledge Causes Concerns, 3) Introducing Change and Generating Awareness, 4) Feelings of Loss of Control, and 5) Users Adoption of Office 365 Applications Drives Change. Within each superordinate theme, there are subthemes. These subthemes will be explained in each section. The superordinate themes and the associated subthemes are displayed in Table 4.3.

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|                                                          | 5.2 Best effort support of Office 365 applications             |
|                                                          | • IT shifts from proactive to reactive                         |
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|                                                          | 5.3 Shift in Campus Training Models                            |
|                                                          | • Shift from traditional training to on-demand                 |
|                                                          | • Utilize Microsoft provided training materials                 |

*Table 4.3. Superordinate Themes and Subthemes*

**Perceived Needs Led to Selection of Office 365**

The first superordinate theme, perceived needs led to selection of Office 365, includes data related to the selection of Office 365 and the requirements to move to a public cloud computing technology. This section begins with the participants’ general understanding of the selection process. Then the four subthemes of existing vendor relationships and campus comfort, legal requirements, expectation for larger email storage capabilities, and business continuity are presented.

Participants were often uncertain as to who selected Office 365. Several participants did not recall or did not have a role on the selection team. Other participants believed Office 365 was selected by the email administrator or Chief Information Officer. In sharing her memory of the selection, Sue like many others could not recall the process: “I mean our typical way of doing things would be to put an RFP [Request for Proposal] out and review proposals from competing
products, but I can’t pinpoint that we did that.” Providing a bit more information, Bella recalled that a small team was put together to evaluate which public cloud technology to select and that this team met three or four times before realizing Office 365 was the way to go. Bella, along with three other participants, were the only ones to recall that the Google Suite was evaluated along with Office 365.

Four main areas emerged detailing the how and why Office 365 was selected and the requirements for a cloud sourcing tool: vendor relationship and campus comfort, legal requirements, expectation for larger email storage capabilities, and business continuity. The subtheme of vendor relationship and campus comfort with Microsoft helps to frame how Office 365 was selected as the right cloud application for campus.

**Campus Comfort and Vendor Relationship**

Within the superordinate theme of perceived needs led to selection of Office 365 theme, the subtheme of campus comfort and vendor relationship with Microsoft helped explain how and why Office 365 was selected. The ideas of campus comfort and vendor relationship emerged through conversations on the selection process and how campus buy-in was achieved. This subtheme includes information on Microsoft use on campus and the Microsoft campus license agreement.

Participants believed selecting a vendor and applications that were already in use on campus, such as Microsoft, would help ease concerns over such a large change. Bella thought the implementation would be a natural process “because so many people on our campus were familiar with the Office products; we felt like it was just a natural shift to kind of stay in that vein” Dylan described IT at Heusser University as being a “Microsoft shop” as not only was Microsoft Exchange in use but Microsoft Windows servers, desktops and Active Directory were
used on campus. In Dylan’s opinion, Office 365 integrations would go more smoothly sticking with one vendor’s products. “There were a lot more integrations that would go more seamlessly with 365. Therefore, it was decided that would be the route we [would] take.” Hawkeye mentioned that the learning curve for campus and IT would be less with Office 365 since the campus was already utilizing Microsoft products. Hawkeye added the idea of certainty over having in place an existing End-User License Agreement. With Microsoft, there would be a smooth the transition from on-premise to the cloud. “We already had a lot of Microsoft products that were licensed, so … other than the moving and shifting and the other organizational changes, … it was an easier path I guess you can say to do that migration.”

Gemma, in her role in Business Services, relayed that initially she was told the cost of the new licensing would be comparable to what they were currently paying. When the quote came to her, it was significantly higher than expected. She then had to negotiate to get it to a manageable number. Jean thought a bit differently than Gemma about the cost of licensing by conveying he had budgetary concerns and wanted to ensure the university was investing in licenses they truly needed since the investment was potentially more than what they were expending for the on-premise Microsoft Exchange environment. Lastly, Chet discussed how the extra security services included at no cost with the new Microsoft licensing would benefit campus by protecting from security threats.

As licensing was discussed, it started to transition from a positive influencer in the selection process to a negative stress point in implementation for these participants due to the constant changing license structure from Microsoft and the way licenses are applied to cloud accounts. When Tom discussed the licensing as it applies to the work he does, he described it as being easier to apply licenses to email accounts when the servers were on-premise. With the
servers now located in the cloud, Tom explained, “Now we have to migrate people, or sync them to the cloud and then we also have to apply licenses to them in the cloud. And that was a rough first couple of years of Microsoft kept changing licensing.” Dylan’s details helped frame the new Microsoft licensing. “Microsoft licensing itself has changed some; they typically have two or three flavors and the higher the number the more feature you get.” Shad expressed frustration surrounding licensing. “Well, before licensing was basically already part of our Microsoft agreement. [Now] we have, I don’t even know how many [licenses] there are.” Maintaining proper licensing is a legal requirement and necessary to stay compliant. The next subtheme of legal requirements expands concerns of licensing to a larger focus on the data requirements with cloud computing adoption.

**Legal Requirements**

Within the superordinate theme of perceived needs led to selection of Office 365, the subtheme of legal requirements revealed concerns about data privacy, security, retention and the ability to perform eDiscovery and holds for litigation needs. As the amount of data expanded on this campus, the data requirements also expanded, which contributed to the participants’ legal concerns.

Early concerns in the selection process were raised about where the data would reside and who would have access to it in a public cloud entity like Microsoft or Google. Tom explained the privacy concern:

They'd [members of IT] looked at Google also at some point, but they didn't feel legally that Google could meet the university's requirements. There can be a lot of gray area with Google … [storage locations for data] legal as far as what they did with the email and such.
Jean, in his role of project manager, reported that Google was not Health Insurance Portability and Accountability Act (HIPPA) compliant at the time of evaluation which necessitated selecting Office 365.

Chet explained that from a legal perspective, the ability to perform eDiscovery searches on current and achieved email are essential as are legal holds where the emails are held forensically going forward as they can be legal evidence. Chet confirmed the delicate nature of the responsibility to perform accurate and repeatable legal tasks, stating he can perform e-discovery and litigation holds from this app [and] explain that we can add conditions such as sender, data, and recipient or can pick a recipient name and a range of dates to look at a certain timeframe or just in certain apps.

Tom added that the university was new to the email archiving business and the number of emails they were expected to retain was growing. Bella confirmed this idea of increased email retention needs when he relayed that an initial concern of all members of the selection team was selecting a tool that had retention mechanism to match state records and security requirements. As he gathered information for our interview, he stated he had trouble doing so since the old system used for retention was antiquated and no longer available. Dylan explained that the on-premise retention system still housed emails that have not aged out yet. Jean recounts his involvement in many discussions involving general counsel to ensure that retention capabilities of Office 365 would meet our university and state requirements. Beyond the retention requirements, Jean further states, “There are definitely privacy policies out there. Data privacy policies. Family Educational Rights and Privacy Act (FERPA) and HIPPA policies that we are required to abide by.”

**Expectation for Larger Email Storage Capabilities**
Within the superordinate theme of perceived needs led to selection of Office 365, a subtheme of expectation for larger email storage capabilities emerged, highlighting the desire and benefit of increased email storage capabilities. As the participants discussed campus buy-in and adoption, the data revealed a campus desire to have more storage space available for storing emails. As campus members began switching to cloud email solutions at home, they began to receive increased or unlimited storage for email. Participants expressed there was a push for campus to do the same at the university.

Jean described the existing on-premise Microsoft Exchange system as “somewhat outdated…. We had it, I would say personally, two years beyond the general usefulness of it.” Dylan describes the previous on-premise Exchange environment as:

Boxed in by the limitations of the hardware at the time and therefore did not allow us to offer what was seemingly widely available on Gmail, Hotmail, or any other email cloud service where users had plenty of excess space where they could store emails indefinitely. According to Hawkeye, “We need to get it [the email infrastructure] off of campus because …, due to the disk space with as many clients as we have, we're running up against quotas, thresholds, [and] constantly fighting that battle.”

Tom mentioned the ever-present issue with mailbox size as a way of generating buy-in for Office 365. “I don't think it was too hard, especially for faculty [and] staff, because just for the mailbox size, that was probably our biggest complaint. People are constantly meeting their limits….” Dylan and Gemma were focused on the capabilities and flexibility the cloud solution would bring to campus. Dylan noted that understanding the increased storage space available was something that stood out to him as contributing to campus buy-in and Gemma thought storage resources would be more readily available yet apprehensively stated they “can be
cheaper.” Like Tom, Dylan brought up the need for space, “We wanted to get to cloud storage where people had more space, they weren't confined or what they stored wouldn't impact other people by chewing up more of the overall available storage on a file server.”

**Business Continuity**

Within the superordinate theme of perceived needs leading to the selection of Office 365 emerged the subtheme of business continuity. In reference to business continuity, participants expressed concerns about living in a hurricane prone area of the United States and losing access to applications and data if campus was not accessible. Single points of failure were identified as a concern with an on-premise data center and servers as data located on campus could not be accessed if needed by campus employees.

With the threat of a natural disaster, Dylan mentioned the benefits of storing files online in tools like OneDrive and SharePoint Online over having a:

Single point of failure in a single file server; now you can put those same files online, have more space that you're not having to worry about backing up locally and things of that nature. It can be replicated more easily. It can be accessed more easily.

Lola expressed that Office 365 provides replication of data across multiple servers, which provides a redundancy where if one server fails the service continues to run. This redundancy was not available with the on-premise solution. Lola explained that she and her team had built every server in the on-premise data center. She explained this comes with responsibilities such as keeping the servers up and running and the data available to campus. “So, if you happen to catch a drive that was blinking an amber light [an indication that something is not right with the hardware], you couldn’t leave. You had to make sure you knew what was going on and get it fixed.” This type of work is eliminated with adoption of Microsoft Office 365 in the cloud. Lola
further explained that the removal of this responsibility has freed up time by not having to rebuild and restore servers in the data center. She now has more time to focus on the migration of SharePoint sites from the on-premise system to SharePoint Online, which supports business continuity efforts by remaining available and accessible during a natural disaster.

Participants raised serious business continuity concerns regarding campus outages due to hurricanes and other natural disasters. Tom asked, “What if we are hit by a hurricane, our systems are here locally.” Hawkeye addressed this concern as he discussed getting campus buy-in by relaying that their data would be secure with virtually unlimited storage capacity and having downloadable copies of the applications all accessible from anywhere off campus. Perry likewise expressed, “If campus was down due to a hurricane, since we live in hurricane alley” all of the benefits stated would make Office 365 an “easy sell.” Perry added to the easy sell idea. “Noting our location here concerning hurricanes and disasters, it’s [Office 365 is] a very powerful tool.”

Lola summed participant thoughts well when she exclaimed, “I guess, [Office 365 is] somebody’s saving grace because it’s always there, no matter where you are!” and later, with a laugh, she added, “They better keep it up and running.” Chet’s comments speak volumes to business continuity,

Once you start having cloud offerings, campus is only where we are. We don’t have to be here…” “But the worth and value … for research, for students, for all of this, for them to be wherever they want to be, to do all of this work is huge.

**Conclusions**

The participants in this study revealed the importance of perceived needs in the selection of Office 365. Through the analysis of data, it was clear that most participants were aware of the
needs and requirements to adopt a public cloud computing technology, yet many were not involved in the selection, nor did they recall how Office 365 was selected. Some had thoughts or opinions as to who selected the system; others believed it was due to the existing use of Microsoft products on campus and having an existing structure for licensing. A few participants cited legal requirements such as storing the data in the contiguous United States, retention requirements, legal holds, and e-discovery as part of the selection criteria.

Email storage limitations with the on-premise, dated infrastructure was a frustration and established many of the needs perceived by the participants. The location of the institution in a hurricane prone area provided another a solid reason for moving an on-premise email infrastructure to a public cloud computing technology. For the participants who held a role in maintaining the physical servers on campus, they noted a having a redundancy they did not have with the on-premise infrastructure. Office 365 would allow for business continuity by storing the data off campus and remaining available during times when campus was closed due to a hurricane or natural disaster.

**Lack of Office 365 Knowledge Causes Concerns**

The second superordinate theme, lack of Office 365 knowledge causes concerns, related to the participants concerns about moving from an on-premise infrastructure they had built and supported to the public cloud computing technology, Microsoft Office 365. This section begins with the participants’ general concerns surrounding the migration to Office 365. Then the two subthemes of fear of the unknown and vendor assistance for Office 365 implementation and IT training are presented.

Participants expressed varied concerns about the adoption of Office 365. The range was wide and went from concerns about who could access university data and where it would be
stored all the way through loss of job. The Office 365 implementation is a shift from an on-premise infrastructure where participants believed they were better able to manage it versus putting it out into the public cloud environment to be managed by Microsoft. Bella expressed IT desired to keep things “in-house” and described it as “protectionism.”

**Fear of the Unknown**

Within the superordinate theme of lack of Office 365 knowledge causes concerns, the subtheme of fear of the unknown surfaced as participants emphasized feelings of uncertainty and frustration over the shift from leading and controlling technology change to reacting to technology change. Bella expressed that he was uncomfortable, “I was honestly fearful of how large of a change it was. We tend to have faculty and staff who were very specific about processes…and introducing that amount of change…was going to be uncomfortable for them.” Linda described her initial thoughts about Office 365 as “I thought it was going to be painful.” Uncertainty was not limited to IT as Hawkeye recalled the faculty perspective regarding concerns and questions they had when the project began, “Will I have space, Will I be able to access it from home, Will I have to change email clients.”

Bella described feeling resistance from IT members because they were not sure of Office 365, “what are we really going to get out of this [Office 365 adoption]?” Shad asserted that “no one knows what the cloud is…we just knew it wasn’t here [on-premise]. I think people were afraid of the cloud taking away their jobs…taking away responsibilities.” Shad felt an uneasiness but believed IT staff would always be needed to run Office 365, “Not having any idea what it was going to be like was a little unnerving, but I mean it’s always going to take people to operate.” Both Lola and Tom termed Office 365 as “The Mist” after a Steven King novel because they felt the cloud was something that just was there with not much definition with Tom
adding, “you really weren’t sure what was gonna happen next [with Office 365] because it was so new.”

Trust was clearly a concern for Lola, “I think just the general trust of is my stuff safe?" When I log in, is my login safe? You hear all the time about people's stuff being stolen.” Early in the process, participants emphasized a common fear regarding who would have access to their data, but Lola stated in the end, “after reviewing Office 365 and the security tools, everything they have in there, it provided me a bit more trust.”

Perry described a feeling of apprehension from IT members because now they have to rely on the connection to the Internet always being available in order to access Office 365. He cautioned that at times the Internet connection is saturated due to high use of streaming video services by students and questioned if it would impact access to Office 365. Another concern Bella described was data retention as he wondered what it would mean for IT to now be responsible for data that was shifted into a location that IT can’t easily access. Linda had the same concern about retention and added concerns about not knowing who’s going to have access to her data and can data be restored if something gets lost. These early concerns still linger with Linda as she shared that she does not store student data in Office 365 due to fear that it could be compromised in the vendor’s public cloud computing environment.

With the move of the systems to the cloud, IT is now vendor dependent. If something went wrong with a server or configuration housed in the cloud, IT must rely on vendor support to resolve the issue. Not having control over the systems was Tom’s biggest concern. In the past, he had total control over the systems and knowing them as well as he did, caused him to be concerned about moving to a “brand new system I wasn’t totally familiar with.” Perry presented a different take on becoming vendor dependent, while he does believe it would require putting
faith in the cloud vendor, IT would also have a burden removed as they would no longer have to
manage and control the systems which could allow them to do more productive tasks.

Perry describes Office 365 as complicated “with a lot of moving parts [and was] not
something you can just kind of flip a switch and go. There needs to be training and
understanding from our fellow employees [IT].” Hawkeye noted that this was a change large
enough that it required vendor assistance as there was a clear need for guidance and expertise.

Vendor Assistance for Office 365 Implementation and IT Training

Within the superordinate theme of lack of Office 365 knowledge causes concerns,
participants revealed the subtheme of vendor assistance for Office 365 implementation and IT
training. Among the participants, there were differing knowledge levels and awareness of
vendor assistance and IT training provided during the implementation of Office 365. When
asked about the selection and implementation process for Office 365, only three participants
mentioned the RFP process. Jean described the stringent RFP process Heusser University
followed from the development of the requirements to remembering how long the RFP was
posted. Jean then clarified, “To be clear the RFP was for hiring a third-party consulting firm to
come in and walk us through the implementation and to get us up and running with it.” Related
to utilizing vendor assistance, Jean referenced engaging the vendor “to provide the guidance and
education of our staff to make sure they knew how to set it up, how to support it in the long
term.” Hawkeye recalled developing the RFP requirements with several IT members and then
working with Purchasing to complete. According to Hawkeye the RFP was necessary “because
we had to go out and get services to help us with the migration.” Dylan expressed that part of his
responsibilities was to select the vendor from those who responded to the RFP.
Only Jean explicitly mentioned that the RFP process included some training for IT staff only. Tom did not mention the RFP process in his interview but when Tom was asked about training, he was aware that a vendor was utilized and that there was no formal training outside of the vendor showing them the administration tools they would need to know. Tom believed the vendor assistance and training set IT up for success. Dylan confirmed Tom’s account of vendor training:

We had training but it was more of collaborative training with the vendor we’d selected. So, as we were going through and setting things up, they were simultaneously explaining why you did something a certain way and how that system integrated with another system.

Dylan also explained that training was “always kind of on the fly as we were doing things” and not in a formal classroom setting with an instructor. Chet had a similar sentiment of learn as you go and referenced the large volume of help documents available for informal training.

Conclusion

This study discovered that due to a lack of knowledge of Office 365 and its public cloud computing infrastructure there were fears of the unknown. IT staff had questions surround the safety of their data as well as the security of their jobs. Migrating from an on-premise infrastructure that was familiar to something that was new and undefined caused concerns. Concerns existed for the new dependency upon a vendor to keep things up and running as well as required campus connectivity to the Internet for access to Office 365. Lastly, with a campus change this large, vendor services would need to be utilized for the implementation and training of IT staff.

Introducing Change and Generating Awareness
The third superordinate theme, introducing change and generating awareness, related to the participants’ understanding of the steps taken to implement Office 365 across campus. All faculty, staff and student email were being moved to the Office 365 platform. The participants’ descriptions of the implementation were varied – from a lack of knowledge to the process not being hard, to it was a strategic process. These varied responses continued to show up in the two of the three subthemes: pilot groups and campus communications. The responses ranged from some to full awareness, actual participant participation, or no awareness at all. For the final subtheme theme, high touch, face to face contact, for successful implementation, the participants had a common opinion and believed providing high levels of communication, training and support for the implementation process contributed highly to the success of the implementation.

**Pilot Group**

Within the main theme of introducing change and generating awareness, the subtheme of pilot group revealed that the typical process for implementing a new tool for campus use involves creating a pilot group consisting of IT and additional members from the campus community to help introduce change and generate awareness of the new tool. The knowledge surrounding the pilot group and campus involvement ranged from very aware to no awareness at all. Dylan, Gemma and Jean described the pilot groups as typical and necessary for testing and learning how to fix and mitigate issues. Dylan described needing to break and fix things to learn about Office 365 before it were rolled out to campus, “trying to work through every scenario we could think of, pushing things until they broke, figuring out what was broken, fixing them, taking our time.”

For Office 365, IT created a pilot group that included members from across campus. Perry’s understanding was that the project management office solicited volunteers for the pilot
group, “I don’t think we’ve had a shortage of people that are interested in being a part of this.” Jean backed up this statement by estimating the number of pilot participants to be approximately 180, with 80 being IT members, 50-60 student employees who worked in IT and the rest from outside of IT. Bella believed recruiting outside of IT for the pilot group was an essential part of the communications, which helped to raise campus awareness and garner buy-in. Jean relayed that many groups across campus were invited to participate in the pilot group, including Systems Steering Committee, Student Government Association, and the Faculty Senate IT Subcommittee.

Despite the certainty of the pilot group makeup from other participants, some participants were less sure. Shad seemed to guess about the group due to the progress of the project, “I'm pretty sure there were other areas of IT that collaborated with other parts of the university to get this project moving forward as fast as it did.” Although IT was mandatorily involved in the piloting of Office 365, Camel had no significant recollections about his involvement with the pilot of Office 365, “I just heard people talking about it. I didn't use it initially when we first went live with it [Office 365], but I can't remember when I first started using it.” This could have been due to Camel’s continued use of the Microsoft Outlook client for email on his computers which shielded him from any changes that would have been apparent in Office 365.

Shad expressed that being a part of the pilot group afforded him the opportunity to communicate his feelings on Office 365 and other than that did not have access to any other communication methods that may have been used in the selection or implementation process. Shad did not remember anything specific about communications, “but I do know, being part of the pilot group and being on the inside knowing more than what the campus did … I mean eventually …, once it was a decision to go with Office 365, [communication happened through] campus emails.” Similar to Shad’s sentiment about the pilot group providing him insider
information, Lola proudly described the pilot phase as a time where people worked together to get it going.

**Campus Communications**

Within the superordinate theme of introducing change and generating awareness, the subtheme of campus communication revealed a lack of awareness by the participants as to the exact type of communications utilized to introduce change and generate awareness during the implementation process. Some participants were completely unaware of the campus communications while others believed many avenues of communication were utilized. Specifically mentioned were the rumor mill, repeated emails, focus groups, a webpage, campus newsletter, and many presentations to leadership.

Prior to official communications going out to campus, Shad noted that rumors started circulating, “oh we're losing this or gaining [that] and everybody has heard what the rumor mill does. So, keeping that to a small roar was I think harder than you expected.” Hawkeye stressed the need to “keep maintaining control of the message” due to reports of people worrying that their email was going away. Hawkeye believed, “The communication and managing expectations is key.” Hawkeye, Tom, and Dylan communicated that IT cannot force campus to read communications. Dylan summed it up, “So you have to hit send a few times and hope they read one of them.”

Continuous communication about changes or new things is what Sue asserted was essential and then it is okay to shift to a maintenance mode of communication as things are fully adopted. Sue also stressed that for Office 365 awareness and communication, targeted campaigns and hand holding worked well based on those who had submitted tickets to the help desk and required extra help.
Participant recall of rumor mills surfacing and targeted campaigns around Office 365 was clear; however, there was still a significant lack of concrete participant awareness or knowledge surrounding communication to the campus. For example, Perry concluded that the communication must have gone really well since so many people volunteered to be part of the pilot group and “I don’t know that we necessarily had communication strategy for every tool, but I don’t think we really needed to. I think we just need to get people in, get them aimed in the right direction.” Gemma felt similarly about communication efforts successfully generating volunteers who would promote Office 365 from outside of IT because:

That has to be the campus deciding that they need something and deciding…it’s working really well and then they communicate that to their network of people and it creates a demand from outside of IT. And that’s really the best success rate for when we are implementing any type of technology.

As part of the campus communications, Tom thought he might have looked at some communications and changed some wording, while Gemma thought they may have used Twitter and Facebook. Lola could not recall the communications used for Office 365, “I don't recall. I'm sure there was something that I don't recall.”

Jean, on the other hand, conveyed that the communication campaign started right around the same time as the evaluation of tools began. Bella recalled contributing to the communication plan because it “was pretty powerful for our IT organization to be offering this new technology and we wanted it to be well received.” Jean and Bella noted that communication began by conducting presentations to high-level leadership, Faculty Senate, Staff Senate and Student Government and informing other key areas.
Additionally, Jean cited a webpage that “outlined the project from start to finish”, a campus newsletter, the student newsletter, and meetings with individual departments across campus. Sue was the only one who recalled conducting open forums for campus awareness. Dylan and Gemma also remembered the newsletter. Dylan and Sue remembered the website, but Dylan was not sure how widely the website was used as “We are a campus dominated by email for communication.” Chet confirms by remembering that they hit “every channel” including emails, newsletters and training and needing a feedback loop to see how it was going along the way.

**High Touch for Successful Implementation**

Within the superordinate theme of introducing change and generating awareness, the subtheme of high touch for successful implementation exposed feelings of satisfaction for providing high levels of communication, training and support to help introduce change and generate awareness. Chet explained that a lot of thought went into the rollout process “when you are dealing with such a wide varied audience and diverse audience that we have on campus, it’s very important the when we roll out a tool, we roll it out well”. Sue recalled having a very detailed implementation plan working from department to department across campus coupled with “a lot of training, a lot of materials developed.”

Chet communicated how tools function better when we have a wider campus adoption especially if it is making a process or work life better. Chet referred to it as “that high touch human environment where we're actually work[ing] to assist them…that’s what makes it work.” Later, Chet mentioned high touch includes pieces like email, newsletters, communication and training. He remembers it being “you have to hit every channel and so it was more along the lines of finding channels to exploit than just sending an email or just having this and then making
sure you were very open and communicative continually.” Participants expressed that two of the more complicated applications to implement have been OneDrive and SharePoint Online. Hawkeye discussed the need to reintroduce OneDrive along with the current SharePoint Online migration, “it’s going to be a high touch project.”

**Conclusions**

This study discovered varied degrees of awareness of the how IT introduced change and generated awareness for the Office 365 implementation. To introduce change and generate awareness, the pilot group was presented as a normal avenue for implementing new technology tools at Heusser University. It was expected that the pilot would be used to get IT staff familiar with the Office 365 applications and provide the opportunity to learn how to fix issues before they were encountered by the general campus. Largely, campus communications over various channels were believed to have been effective to introduce Office 365 and generate awareness; however, the channels were not consistently listed or understood by participants. Finally, working across the university going department by department and utilizing multiple communication channels created a high touch environment which contributed positively to introducing change and generating awareness for the implementation of Office 365.

**Feelings of Loss of Control**

The fourth superordinate theme, feelings of loss of control, related to the fast pace with which Office 365 releases new or changed applications and the need to depend on Microsoft for support. Several participants estimated the number of application updates waiting in the Microsoft pipeline ranged from 200 to over 700. Many participants mentioned the dependency on Microsoft support can negatively impact the good reputation IT had worked so hard to build. Participants expressed that it is not easy to be aware of all the new Office 365 applications when
Microsoft dictates the release schedule with little to no notification to campus. The development of two subthemes of the constant release of Office 365 applications and challenges with Microsoft support serve to detail the participants’ concerns and perceptions on their feeling there was a loss of control.

**Constant Release of Microsoft Office 365 Applications**

Within the superordinate theme of feelings of loss of control, the subtheme of constant release of Microsoft 365 applications exposed feelings of concern and frustration related to the volume of Office 365 applications and the rapid release schedule from Microsoft. The need for IT to support and become subject matter experts on applications that are rapidly released and adopted by campus faster than IT can prepare for lead to feelings of being overwhelmed and stressed. Shad describes the old Exchange email environment as “pretty basic” and with Office 365 “they’ve incorporated a lot of, almost too many things to try to keep up with to be subject matter experts. Too many of them. It’s hard.” Other participants expressed levels of satisfaction regarding the ability to provide campus with tools that help streamline work, increase collaboration, increase data security, and reduce silos. Chet agrees that making the applications available is a good thing, “While we want to make sure all the apps are out there, there’s a lot of effort to support all of it.”

Jean calls it the “ugly truth about Office 365” in how the helpdesk learns of new applications “literally the helpdesk gets a phone call and that how we know it is out there.” To build IT knowledge around Office 365, an early adopters’ team was created to review the new Office 365 applications before they were released to campus. The team was focused on evaluating new applications as they were released. Participants shared beliefs about this group being necessary to help manage the dynamic process of application releases from Microsoft;
however, since they needed to do their normal jobs first and belong to the team second it fell apart.

Without the early adopters’ team, Bella feels the department is segmented in its approach to adopting new applications because:

I was on a team for a short while where we were supposedly going to look at the new features coming out. There was a SharePoint site set up for us to talk and discuss on that. Then one person was supposed to present this is what I found, but that never came to fruition.

Sue recalled a team of “first responders” or “first something” who would go out and look at applications that were in pre-release state. Sue was not sure this was the best way to do it, “I mean it was, it was just an add on responsibility to their job and they were to kind of decide whether it was worthy to bring back or not. It was kind of happening but not in a systematic way.” As Jean puts it, “Our first look team, I think they were called something like that. They were a trial run that we ran through here. Basically, their purpose was basically to have the new functionality released to the team prior to the campus seeing it.” Many participants recalled that initially applications were blocked until they were reviewed or approved. Jean thought the team was in place for about three months and then fell apart based on the sheer volume of applications that were continuing to be released.

Complicated and overwhelming are two words Lola uses to describe what was happening with Office 365 adding, “We’re being reactive, kind of in arrears to some things that are coming in people requesting for, but we haven’t even learned that tool yet.” She continued, “You are kind of forced to be diverted from your normal duties. And separately is making sure your other users, for your other duties, don’t feel ignored.” Bella is still an advocate for the early adopters’
team as he believes it would help, “maybe if we did have that group together and it involved faculty and staff and students, we could be more championing from an IT perspective through communication some of the new features that are coming out.”

Eventually, due to the inability to review all the Office 365 applications before they were released, Dylan and his team made the decision to release all applications to campus. With the automatic release to campus and the early adopters’ team dissolving, Jean describes it as “There is no filter, there is no, there’s no funnel.” Lola exasperatedly relays, “There’s just so much to do... It’s hard to keep up with all that stuff. It really is.”

In the past, Dylan articulates IT would control what applications were released to campus and currently, within Office 365, all applications are automatically released to campus. Dylan conveys IT’s desire to not overwhelm the users with too many applications and receive “push back and say you guys are throwing too much at us” yet they want them to have access to all the tools available in the license agreement.

Tom conveyed that like IT, Microsoft does not force updates of the Office 365 applications. Others believed Microsoft does force changes and automatically releases applications resulting in support issues for IT. Microsoft does recommend that when a new version is released it should be installed. Tom likes to wait to release because Microsoft tends to release applications before they are 100% ready to go. Conversely, Shad and Bella have experienced Microsoft making changes that were not communicated and believes it impacts their ability to stay consistent with support. Bella said one of his initial concerns was, “How would we be able to support software that we didn’t necessarily have control over. Upgrades happen whether we want them to or not.” Bella’s concern still has validity, “And now today, many years out, Office 365 is making changes or introducing new technologies that’s breaking connectivity.”
Participants agreed that this type of rapid release with tools not being 100% ready, no notification, or breaking connectivity pushes IT into a reactive mode where time is diverted from your regular job to fix issues reducing the time available to look at new applications. Bella described the forced upgrades as, “It was kind of moving us from a planning and releasing and to now a reactionary stage.” Tom described this loss of control on how his time is spent as having no power over how things happen in the cloud, “Often our time is spent taking care of problems and we really don’t have the time to spend looking at new features.” Sue explained that things are more fluid now and less controlled, “Things just show up and we need to be prepared for that.”

Lola thinks IT tries very hard to keep up with all the changes, “but there's an Office 365 roadmap and there's an Azure roadmap. On any given day, I think on there like today, there was 200 pending implementations. And these are daily, so it's crazy.” This promoted an ongoing implementation thought process. Lola thinks IT needs to be constantly thinking about direction because:

There's been a couple of changes that could have made us have to rethink the direction we're going in. [With] some features being turned off in some [applications] and some features being turned on, [thinking] okay, is this now going to work for the user community?

Bella and Lola have similar thinking when it comes to thinking about how IT handles this constant change of Office 365. Bella is finding that IT is trying to organize itself around the roadmap and update schedule of Microsoft Office 365 and other cloud applications the campus has adopted. Bella described the long-term strategy as one of staying on top of the vendor,
analyzing the release notes, and ensuring that whatever is released will play nicely with other
tools you have on campus. Bella also used the term modernizing:

I’m trying to say modernizing that’s out of our control, like we’re constantly being forced
to stay up to date and current. It’s living in the present… It’s turning IT into a modern
factory. A modern technology factory where…we constantly have to be staying on top,
sharpening our tools and being at the forefront because we need to be ready for what
these software vendors are pushing down.

Lola emphatically stated, “Oh, I think it's still changing, it's changed and we're figuring that we
need to change with it and we're thinking we're realizing it's like a way bigger beast than what
we thought.” Perry contemplates if IT is getting to “a tipping point where we can’t get it out fast
enough. The demand will outrun our abilities, but that’s a good thing.”

**Challenges with Microsoft Support**

Within the superordinate theme of feelings of loss of control, the subtheme of challenges
with Microsoft support exposed frustrations related to the quality of Microsoft support. Without
a physical server presence on campus, IT must reach out to Microsoft for support when issues
are encountered. Adding to the complexity, Shad relayed that there are third party products that
are also integrated with Office 365 and that throws another layer into the support model. When
something goes wrong, Shad has experienced finger pointing between Microsoft support and the
third party. Chet and Tom expressed similar concerns about the servers not being locally on-
premise creating the need to rely on Microsoft support. Chet expressed reservations “because if
we get everybody moved over and then suddenly there is an outage and we can’t do anything.
We can’t go reboot the server.” Tom expressed a dissatisfaction with Microsoft support:
Microsoft support has never met up to my expectations. It's always been very bad trying to get [support], especially … [with] new problems if they’ve folded in something new. A lot of times, …after several weeks on the phone with them [Microsoft support], they will finally admit, *well this is something we can’t fix to your satisfaction at this point.*

Dylan was also aware of the issues with Microsoft support citing in certain cases they are not responsive and other times the resolution of an issue depends on who you get on the phone. If you are fortunate enough to get someone who knows everything you “can resolve a problem in the snap of a finger or sometimes days go by and you’re still struggling, or if not longer.” Lola prefers to get support from online webinars and forums. Lola relayed that even Microsoft MVPs express that they don’t know how to use all of the applications, but they are learning every single day. Lola described how others in the forum try to help but there is no evidence if the solution they are providing is right or wrong.

**Conclusions**

This study discovered that the dynamic process of application release and deficiencies in Microsoft Office 365 support can lead to feelings of loss of control. New applications are being released in Office 365 on an almost daily basis. The pipeline of changes or new applications ranges from 200 to greater than 700 on any given day. With the implementation of Office 365, the servers that run the email system are now in the cloud and IT must reach out to Microsoft support for help when there are issues. All Office 365 applications are automatically released to campus. IT no longer controls the release of applications to campus resulting in a transition to a reactive role, responding to the demands and questions of a user community who is free to adopt Office 365 applications.
To prepare for supporting the new Office 365 applications, an early adopters’ team was formed during the implementation process but did not prove to be fruitful based on the volume of applications released coupled with the team members’ regular job responsibilities. In response to the constant release of Office 365 applications and the disbanding of the early adopters’ group, IT made the decision to release all Office 365 applications to campus and let them choose which applications to adopt. IT is handling the demand to the best of their ability and continues to respond and react to campus needs with concerns that demand will soon outpace their capacity.

**User Adoption of Office 365 Applications Drives Change**

The fifth superordinate theme, user adoption of Office 365 applications drives change, related to the adoption of Office 365 applications by faculty, staff and students and its impact on the IT department. Participants were consistent in expressing their satisfaction and excitement over the new functionality Office 365 has brought to campus. Most participants utilized more than one Office 365 application and fluidly multi-tasked between them during the observation process which reinforced IT adoption of Office 365 they communicated during the interview process.

With time passing since Office 365 was first adopted, Gemma conveyed that the campus is now very comfortable with using the applications. Gemma has witnessed campus “finding them and using them” as the applications campus desire to use bubble up to IT. Bella speaks to the systematic use of Office 365 applications across campus, “I think Office 365, it’s just been an extension of IT now”

While observing many of the participants, they rapidly switched among the different Office 365 applications and administration portals. At one point in the observation, Sue was humming softly, *da da da da da* as she moved around in Outlook and OneDrive showing off the
collaboration and organization it provides to her and her team. There is an ease with which IT staff members multitask in the various Office 365 applications and portals. Chet referred to Office 365 as more than simply cloud storage and moving data off premise, “It’s a suite of services and utilities that really offer a much greater range, especially for us in security… but just offer a much greater range of tools and utilities to do our jobs.”

Speaking of jobs, some of the IT staff also teach courses at Heusser University. Sue mentioned how in the past she would have to take files with her to class on her thumb drive or print items for class. She explained that utilizing OneDrive everything is now organized and she doesn’t have to search for emails with attachments. She takes her iPad to class and display the documents stored in OneDrive, which she has organized by folder and file names with dates, using the projector.

In addition to faculty use of Office 365 in the classroom, Bella describes how the campus staff has also quickly started adopting Office 365 applications. He was meeting with a staff member outside of IT and she began describing how she was using some of the Office 365 applications to work out business processes and help her do her job better. Bella excitedly stated, “I thought, how cool is that!” and “I thought that was pretty empowering and something that I strive for in my own work is to always empower the users to kind of do and grow.”

Likewise, Shad believes the applications built into Office 365 has made it easier for people to do their jobs. Along similar lines, Camel was shown how to utilize OneDrive from a staff member he works with in another division. He explained that not only does he collaborate on documents with the other division but also show me a document under the shared with me section that was shared with him by a vendor. Camel explained that it is a very large workbook and he and the
other division each have access to update. He animatedly explains that there is versioning on the file in case it gets corrupted.

Camel also mentions that he is looking forward to the next IT session called Coffee and Conversations. At the next meeting they will discuss SharePoint Online and Teams. Camel explains that his boss is already using Teams because he demonstrated how one can use Teams to access someone’s computer and provide assistance easier than the current way they utilize. Teams provides for a level of collaboration they have not known prior to Office 365. Supporting the superordinate theme of user adoption of Office 365 applications drives change are three subthemes: accessibility and availability of Office 365 leads to collaboration, best effort support of Office 365 applications, and a shift in the campus training models.

**Accessibility and Availability of Office 365 Leads to Collaboration**

Within the superordinate theme of user adoption of Office 365 applications drives change, emerged the subtheme of accessibility and availability of Office 365 leads to collaboration. This subtheme is supported by expressions of satisfaction and accomplishment about the ability to collaborate by utilizing the same Office 365 tools from any device. Participants asserted that the availability coupled with the ease of accessibility of Office 365 promoted communication and collaboration. Observations of the participants demonstrated seamless views from mobile devices, desktop devices, and web applications which support collaborative behaviors including teleworking. Positive feelings were expressed over having data stored in the cloud, automatically saved and accessible from anywhere on any device.

Jean discussed the value of OneDrive during his observation stating it can be accessed with any device from any conference or classroom. Jean also demonstrated the use of Microsoft
Teams for project management tasks. He shows one project with 35 members and a shared issues log that they can all collaborate on, has a version history and syncs back to cloud.

In addition to Jean, other participants expressed a similar sentiment on their satisfaction with the collaboration aspect of Office 365. Shad expressed that communication is more instantaneous when you utilize the new collaboration tools in Office 365. Bella enjoyed the collaboration aspect of being able to work in a document and when others join and begin working in the document, he can visually see who is working at the same time. He asserted it expedites projects “especially with the brainstorming stage because you have one central place to work in.” Sue explained that she collaborates on beginning of the year communication brochures for IT with a large team. She showed how she has them neatly organized so the team can easily access the most current version in one location instead of having to hunt around in emails or hard drives.

Linda also likes having one cloud location to go to for documents and thinks Office 365 is very useful, “It’s easy to use and makes it easy to better utilize your time because you can have everything stored in a location and you’re not scrambling to find where you have stored it.” Linda utilizes OneNote for documentation and demonstrated how she can search for key words in all the files and a list is easily produced of all the documentation that contains that word. Linda especially liked the feature of when another team member adds something to a document it shows their name right in line with the change, so everyone knows who added it. She reiterated, the best feature is being able to search on any word, no matter who entered it and see the results.

Linda also utilizes Teams for collaborative work and states that it is especially helpful when she is teleworking because it makes her feel connected to the people in the office as if she
were in the office. She enjoys freedom to access any of the Office 365 applications and has chosen what works for her in her daily job. She shows how she can access them all from her desktop computer utilizing Single Sign On capabilities and quickly launch whichever application she needs at the time.

Several other participants illustrated ease of accessibility when they conducted their observations by utilizing iPads and their desktop computer. This showed how Office 365 applications are accessible from any device and have a similar look and feel. Perry stressed timely access of documents and applications when he demonstrated how he can turn his phone into a computer and access all Office 365 applications to collaborate with committees where he is a member. He accessed his email and opened a request to grant access to certain servers for a project. He then navigated to a SharePoint Online site, opened a shared document and entered the server information in the document. Perry showed that he could have done all the work from his phone or his desktop computer and conveyed this was extremely helpful and satisfying. At the end of the observation he concluded by describing how the look is the same from different devices and can be accessed from anywhere with no Virtual Private Network (VPN) necessary. The participants described similar satisfaction about the ability to store the data in the cloud which allows each device to access and update the same data making it instantly synchronized resulting in the updated content being available to all who have access.

**Best Effort Support of Office 365 Applications**

Within the superordinate theme of user adoption of Office 365 applications drives change, the subtheme of best effort support of Office 365 applications emerged. It is related to a shift from controlling what was released and utilized by campus to automatically releasing all Office 365 applications to campus with IT providing best effort support. Participants
unanimously reported that there are simply too many applications released in Office 365 to support them all which resulted in a best effort support of Office 365 applications model.

All of the Office 365 applications are available at the click of a button. Dylan referred to the faculty “jump[ing] into Microsoft Teams long before we really knew what it was. It was something [Teams] we weren’t necessarily ready for but this particular faculty member jumped in…..” Similarly, Bella identifies that other university supported applications are available, but faculty, staff and students may adopt a newly released application in Office 365, “so it augments or splinters how our campus is using the tools that we are trying to provide and that becomes a challenge with a support.”

Sue and Tom express a motto of support it as best we can. Sue believes understanding and responding to the use cases on campus is what helps IT be able to stay in from of support request as best they can since applications are changing every day. Tom urged IT to “just open it up and let people use it that want to use it and then we’d support it as best we can.”

Some campus members have provided positive feedback to Jean letting him know, “they liked the fact that we’re just making it available to them.” Jean thinks at times this could be a double-edged sword, a good and bad thing. He believes, “the campus just realized that there are so many new things out there, we just can’t support it all.” Dylan agrees that staying on top of all the new functionality is “by far the hardest” but “there are a lot of features that are new in Office 365 that people have never had a true analog for on campus.” Along with new features and applications usually comes training which is hard to do when there are too many applications with fluid updates on an irregular basis.

Hawkeye disappointedly recapped his view of what is happening:
Having the IT staff keep up with [the rapid release of applications], being able to support all those apps…. they just keep putting them out, putting them out and the faculty, staff and students, they access them, start using the and then they ask us questions about them and [IT thinks] *Oh, I didn’t know that came out yesterday.*

The first line for support is the helpdesk. Sue believes a strong support staff is necessary with things changing every day. She asserted that the helpdesk “needs to be aware of what’s out there and they need to be able to answer the questions.” Adding to the stress of supporting the new applications is the quick rate of adoption from faculty, staff and students. Sue has observed her helpdesk staff learning from their clients which is different than the past because now campus can go explore and adopt on their own. Sue would like the helpdesk to be aware of what is available and be able to answer questions but “we need to draw a line in the sand and say that these are at your own risk” or as Dylan put it, “at least it will be available to users to use at their own discretion.” Jean concurred, “So what happens now typically is we have basically stated that we will support Office 365 to the best of our ability.” Formal training is usually offered when new applications are released to campus, with the best effort support of Office 365 applications, there has been a shift from formal training dictated by IT, to an on demand, train yourself and then train others approach.

**Shift in Campus Training Models**

Within the superordinate theme of user adoption of Office 365 applications drives change, the subtheme of shift in training models identified the need to move from traditional training models to an on demand, train yourself and then train others approach. Although two, part time trainers have been hired since implementing Office 365, many participants revealed that they must quickly train themselves in order to respond to user questions and adoption.
Chet explained that the training the IT trainers offers is based on adoption, “So if more and more people start using something like Teams, we make an intentional determination.” Gemma adds that as more people start using tools, IT is learning from their clients, “And so that’s a different scenario too because a lot of times the clients will find things out before we do because they may have just been in there and explored.” With the information gathered from the clients and reports available in Office 365, Chet described that the trainers, “are constantly refining that message and what’s actually taught in the training.”

In addition to the trainers, Sue mentioned the creation of a new facility where the trainers are present most of the day to answer questions and provide on demand and scheduled trainings on Office 365 applications. Lola mentioned starting a “roadshow” that would go across campus to associate IT faces with knowledge on the Office 365 applications.

Chet believed that “informal training and learn as you go” is happening and the widely available help documents are key to success. In addition, Hawkeye asserts that Microsoft provides information on their website with “links to training, short video clips, things like that” and IT will refer people to these offerings when new applications are released. Hawkeye also refers to a knowledgebase in the incident management system that IT has built. It contains documentation and articles that people can reference when they have a question instead of calling the help desk.

Conclusions

This study revealed that user adoption of Office 365 applications drives change through increased collaboration, creation of a new best effort support model for Office 365 applications and a new training model. The ease of accessibility and availability of the integrated suite of applications increased collaboration in IT and around campus. Tools like OneDrive, OneNote,
SharePoint Online and Teams are supporting a collaborative environment and inviting those who may not be physically located on campus, such as teleworkers, to collaborate as if they were on campus. Examples of faculty and staff adoption highlighted streamlining of job duties. It provides a level of organization and efficiency through having a central cloud location to store and search for documents.

Accessing the Office 365 applications is done easily through devices such as iPads, mobile phones, web browsers and desktop computers. Office 365 applications provide the foundation to have a single document that is shared amongst many users updated in real time, always synchronized to the cloud and available to all. The participants expressed satisfaction with the decision to release all new Office 365 applications to campus as they become available as it provides the freedom to choose what Office 365 applications to use, from what device and from where.

Additionally, the participants expressed the desire to stay up to date on what is available and provide support for it all but that is not possible with the rapid release of applications in Office 365. The participants consistently referred to the volume of applications as simply too many; Too many to be aware of, too many to learn, and too many to support. Support it as best we can, to the best of our ability or best effort support of Office 365 applications is the new model for IT.

Coupled with the new model for support is the new model for training. In the past, when IT controlled what was released to campus, they could learn it first to be prepared for questions from campus as well as provide formal training on the application. Today, there is a shift to an on-demand model, learn as you go. The IT trainers will often take their cues from campus as to
where to focus their training efforts. Campus also can train themselves utilizing the knowledgebase articles IT has created as well as Microsoft materials.

**Summation**

The research findings in this chapter were identified based on the participants’ perceptions of the Office 365 implementation, observations of the participants interacting with Office 365 applications and documentation provided by the participants. The selection of Office 365 introduced fears regarding job safety, data safety, and reliance on a vendor. The selection and implementation of Office 365 introduced feeling of loss of control due to a decreased ability to control when applications are released to campus, reduced capabilities to manage a public cloud systems infrastructure and created a dependency on Microsoft to keep things running and resolve problems. Participants expressed that Office 365 rapidly releases many new applications, too many for the IT department to keep pace from an education and support perspective. While there is an appreciation for releasing all the Office 365 applications to the campus community upon release, providing campus with the ability to make choices and streamline their work practices, it has altered IT’’ support model from full support of campus applications to best effort support of applications. The next and final chapter will provide the conclusions based on the research findings and offer recommendations for further research.
CHAPTER 5: DISCUSSION

This case study was focused on exploring the research question, “How did an IT department at a southeastern university progress through the adoption of a public cloud computing technology?” The study was conducted with thirteen research participants who were members of an IT department who were involved in the implementation of Office 365.

In this chapter, the alignment of the findings with the theoretical framework, the connection of the findings to the literature, as well as the implications for practice, importance to the research question and recommendations for future research will be discussed. Finally, a conclusion for the chapter, as well as an overall conclusion for this doctoral thesis will be provided.

Alignment with the Theoretical Framework

Rogers’ (2003) Diffusion of Innovation Theory was used for the theoretical framework in this study. Rogers asserted that as new ideas are created and diffused, they can either be adopted or rejected which leads to different consequences and hence social change. Rogers (2003) believed in the importance of interpersonal networks for either the adoption or rejection of an innovation, “Diffusion is a kind of social change, defined as the processes by which alteration occurs in the structure and function of a social system” (Rogers, 2003, p.6). As depicted in Figure 5.1, the Diffusion of Innovation Theory has four main components: the innovation, communication channels, time and a social system which are mapped to the findings of this study.
Diffusion of Innovation Theory components of innovation, communication channels, time and social system help to understand the successful implementation of Office 365, a public cloud computing technology. The social system acted as a boundary within which the innovation of public cloud computing, Office 365 diffused and provided a structure that can be used to predict behavior with some degree of accuracy (Rogers, 2003). In this study, the participants presented their knowledge on the how the university progressed through the implementation of Office 365 innovation and how it led to changes in the IT social system,
demonstrated by new communication and collaboration channels and a new support model for Office 365 applications utilized by the university.

**The innovation.** The first element in Rogers (2003) Diffusion of Innovation Theory is innovation. A technological innovation usually has some benefit to the potential adopters, but in the beginning the advantage is not always apparent to the intended adopters (Roger, 2003). The innovation of Office 365 changed the way this IT department provided some services to the university by moving infrastructure such as hardware and software from on-premise to the cloud and by shifting to a new best effort support model for Office 365 applications. At the beginning of the adoption process, IT was not certain that this represented a superior alternative to the way they had been providing services. Prior to the implementation of Office 365, this IT department built, supported, and was extremely knowledgeable about the on-premise infrastructure, and there was uncertainty over moving to Office 365.

The adoption rate of public cloud computing technology, specifically Office 365, can be impacted by the characteristics of the innovation as perceived by the individuals (Rogers, 2003). Characteristics could include: relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003). In this study, the first step in the progression of the adoption of Office 365 was identifying the need to move to a public cloud computing technology. In this case the needs aligned with relative advantage through the need for more email storage and wanting to stay competitive with what users could get on their own. The characteristic of compatibility was met by identifying the desire to stay consistent with Microsoft products to make the transition for campus as easy as possible. The characteristic of complexity was highlighted by the participants’ concerns about moving to Office 365 as public cloud computing technologies were unknown to the university. The characteristic of trialability was achieved
through the ability to pilot the implementation with a smaller subset of the university and through the early adopters’ team to check new release functionality and compatibility before it was released to campus. Lastly, the characteristic of observability was modeled by IT staff visibly showing others the results as they began to adopt the new applications and altered their processes for managing the applications and infrastructure.

The last aspect of Rogers’ innovation element (2003) is the re-invention of an innovation which relates to how an organization modifies or alters the innovation for their needs. In the case of Office 365, the IT participants mentioned they modified a feature of Office 365 to perform litigation holds; a requirement to preserve all data that relates to a given legal action. This use of the feature was not intended by Microsoft. Over time, Microsoft adopted and now supports the use of that feature for litigation holds. Another example of modification of the Office 365 innovation was the adoption of the Teams application by a faculty member as a Learning Management System, LMS, like Canvas, BlackBoard and Moodle. The intended use of the Teams application is as a communications platform and not a fully featured LMS. Although the university had a campus-wide LMS in use, the faculty member altered the Teams application for his particular need.

**Communication channels.** The second element of Rogers (2003) Diffusion of Innovation Theory is communication channels, which connects individuals with knowledge of the innovation to those without knowledge of the innovation. The communication process by which participants create and share information with one another about an innovation is known diffusion. Rogers (2003) lists four main steps that are involved in the diffusion or communication process: the innovation; an individual that has knowledge of the innovation;
another individual or unit that does not have knowledge of the innovation; and a communication channel that connects the two.

In this study, the innovation is Office 365; the individual with knowledge is the IT unit; and the individuals or unit without knowledge, requiring communication, is the campus community. The communication channels that connect the two include: emails, newsletters, open forums, training, presentations and a website. The participants contended that email was readily adopted by campus as it was the one supported campus email platform and the primary communication method for the university and, therefore, adoption was required. After IT migrated the campus’ exiting email system to Office 365, if a campus member wanted to communicate via email, they did so in Office 365. Other components of Office 365 were not required; however, IT encourage adoption of applications such as OneDrive for Business and the free Office 365 downloads. Participants relayed that adoption of the optional Office 365 applications was facilitated through the mass communication channels and smaller personal sessions.

As another aspect of the communication element, Rogers’ (2003) asserted that most individuals will adopt an innovation based on the evaluation of the innovation by another individual who has already adopted the innovation. Some participants in this study confirmed their adoption of Office 365 applications as a result of learning from their peers, both from inside and outside of IT, who had already adopted one or more Office 365 applications. IT staff and members of the campus community were acting as change agents and providing new, helpful information on the innovation to other individuals.

**Time.** The third element of Rogers (2003) Diffusion of Innovation Theory is time, and it involves three main steps: (a) the innovation-decision process for an individual to progress from
first awareness through adoption or rejection of the innovation, (b) How early or late an individual adopts the innovation compared to other members of the social system, and (c) an innovation’s rate of adoption by the whole social system (Rogers, 2003). There are 5 steps in the decision-innovation process: 1. Knowledge of the innovation, 2. Persuasion where an attitude toward the innovation is formed, 3. Decision to adopt or reject, 4. Implementation of the innovation, 5. Confirmation to continue adoption, late adoption or discontinuation of adoption and occur in the same time ordered sequence (Rogers, 2003). Individuals and social systems will vary in the amount of time required to pass through the innovation-decision process with some requiring years to adopt (Rogers, 2003).

The participants in this study revealed that time to adopt this innovation varied based on their knowledge of the innovation and understanding of how it functioned. Some participants were quick to investigate the functionality contained within Office 365 and its applications therefore building knowledge, while others were less aware and cited not having time to investigate. Persuasion took place as the participants developed either favorable or unfavorable attitudes toward the innovation. Most participants had a favorable attitude toward Office 365 applications; however, some participants had an unfavorable attitude about the rapid release schedule Microsoft maintains on Office 365 applications. All participants decided to adopt various portions of Office 365. The adoption of Office 365 applications was observed as participants utilized Office 365 applications from various devices including mobile phones and tablets. Confirmation of the adoption of Office 365 applications was evidenced during the interviews as participants mentioned wanting more training, more time to investigate the new Office 365 applications and a desire to attend brown bag sessions which discussed how IT was using of some of the newer Office 365 applications.
The participants expressed that campus was simultaneously progressing through the same innovation-decision process. IT had made the decision to make all new Office 365 applications available to campus as soon as they were released from Microsoft. The decision provided the campus with the opportunity to obtain their own knowledge about the new Office 365 applications. Persuasion then begins as they decide whether they have a favorable or non-favorable attitude toward the Office 365 application. Implementation is recognized by IT as there are dashboards within Office 365 that show campus utilization of the Office 365 applications as well as the help desk started to receive calls when the campus community had a question or encountered an issue with an application. The participants demonstrated confirmation happening either through questions directly to the IT staff or to the help desk for reinforcement on the use of the Office 365 application.

**Social System.** The fourth element of Rogers (2003) Diffusion of Innovation Theory is the social system which is a boundary within which an innovation diffuses. A social system can be thought of as a group of interrelated units who are engaged in working toward a common goal or solving an issue (Rogers, 2003). In this study, the IT department was the social system. The data from the participant interviews and observations conveyed that the IT department experienced a change in the structure and function of the social system. The structure changed from siloed to open, real-time communication through the use of collaboration tools.

Information that used to remain within a specific group is now shared with other groups through the new Office 365 applications like OneDrive, SharePoint Online, OneNote and Teams. The structure is also changed by the number of IT staff that are now teleworking. The Office 365 applications allow IT staff members to work remote and feel as if they are physically there on campus. The Office 365 applications allow them to work collaboratively with others on
documents, projects and even meetings. Functionally, IT has changed from a department that fully supports all applications IT released to campus to a best effort support model of Office 365 applications. Due to the rapid release and ability of campus to adopt as they wish, IT can no longer keep up with becoming subject matter experts on every application. The campus has expressed appreciation for the automatic release of all new Office 365 applications and will need to adjust to the new best effort support model for Office 365 applications.

**Discussion of Results**

Cloud computing is extremely important and necessary in higher education to facilitate modern education. When adopting a public cloud computing technology, like Office 365, it is important to understand the IT staff’s experiences as they progress through the implementation. In the following sections, each finding will be discussed, including connections to the research question, connections to the literature, and implications for practice. The collection and analysis of research data from this study resulted in five findings and are presented in (Figure 5.2) in the order the participant experienced the Office 365 implementation.
Based on the IT participants in this study, the department progressed through the adoption of Office 365 in a linear fashion beginning with the perceived needs that led to the selection of Office 365. The desire to have greater email storage capacity was a significant need expressed by many participants. A benefit of public cloud computing technologies such as Gmail, Dropbox, and Office 365 is the provisioning of limited amounts of free storage for email and files. In order to provide the same level of storage as a cloud provider with the on-premise infrastructure, a significant capital investment would have been required by the university. Due to budgetary concerns, participants admitted the university often utilized systems that were beyond their useful life which resulted in additional support issues for IT as they tried to maintain this aging on-premise infrastructure.

This finding of additional storage needs and an aging infrastructure was not surprising and due to the large base of previous researchers (Attaran et al., 2017; Bouyer & Arasteh, 2014, Dhar, 2012, Kiryakova, 2017, Maresova et al., 2017; Marston et al., 2011; Sultan, 2010; Tashkandi & Al-Jabri, 2015) who have advocated for cloud computing as an effective strategy to
meet the need of responding to technology changes without increased costs for hardware and software or having to physically provision hardware and software. Further support is provided by Attaran et al. (2017) by citing a lack of adequate infrastructure to support changing educational needs, inability to maintain the current infrastructure, coupled with maintaining large varieties of hardware and software as the one of the biggest challenges facing higher education institutions. A multiple case study (Jones et al., 2017) on the risks and rewards of cloud computing, revealed providing additional storage needs and replacing an aging infrastructure as benefits of cloud computing. In this case, the researchers identified needs for moving to public cloud computing like those identified by the participants. Jones et al. (2017) addressed the fact that many on-premise, internal IT infrastructures exist, and they are in a poor state due to a lack of investment. In the current study and past studies, it is clear that cloud computing can help mitigate the capital investment to bring outdated infrastructure up to date with more storage and compute abilities.

As a digital transformation happens across higher education campuses, there is an increased volume of data that needs to be governed including access, storage, classification, transmission, and retention. Within this increased capacity, IT needed to comply with legal needs such as state retention requirements, litigations holds and e-discovery. The participants’ perceived legal needs for selection of Office 365 is support by Gonzalez et al. (2012) in their analysis of security concerns for cloud computing for higher education, identified legal issues and compliance as the top two out of three major problems for cloud security. Similarly, Attaran et al. (2017) identified security and compliance as two of three top challenges when implementing cloud computing in higher education. In direct support of perceived legal needs,
Katzer (2015) found that customers who adopted Office 365 significantly reduced their costs and concerns in the areas of data discovery for investigative purposes, security and compliance.

Another perceived need for the selection of Office 365 expressed by many participants was a concern over the impact of a hurricane or other natural disaster related to the geographic location of the campus. Moving to a public cloud computing technology, like Office 365, would enable many technology functions to continue running for faculty, staff and students should the campus be shut down as a result of a natural disaster. Pardeshi (2014) supports the perceived need of disaster recovery by listing disaster recovery and business continuity as two benefits of cloud computing offering data an extra layer of protection against data loss from traditional, on-premise storage options. It was surprising to find very few researchers identifying this benefit could indicate that disaster recovery and business continuity needs vary based on location and context.

Lastly, the perceived need of least impact to campus expressed by the participants emphasized that the selection of Office 365 was considered a default decision due to the comfort level campus had with Microsoft. Tashkandi and Al-Jabri (2015) and Gartner research (Mariano, 2016) research, surprisingly, directly conflict with the perceived need of least impact. Tashkandi and Al-Jabri (2015) assert that compatibility with ones existing infrastructure does not play a significant role in cloud computing adoption and Gartner research (Mariano, 2016) highlighted the need for developing a list of risk and rewards of an Office 365 implementation during the evaluation and planning phase in order to make an informed decision rather than relying on a perceived need. Mariano (2016) stressed identifying exactly how an IT department will realize each expected benefit and mitigate each risk through establishing a cloud computing
strategy or plan. Unexpectedly, only a couple of participants from the current study mentioned completing any type of evaluation against needs before moving forward with purchasing.

The complexity of a large transition to cloud computing is often underestimated by IT professionals (Mariano, 2016) and is evidenced by the participants in this study as they revealed the selection of Office 365 was based on perceived needs and not assessed needs. Additionally, Alfifi (2015) identified a gap in that many Chief Information Officers lacked sufficient data and a clear understanding about vital factors that contribute to making an informed decision regarding the adoption of cloud-computing technologies.

**Theme 2: Lack of Office 365 Knowledge Causes Concerns**

Prior to the Office 365 implementation, the IT department had built all the systems and servers located within the on-premise data center and knew where and how the data was stored and who had access to it. With the selection of Office 365 and impending move of infrastructure to the cloud, some participants in this study had a fear of the unknown regarding who would have access to university data and where and how long it would be stored. A similar finding was identified in Tashkandi and Al-Jabri’s (2015) study, which listed data concerns around the privacy of student data stored in the cloud as a significant barrier to cloud computing adoption. Pardeshi (2014) seeks to alleviate the fears expressed by the participants in this study by suggesting a five-phase strategy for the adoption of cloud computing in which the primary step promotes gaining knowledge and an understanding the cloud from benefits, to risks, and finally best practices. A similar conclusion was made by DeBary (2017) when he asserted that concerns could be avoided if an evaluation of the current systems and services along with an expectation of how they would work in Office 365 had been completed before the implementation phase began.
In this study, other participant fears of the Office 365 implementation were a new reliance on the university Internet connection to both stay available and to provide appropriate speeds and a concern about job security or change in job responsibilities. In their study, Jones et al. (2017), support participant Internet dependency concerns as the explosive use of the Internet has resulted in challenges in supporting thousands of concurrent transactions and millions of Internet searches every day. The participant concerns over job loss or change in responsibilities are supported by various researchers (Jones et al., 2017; Kiryakova, 2017, Sultan, 2010) who indicate a move to a public cloud computing technology will reduce the need for IT staff and reduce costs. Conversely, and supported by data in this study, Pardeshi (2014) asserts IT staff will still be needed because higher education administration will task IT with implementing cloud computing technology to address faculty, staff and student needs. The expectation that IT will still provide the necessary resources, training, and support through implementation, adoption and use across campus will always be there (Pardeshi, 2014).

One participant in this study thought the large shift to Office 365 would cause pain. Carr (2005), aligning well with thought, stated that the biggest adoption problem to cloud computing “will not be technological but attitudinal” (p. 71). Not surprisingly, some of the words participants in this study used to describe the IT department’s reaction to the adoption of Office 365 were resistance, uncomfortable, and apprehension. Similar to participant descriptions, many studies (DeBary, 2017; Pardeshi, 2014; Tashkandi & Al-Jabri, 2015) use the terms concerns, issues, risks, fears, and barriers to describe thoughts on cloud computing adoption or lack thereof. Fear was not limited to the IT department in this study as faculty also expressed concerns about changes such as storage space size, access from home and changing email clients.
Some participants in this study expressed that the implementation was a large enough change, including IT training needs, to warrant utilizing help from a third party, or vendor.

Participants in this study believed that utilizing vendor support would provide a consistent way for IT to learn and implement new public cloud computing technologies efficiently and successfully. Some researchers advocate for the use of vendor assistance as an effective strategy for implementing cloud computing as cloud computing introduces new complexities on an IT department as they attempt to harness all of its capabilities and transition from on-premise to the cloud (Babcock, 2010; Mariano, 2016). In a study on community college cloud adoption (DeBary, 2017), participants reported using their IT staff and services from the vendor providing the cloud computing technology instead of a third-party vendor.

As more and more customers move to Office 365, a similar sentiment to that of participants in this study is being voiced, urging their fellow professionals not to undertake an Office 365 transition on their own but to obtain assistance from Microsoft or third-party vendor (Mariano, 2016). Pardeshi (2014) identified five phases to be included in a cloud strategy: preparation, analysis, migration, conclude migration, and maintenance and vendor management. Perhaps with too narrow a view, Pardeshi (2014) lists selecting the cloud computing vendor as one of the steps within the migration phase and doesn’t explicitly list utilizing a third-party vendor service for migration; however, working with the vendor to perform necessary integrations with on-premise applications is listed and does support the need for IT assistance in the transition to cloud computing.

**Theme 3: Introducing Change and Generating Awareness**

When reflecting on the preferences of the participants in this study to begin with a pilot group, implement formal campus communication and provide a high touch user experience for
implementation many researchers support these preferences with some summing it up as a cloud strategy (Babcock, 2010; Carraway et al., 2015; Carraway, Cato, Chapple, Dugas, et al., 2015). Directly supporting a cloud strategy, the literature supports the need to introduce change and generate awareness through engaging with the organizations to create both short-term and long-term strategies to take advantage of the benefits of cloud computing (Abel et al., 2013; Dhar, 2012; Marston et al., 2011).

At Heusser University, pilot groups are expected to be utilized in order to identify members of the campus community who will serve as champions for adoption for the rest of campus as well as provide IT’S the opportunity to learn how to implement, to break and fix, and support the new technology. The use of campus communications such as email, newsletters, open forums, a website, and group presentations helped to raise awareness and get volunteers for the pilot group. Creation of the pilot group and formal campus communication is important and aligns with the recommendations (Marston et al., 2011; Pardeshi, 2014) to identify the challenges unique to the institution and to create a roadmap which involves relevant stakeholders to prepare the organization for the migration to the cloud.

The success of the Office 365 implementation was identified as extremely important to the participants. Many participants expressed the idea of high touch where IT would go and have face to face experiences with departments across campus in order to provide the best possible levels of communication, training and support. The literature supports the high touch need with finding that IT must make implementation processes transparent to campus stakeholders to streamline and support the adoption process (Carraway, Cato, Chapple, Dugas, et al., 2015). In their studies, Attaran et al. (2017), DeBary (2017) and Pardeshi (2014) advocate for the development and use of cloud computing strategies which include facets of assessing
needs, updating business processes, integrations with existing systems, and mapping applications to cloud providers; however, they lack references on how to bring campus along on the journey through a model such as the high touch model cited by the participants of this study.

**Theme 4: Feelings of Loss of Control**

With the campus ability to adopt new Office 365 applications on demand, participants in this study conveyed that Office 365 has introduced feelings of loss of control as IT strives and struggles to keep up with the constant release of Office 365 applications. Campus users, also known as consumers in the literature, are utilizing and accepting public cloud computing technologies in their personal lives and they are bleeding over into work life (Attaran et al., 2017; Ercan, 2010). As a result, IT feels a loss of control coupled with the responsibility of making the implementation of Office 365 an important, successful endeavor.

Researchers, like the participants in this study, have identified many concerns about the transition from on-premise data centers to public cloud computing technologies including but not limited to: a decline in the reliance on a central IT department, control shifting from IT to campus users, lack of awareness on who is conducting university business through new public cloud computing technology (Boja et al., 2013; Carraway, Cato, Chapple, Dugas, et al., 2015; Yanosky, 2010). Jones et al. (2017) support these concerns and feelings of loss of control, “Loss of control over both the physical and logical aspect of system and data as the shift to the public cloud requires a transfer of responsibility and control to the cloud provider” (p. 7).

To address the constant release of Office 365 applications, an early adopters’ team was formed to review applications released within Office 365 before they were released to campus. The data from this study revealed that the early adopters’ group was a good concept; however, the implementation did not support the intention. Members of the early adopters’ group were to
look at the newly released applications in addition to performing their regular job duties. Like
the participants in this study, Marston et al. (2010) suggests forming a cloud group or committee,
like the Office 365 early adopters’ group created at Heusser University, to continuously review
new developments in cloud computing. Creating a group that is dedicated to cloud computing to
evaluate new offerings, integrate areas on campus such as purchasing and legal, is essential to a
cloud strategy (Carraway, Cato, Chapple, Dugas, et al., 2015). The cloud group could address
the two trends of rapid rate of application development in the cloud computing environment and
the quick rate of adoption by faculty, staff and students (Carraway, Cato, Chapple, Dugas, et al.,
2015). Without a cloud strategy and group dedicated to look at cloud offerings, Thompson
(2018) described it organizations are being forced into the adoption of cloud technologies by
campus users and cloud vendors creating the problem of being reactive rather than proactive.

Contributing to the feelings of loss of control is the reliance the university now has on
Microsoft to resolve issues that used to be resolved by IT. Cloud vendors will have many
customers competing for the same level of support and customers will expect the same level as
they received when the systems were hosted on-premise (Khajeh-Hosseni et al., 2010). When
something went wrong with the on-premise infrastructure, IT had complete control over how to
prioritize and resolve. While researchers agree with the participants in this study that vendor
reliance is increased when using cloud computing (Boja et al., 2013; Carraway, Cato, Chapple,
Dugas, et al., 2015; Yanosky, 2010), some researchers unexpectedly convey that the need for IT
support is subsequently reduced as systems are migrated to public cloud computing vendors
(Jones et al, 2017; Khajeh-Hosseni et al., 2010).

Participants in this study revealed an increased dependence on IT as well as the added
responsibility of vendor management and an increased reliance on vendors due to the
infrastructure being moved off premise. The migration caused anxiety for the IT staff and coupled with the rapid release of new applications within Office 365 there was growing frustration over the ability of IT to keep up and support campus. Attaran et al., (2017) supports the increased dependence on IT by expressing that the need for IT expertise will grow requiring the training with more workloads being placed in the cloud and ongoing cloud implementations. Carraway, Cato, Chapple, Dugas, et al., (2015) further added the need to develop IT staff along with creating new positions dedicated to serve as strategic partners with campus as integration and coordination with vendors continue to grow.

**Theme 5: User Adoption of Office 365 Applications Drives Change**

Public cloud computing technologies, like the Office 365 suite of applications, provide the opportunity to collaborate allowing dispersed groups of people to meet virtually and share documents and information (Al-Zoube, 2009; Attaran et al., 2015; Kiryakova, 2017) and fully support the participants identification of Office 365 as an effective tool for enhancing collaboration. Faculty, staff and students are free to choose from the many Office 365 applications and install them for free on multiple devices (Attaran et al., 2015). The participants revealed an increased level of collaboration internally to IT, across the university and with external entities as a result of the adoption of Office 365 applications. Some participants were invited to collaborate on processes and improvement by faculty members who have found and adopted Office 365 applications.

This collaboration spurred a shift in mindset within the IT department and can be considered one of the most significant findings of this study. Silos were removed due to the IT department coming together to collaboratively address the complexity of supporting a public cloud computing technology like Office 365. New relationships were developed both internal to
the IT department and externally as university clients pushed for adoption of specific Office 365 applications instead of a push from IT.

Breaking normal tradition of IT pushing applications out to the user community, clients are now adopting applications of their choosing. This leads to the second most significant finding of this study which I have termed best effort support (Figure 5.3). This best effort support necessitated the role of the IT department to transition from technology and hardware to service management. Instead of IT determining what is best for campus, the campus community is now selecting technologies and expecting support from IT. IT needs to provide services such as integration with other campus technologies, training, support, contract negotiations, and ensure service levels are set and met by vendors. Partnerships will grow across campus as areas become more integrated with each other through the use of the new technologies and the increased communication and collaboration. There will be ongoing implications for IT departments across higher education institutions as the number of public cloud computing technology adoptions continue to rise.

Figure 5.3. Push Pull Relationship with IT and Campus with Public Cloud Computing

Many participants shared that the rapid rate of adoption of Office 365 applications by the campus challenged the IT department to keep up with learning and supporting the Office 365
suite of applications. Complimenting the participants experiences, Pardishi (2014) believes the design of public cloud computing provides for flexibility, mobility and collaborative capabilities.

Storing data in the cloud increases the potential for collaboration between multiple users and has the potential to increase productivity (Kiryakova, 2017). As the participants demonstrated during observations, storing data in the cloud allows for access from anywhere from any device (Kiryakova, 2017). Participants demonstrated Office 365 applications such as OneDrive, OneNote, and SharePoint Online and highlighted features such as real time editing, sharing with others in IT, sharing with others across the university, and having one central location for shared documents. The shared locations made it easier to find and keep versions of document organized as well as the data and applications being accessible from any location, at any time, from any device. Kiryakova (2017) supports the participants’ views on collaboration through highlighting the vital importance of sharing files both with internal campus users and with external users by providing public links.

Focusing on the participants desire to provide equal tools on campus to those being utilized by users at home, previous researchers (Attaran et al., 2017; Ercan, 2010; Jones et al., 2017) similarly assert that there is a need to adopt the Office productivity tools, collaboration software, and storage sites that are offered a little to no cost as the campus community is already utilizing these cloud offerings in their daily lives. Kiryakova (2017) supports the enhanced collaboration mentioned by the participants by referring to Office 365 as a “cloud-based office suite, also known as online office suites or cloud-based collaboration tools in real time” (p. 278).

The participants realized the real time collaboration advantage of Office 365 and are utilizing new Office 365 applications to complete their work in a more streamlined fashion through real time communication and collaboration. Similar to the IT department collaboration,
Kiryakova (2017) approached his study from an e-learning perspective stating cloud-based office suites allow faculty and students to work together on tasks, projects and documents in real time. Additionally, like the participants, Kiryakova (2017) touches on the ability to access the cloud-based office suites from a Web browser which removes the need to install and configure software making access easy especially from mobile devices. Tied closely to application access is the availability of the data that is now stored in the cloud which can lead to collaboration opportunities and increased work productivity (Kiryakova, 2017).

Al-Samarraie & Saeed (2018) conducted a systematic review of the literature on cloud computing tools looking for collaborative learning to find the opportunities and challenges for blended-learning environments. The review found that not only did cloud computing technologies help with collaboration such as online editing of documents and the exchange of thoughts, it found that the collaboration led students to engage in the collective generation of knowledge and an increase in quality on teamwork (Al-Samarraie & Saeed, 2018).

Early strategies for cloud adoption included IT determining which applications should move to the cloud and which needed to stay on-premise (Babcock, 2010). With the proliferation of cloud applications and the data from this study, the IT department is now not only tasked with determining what can and should be moved to the cloud but also is tasked with determining which Office 365 applications to support based on campus adoption. Office 365 administrators can see which applications are in use by campus as well as look at help desk tickets opened for Office 365 applications. IT then began to support these Office 365 applications with the creation of knowledgebase articles, the training of IT staff and provision of formal training classes on these specific applications. While the literature shows the need for IT to continue to support campus technology, including cloud computing technologies (Babcock, 2010; Pardeshi, 2014).
there is no explicit model defined. The data in this study, revealed that *best effort support* is tied closely to the campus ability to adopt all of the Office 365 applications which are accessible from multiple devices, from any location and creating new collaboration opportunities. The rapid release and adoption of Office 365 places IT in a reactive role instead of a proactive role. Participants expressed that IT would need to identify which Office 365 applications to support and which campus would have to find ways to support themselves. The IT department is now in a situation of needing to support more applications, from more devices than is possible by one department.

**Conclusion**

This chapter discussed the alignment of the findings with the theoretical framework, the connection of the findings to the literature, as well as the implications for practice, importance to the research question and recommendations for future research. The findings discussed were: (1) Perceived Needs Led to Selection of Office 365, (2) Lack of Office 365 Knowledge Causes Concerns, (3) Introducing Change and Generating Awareness, (4) Feelings of Loss of Control, and (5) User Adoption of Office 365 Applications Drives Change. The purpose of this case study was to explore the progression of an IT department through the successful adoption of public cloud computing technology at a southeastern university.

Through the research, this question was used to frame the study, “How did an IT department at a southeastern university progress through the adoption of a public cloud computing technology?” Through the various data collected and subsequent analysis process, it became apparent that the adoption of Office 365 had a significant impact on the IT department and the ways it provides services to the campus community. It has provided an understanding of the importance of a cloud computing strategy to provide a foundation on which successful
adoption of cloud computing can occur. The understanding of the impact to an IT department and need for a cloud computing strategy could assist higher education organizations in supporting the IT department through transitions to new public cloud computing technologies.

Additionally, understanding how the implementation of public cloud computing technologies changes an organization including, but not limited to, changing processes, changing responsibilities, and changing support models may positively impact future public cloud computing technology implementations. This study has also provided new insights into the significant challenges an IT department experiences with technology change and may have also provided a basis for addressing the iterative needs of a cloud computing strategy.

The progression of steps in this study can be used as a model for developing a cloud strategy for how IT deals with complex public cloud computing implementations. Figure 5.4 shows how the IT department iteratively progressed through themes 3 through 5 with each new Office 365 application. This iteration can be seen as a representative illustration of each new public cloud computing technology universities may implement. Planning in advance for iteratively moving through a cloud strategy could aid in reducing the complexity of implementing public cloud computing technologies as well as plan for the shift in the management of IT, IT training, job descriptions, skills, and relationships.
A proposed cloud strategy model was developed (Figure 5.5) based on the themes presented in this study. As Office 365 applications were released, the IT department found itself repeating the process used to adopt Office 365 at Heusser University. The model has elements of Lewin’s Change Model, which states a successful change will consist of three stages: Unfreezing, Transition, and Freezing. There first has to be a recognition that there is a need to change due to a realization that the current way won’t meet future needs (Schein, 2010). The activation of change or unfreezing of the current status maps to theme three - Introducing Change and Generating Awareness. Once awareness has been generated, transition can begin and maps to theme four - feelings of loss of control or shift to campus control. Lastly, freezing indicates the change has been absorbed into the system and is now the norm. This maps to theme five - user adoption of Office 365 applications drive change and completes the change process.

**Figure 5.5.** Proposed cloud Strategy Model Based on Lewin’s Change Model.

In the proposed model, the first step is a recognition of need by any member of campus which leads to the second step, a desire for change. Public cloud computing enables everyone on campus to become a change agent and either participate or lead the adoption of a public cloud
computing technology (unfreezing). Participation can be in the form of using the public cloud computing technology in any setting and providing the platform for innovation to occur with reduced concerns for how the new technology may impact existing technologies on campus. It can provide a freedom to those who have a desire to change to test the new public cloud computing technology as creatively as they can think up (transition). Lastly, through feedback on public cloud computing technologies adopted by campus, changes will occur within IT and around the campus community (freezing). This change can occur with each new adoption of a public cloud computing technology.

The data in this study provided a foundation on which new practices could be formed and implemented in higher education institutions. Public cloud computing adoption is relatively new in higher education and requires looking back at implementations in order to move forward with stronger and more successful implementations. Three recommendations for practice and three recommendations for future research are provided in the following sections.

**Recommendations for Practice**

Through the analysis of the data and reflection on the current literature, three additional considerations were identified they may help organizations in their transition to public cloud computing technologies. The three additional considerations are: (1) public cloud computing creates opportunities to evaluate support models, (2) IT department experiences support development of a cloud strategy framework, and (3) evaluate IT skillsets needed to support cloud computing. Each consideration will be discussed in detail, followed by recommendations for future research.

**Recommendation 1: Public Cloud Computing Creates Opportunities to Evaluate Support Models.** Historical IT models will need to change with the rapid adoption of public cloud
computing. Historical IT models focused on technology, including an on-premise infrastructure and applications that were selected and approved for use by IT, where public cloud computing focuses mainly on services (Attaran et al., 2017). With the historical IT model, IT departments were often challenged by constrained IT budgets, a need to grow and maintain an aging infrastructure, and implement, support and maintain a wide range of applications and integrations (Attaran et al., 2017). Public cloud computing is transforming the way higher education institutions provide technology resources to faculty, staff and students. Hence, the historical IT support models will need to change.

DeBary (2017) in his exploration of strategies for community college transition into a cloud environment found a lack of knowledge on how systems and applications currently worked and how they were expected to work in a cloud environment. Higher education institutions would benefit from taking the time to evaluate how the systems, applications, integrations, support and training are currently operating and look for opportunities to improve them with the implementation of cloud computing. If this were to happen, it is possible that the university would have a different expectation on reducing IT staff members as a result of a cloud computing implementation.

Aligning with this thought, Green (2018), in his study on IT in higher education, identifies IT Security and hiring and retaining IT talent as the top two priorities for IT leadership. Understanding the staff needs to retain institutional knowledge is critical as well as the inclusion of IT Security in the new support models. Raising awareness on the benefits of cloud computing adoption, changing old outdated business processes and methods for teaching and learning could serve as a catalyst for major change. Advocating for an organized, strategic transition to cloud computing technologies reduces the overwhelming nature of new cloud technologies and can
make better use of the IT staff resources where data security is planned and emphasized, efficiencies can be realized, and helps develop new support models where IT can become a leader in assisting with adoption and integration with teaching and learning.

**Recommendation 2: IT Department Experiences Support Development of a Cloud Strategy Framework.** It became clear from the data in this study that a cloud strategy is essential for successful implementations of cloud technology in higher education institutions. Attaran et al. (2017) assert that the framework for a cloud strategy should be built around the needs of campus stakeholders including faculty, staff, students, board members and alumni. If full advantage is going to be taken of cloud computing implementations, understanding how the IT services will be delivered in the new cloud environment could lead to a higher success rate for adoption.

Developing a requirements document before looking at specific vendor offerings. Identifying the requirements before a tool is selected would help to clarify why a vendor was selected and to evaluate at the conclusion of the implementation if the stated objectives were met. Implementing a formal process for the adoption of technology across campus would assist in understanding the need to select the best product and to create efficiencies in spend across the campus. Participants in this study identified that faculty and staff get set in their ways and often resist change. The evaluation of current business processes to assess whether they will need to be updated or removed is extremely important to the success of a technology implementation.

For example, the campus adoption of free public cloud computing technologies to store university data could introduced security and legal concerns. If an employee were to separate from the university, the university would not have access to that data; therefore, having the requirements identified before a technology is selected could address these issues. Furthermore,
legal, purchasing, and IT need to have the opportunity to review or approve of how or where the public cloud computing technology stores or transfers data or any other legal requirements.

Complimenting Attaran et al. (2017) view of stakeholders, a cloud computing committee who regularly pulls together the needs from the various stakeholders to develop an iterative framework for cloud computing adoption. When working within project management, it is often described as an iterative process as a project team evaluates each iteration evaluates what changes may be needed to produce a successful project. A cloud computing framework would be similar in that the cloud computing field is changing so rapidly, that a static framework will be outdated almost as soon as it is developed.

Reflecting on the participant experiences in this study and the literature on cloud computing strategies, a picture is painted of a dynamic and complex process of cloud computing adoption. IT strategic plans usually range in duration from 3-5 years. Some institutions revisit them every year in order to keep up with the changes in technology. The establishment of a template or framework for cloud computing adoption in higher education can provide institutions with the foundation they need to then fold in their needs and vision to better support deploying and supporting cloud computing technologies.

**Recommendation 3: Evaluate IT Skillsets Needed to Support Cloud Computing.** Cloud computing technologies are appearing in large numbers and are very appealing to higher education executives, IT departments, faculty, staff and students for a variety of reasons including rapidly providing new services that can create a perceived advantage over other higher education universities, increasing availability of software and data, cost reductions and the belief that cloud computing reduces the reliance on the skills and knowledge of an IT department. The literature does not provide evidence that a reduction in the skills and number of IT staff is
realized by implementing cloud computing technologies. The literature does validate that cloud computing introduces new complexities including the need for vendor integration skills as new knowledge is needed to support the implementation of cloud computing technology (Babcock, 2010; DeBarges, 2017; Mariano, 2016; Pardeshi, 2014).

Office 365 is no different as it offers new services that needed to be integrated with legacy systems on campus. This research has shown that fears from the IT department are valid and the participants benefited from having a third party involved and how valuable contracting with a third party can be to the success of a public cloud computing implementation. A cloud strategy that focuses on understanding the cloud, defining user requirements and adds the use of vendor services could significantly support the success of cloud computing implementations. Universities will need to created teams or groups that are dedicated to cloud technology. Some of the items they will address are a cloud migration strategy, identifying needs, creating data governance, policies, integrations. One of the most critical needs is to education and train IT staff to support these investments in public cloud computing technologies. The change rate is so rapid and under the control of the vendor that IT serves in more of a facilitative, vendor management role. As the driving force for technology adoption shifts from traditional IT to campus users, IT will see a shift in roles and skills required to support cloud computing adoption.

**Recommendations for Future Research**

As described in Chapter 2, the use of technology in higher education has evolved tremendously over the years and cloud computing technologies are increasing the pace of change. The pace is so great and adoption by consumers in their daily lives, pushes higher education into adoption whether they are ready or not. When considering the data and themes identified during the course of this doctoral thesis, three primary areas emerged to pursue further
research in the area of public cloud computing adoption in higher education: 1. Assess the fears and concerns of public cloud computing adoption at additional institutions, 2. Compare the changes in structure and support in IT departments after the adoption of public cloud computing, and 3. Compare and contrast cloud computing strategy models toward establishing a standard.

**Recommendation 1: Assess the Fears and Concerns of Public Cloud Computing Adoption at Additional Institutions.** Many of the participants had concerns and fears regarding the adoption of Office 365, it would be helpful to know how other higher education IT departments addressed fears and concerns prior to the adoption of a public cloud computing technology. IT departments are often stretched very thin and do not grow at the same rate as other university departments. They are often burdened with doing more with less resources. IT departments are an essential resource for higher education and should be strategically incorporated into all aspects of the university. Taking this into consideration, understanding how IT can gain knowledge and comfort with new technology implementations would be beneficial for staff retention, stress reductions, and positively contribute to success future implementations.

**Recommendation 2: Compare the Changes in IT Structure and Support After Public Cloud Computing Adoption.** Every member of the IT department has something to contribute in the adoption of public cloud computing. It may be helpful to look across universities to understand in what ways IT department structure and support changed as a result of the implementation of Office 365 or any public cloud computing technology. Many times, IT staff are expected to absorb new responsibilities while retaining their existing responsibilities. It was clear from the interviewees, that a new support model of *best effort support* was developed in response to the adoption of Office 365. If we were to look at many university IT departments after a successful implementation of public cloud computing, to see if there were common
themes, it may help better prepare an IT department and university for the adoption of public cloud computing.

**Recommendation 3: Compare and Contrast Cloud Computing Strategy Models Toward Establishing a Standard.** It became clear during this case study, that performing a detailed analysis of the services needed, integrations with other applications, and security and compliance needs is essential to selecting the correct cloud computing technology. With the wide availability of cloud computing offerings, including free and low-cost options, it could be helpful to have this process of discovery formalized. As the literature was reviewed it became apparent that cloud computing strategies have been developed in efforts to assist in formalizing the cloud adoption process; however, the cloud strategies lack consistency. Conducting a review of the literature to compare and contrast cloud computing strategy models could assist in the development of a standard framework.
References


Appendix A: Initial Recruitment E-mail to Potential Participants

Dear [Participant]:

My name is Sharyne Miller, I am in the research phase of my doctoral studies at Northeastern University, and I am in need of study participants. The purpose of this research is to explore the progression of an IT department through the adoption of a public cloud computing technology at a southeastern university. The goal of this study is to document the progression through the adoption of a public cloud computing technology as experienced by an IT department at a southeastern university. The public cloud computing technology for this study is Office 365, and the study will be retrospective in nature. The experience of the participants will range from less than 2 years university experience through greater than 10 years of university experience.

I am interested in interviewing you about your experiences during the planning and implementation of a public cloud computing technology, Office 365. This would take approximately 45 minutes to 1 hour, and it can take place at a time of your choosing. The location would be a quiet conference room located at your campus. As a participant in the study, I would ask that you provide me with any documentation you believe would be useful in obtaining relevant information regarding the planning and implementation of a public cloud computing technology, Office 365. Last, I request that you permit me to observe you for approximately 10-15 minutes in your workplace setting while interacting with or administering the public cloud computing technology, Office 365.

Your participation in this study is voluntary, and you can withdraw at any time. Your privacy is important to me, and I will hold all the information I gain in this study in confidence,
using pseudonyms for your identity and for the university’s identity. As a thank you for your participation, I will give you a $15 gift card at the end of our final meeting.

If you are willing to participate, please respond to me at this e-mail address, and I will contact you with further information. If you have any questions about my study, please feel free to contact me. Thank you very much for your consideration, and I look forward to hearing from you.

Best Regards,

Sharyne A. Miller

Miller.sha@husky.neu.edu
Appendix B: Signed Informed Consent Form

Northeastern University, College of Professional Studies, Doctor of Education

Name of Investigator(s): Dr. Shannon Alpert, Sharyne A. Miller

Title of Project: Public Cloud Computing Technologies: The People Side of Change

Informed Consent to Participate in a Research Study

We are inviting you to take part in a research study. This form will tell you about the study, but the researcher will explain it to you first. You may ask this person any questions that you have. When you are ready to make a decision, you may tell the researcher if you want to participate or not. You do not have to participate if you do not want to. If you decide to participate, the researcher will ask you to sign this statement, and she will give you a copy to keep.

Why am I being asked to take part in this research study?

We are asking you to be in this study because you are a member of the IT department at a southeastern university and have experience with the adoption of a public cloud computing technology, Office 365.

Why is this research study being done?

The purpose of this research is to explore the progression of an information technology department through the adoption of a public cloud computing technology at a southeastern university.

For the purpose of this study public cloud computing is defined as software, platforms or infrastructure are offered by service providers for use by the general public on hardware in the provider’s data center and maintained by the service provider. The public cloud computing technology identified for this study is Office 365 and will be retrospective in nature.
**What will I be asked to do?**

If you decide to take part in this study, we will ask you to participate in an interview lasting approximately forty-five minutes to one hour. The study will be explained to you prior to the interview and you will be asked to sign the informed consent agreement. The interview will be recorded on a password-protected iPhone and a back-up device in case the primary recording malfunctions. Within one week of the interview, the co-investigator will email you an interview transcript. You will be invited to react to the transcript by clarifying, confirming or disagreeing with any of the content in writing to the co-investigator.

At the end of the interview, you will be asked to email any documents you believe would be pertinent to the study to the researcher and we will schedule a time for the short observation of interaction or administration of the public cloud computing technology.

During the 10-15 minute observation, you will interact with or administer the public cloud computing solution as you would in normal work business.

**Where will this take place and how much of my time will it take?**

You will be interviewed in a conference room located on your campus at a time that is convenient for you. The interview will take about one hour. The observation will take about 10-15 minutes and take place in your workplace setting.

**Will there be any risk or discomfort to me?**

There is no anticipated risk involved in this research study.

**Will I benefit by being in this research?**

There will be no direct benefit to you for taking part in the study. However, the information learned from this study may help future implementations of public cloud computing in higher education institutions go more smoothly.
**Who will see the information about me?**

Your part in this study will be confidential. Only the researchers on this study will see the information about you. No reports or publications will use information that can identify you in any way or any individual as being of this project.

All electronic files will be stored on the researcher’s home computer accessible only to the researcher through two-factor authentication. All recorded interview files will be stored on a password protected iPhone. Once the audio files are transcribed, they will be deleted from that iPhone and home computer. Paper copies of documents obtained and used during the research process will be scanned and stored on the researcher’s home computer and stored in a locked file cabinet accessible only by the researcher.

The researcher will consistently use pseudonyms for the participants to fully comply with confidentiality, not only during the data collection process but also in any subsequent publications or use of the material collected.

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**If I do not want to take part in the study, what choices do I have?**

There is no obligation to participate in this study.

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**What will happen if I suffer any harm from this research?**

No special arrangements will be made for compensation or for payment for treatment solely because of my participation in this research.

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**Can I stop my participation in this study?**

Your participation in this research is completely voluntary. You do not have to participate if you do not want to and you can refuse to answer any question. Even if you begin the study, you may quit at any time. If you do not participate or if you decide to quit, you will not lose any rights, benefits, or services that you would otherwise have as an employee.
<table>
<thead>
<tr>
<th><strong>Who can I contact if I have questions or problems?</strong></th>
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<tbody>
<tr>
<td>If you have any questions about this study, please feel free to contact Sharyne A. Miller at <a href="mailto:miller.sha@husky.neu.edu">miller.sha@husky.neu.edu</a>, the person mainly responsible for the research. You can also contact Dr. Shannon Alpert at <a href="mailto:s.alpert@northeastern.edu">s.alpert@northeastern.edu</a>, the principal investigator.</td>
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<tr>
<th><strong>Who can I contact about my rights as a participant?</strong></th>
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<tr>
<td>If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, Mail Stop: 560-177, 360 Huntington Avenue, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, E-mail: <a href="mailto:n.regina@neu.edu">n.regina@neu.edu</a>. You may call anonymously if you wish.</td>
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<th><strong>Will I be paid for my participation?</strong></th>
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<tr>
<td>You will receive a $15 gift certificate to Starbucks as soon as you complete the interview and observation.</td>
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<th><strong>Will it cost me anything to participate?</strong></th>
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<tr>
<td>Your participation in this study will not cost you anything.</td>
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<th><strong>Is there anything else I need to know?</strong></th>
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<tr>
<td>No.</td>
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I agree to *have my child* take part in this research.

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<th>Signature of person [parent] agreeing to take part</th>
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Printed name of person above

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<th>Signature of person who explained the study to the participant above and obtained consent</th>
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Printed name of person above
Appendix C: Interview Questions

Interviewer: Sharyne A. Miller,

Interviewee Pseudonym:

Date and Time of Interview:

Interview Location:

Interview Questions:

1. How long have you worked in IT?

2. Tell me about your role in IT during the planning and implementation of Office 365.

3. Tell me about your role in IT now and how it has changed with the implementation of Office 365 and its various applications.

4. Think about when you started with Office 365; how would you have defined or described “public cloud computing”?

5. How would you describe public cloud computing, or Office 365, today?

6. When you first started working with the adoption of Office 365, what do you remember most about it and its applications?

7. How would you describe your current experiences using Office 365 and its applications today?

8. How would you describe the process and schedule involved in identifying, selecting, and implementing Office 365?

9. Who, including different groups or areas, participated in the selection and implementation of Office 365?

10. With new applications being regularly released within Office 365, how would you describe who helps to identify and select which new Office 365 applications to implement today?

11. How would you describe the strategy the university used to adopt Office 365?

12. How did it accomplish campus buy-in?

13. Tell me how the university accomplishes campus buy-in today as new applications become available within Office 365?
14. Were there any campus policies and procedures that helped or constrained the adoption? If constrained, how did the university mitigate them?

15. What concerns did you have prior to adopting Office 365?

16. How did the university mitigate your concerns?

17. Can you describe any new concerns you may have as Office 365 continues to release new applications?

18. How have your expectations of Office 365 changed during or after the implementation?

19. What were the initial communication strategies during the adoption process?

20. How have these communication strategies evolved (changed) since the initial adoption process?

21. If you were to identify one process to ensure long-term adoption of Office 365, what would that process be? Please describe it.

22. In what ways has the IT department changed in response to the adoption of Office 365?

23. What three words would you choose to describe the ways Office 365 has contributed to changing the processes, culture, and collaboration at the university?

24. Would you be willing to answer a few questions via e-mail when you receive the interview transcript for verification?