ABSTRACT
Users’ information sharing and storage behavior is noticed to have an apparent reliance on cloud computing based environment instead of traditional tools and techniques. University students represent a broad sector of cloud computing services’ (CCS) users who are heading toward using this technology in multiple aspects of their life. Security and privacy concerns are considered one of the hindering factors behind the wide adoption of this technology. It is noticed that there is a lack of studies conducted to evaluate CCS acceptance behavior taking into consideration the effect of security and privacy. The unified theory of acceptance and use of technology (UTAUT) is selected to address the behavior determinants because of its ability to express users’ intention toward the use of technology more than any model in the same context. Additionally, this theory is not tested before in the area of CCS. The proposed model uses reliable and valid measures to explore the factors influencing the adoption behavior which is described by behavioral intention. The addressed factors comprise multiple beliefs, social influence, facilitating conditions, perceived security, perceived privacy, and moderating variables.

Keywords: Cloud computing services (CSS); unified theory of acceptance and use of technology (UTAUT); perceived security; perceived privacy

INTRODUCTION
Cloud computing acquires growing attention in information systems and technology research areas (Armbrust et al., 2010; Pallis, 2010). The concept that has been defined adequately by researchers of various areas and backgrounds is related to Internet-based applications that provide several services such as social networking, distributed file systems, and structured storage systems to facilitate sharing and storing of data, synchronization, and creating multi-format contents (Arpaci, Kilicer & Bardakci, 2015). In the educational sector, cloud computing services (CCS) have facilitated the process of utilizing and releasing resources and services based on terms of agility and pay-as-you-go model (Mircea & Andreeescu, 2011; Sarabdeen & Ishak, 2015). Although these services are becoming more popular, a few studies explored users’ perceptions about the services provided and little information was provided about the psychological factors affecting users’ acceptance and adoption (Park & Kim, 2014).

Sclater (2009) indicated that CCS are becoming more popular in universities and support students and instructors with numerous services including email, contact lists, calendars, document storage, creation and sharing in addition to the ability to create websites. However, cloud computing adoption is explored from institutions perspective without paying sufficient attention toward users’ beliefs and expectations (Ion, Sachdeva, Kumaraguru & Capkun, 2011). CCS support of the
learning process changes the behavior of information sharing and storage (Alharthi, Yahya, Walters & Wills, 2015). In a study conducted by Oliveira, Thomas, and Espadanal (2014), it was stated that users are moving toward accessing cloud applications rather than installing them on their platforms in order to avoid configuration or operability issues. Also, Park and Kim (2014) stated that users are now moving to store their information on cloud computing servers and can use various electronic devices to access it.

Concerns about security and privacy were considered the main limitations of CCS (Arpaci et al., 2015; Chen & Chang, 2013; Bhattacherjee & Park, 2014; McCauley, 2011; Oliveira et al., 2014; Park & Kim, 2014; Rathi & Kumari, 2015; Ratten, 2014; Shin, 2010; Wijdaja & Chen, 2012; Yenisey, Ozok & Salvendy, 2005). Arpaci and others (2015) found that users’ beliefs and thoughts about security and privacy influence their attitude toward acceptance and adoption of CCS. Users’ privacy beliefs may vary by location changes. For example, Kumaraguru and Cranor (2005) indicated that Indian users exhibit a low level of privacy awareness and have fewer concerns compared to Americans.

Although CCS offer various opportunities for customers in the marketplace, users still reluctant to move toward using them because they have several concerns about data security and privacy (Bhattacherjee & Park, 2014). Without having coherent security and privacy basis, CCS will seem untrusted and act in an isolated environment without fulfilling their enormous potentials. We realize the importance of highlighting the reality of this technology acceptance and the necessity of framing a wider view of users concerns, beliefs, and their usage behavior. The assumptions of this study are built on the unified theory of acceptance and use of technology (UTAUT) which has been used considerably in information technology literature. We focus on university students’ adoption behavior since they are usually targeted by service providers to support their learning process (Sultan, 2010). The results may contribute to the body of knowledge in information technology literature and help researchers to obtain a better understanding of students’ adoption behavior of CCS in educational sectors. Our research questions are: (1) What are the factors affecting students’ acceptance and adoption of CCS? (2) What is the effect of perceived security and perceived privacy on students’ intention to use CCS?

The study starts by exploring the literature to investigate users’ adoption behavior of CCS taking into consideration security and privacy beliefs. Additionally, the main models and theories used to describe cloud computing adoption behavior are discussed. A proposed research model and main hypothesis are presented followed by the methodology will be pursued to apply data collection and analysis.

**LITERATURE REVIEW**

*Security and privacy in CCS*

Cloud technology innovation is offered by multiple service providers and comprises several services such as software as a service (SaaS), web services, utility computing, and platform as a service (PaaS) (Ratten, 2014). Deciding whether individuals will adopt or abandon a particular technology has motivated researchers in several areas of study (Straub, 2009). Therefore, understanding user’ beliefs, intention, and social context is essential to understand their behavior. However, cloud users are changing their behavior in response to inconstant perceptions of benefits and risks over time (Kshetri, 2013). In spite of the wide dissemination of this technology,
researchers specified several issues reflecting users’ concerns including security and privacy (Alharthi et al., 2015; Armbrust et al., 2010; Wu, Lan & Lee, 2013). Also, researchers confirmed that security and privacy concerns may diminish cloud computing diffusion (Oliveira et al., 2014) and discourage cloud computing migration behavior (Bhattacherjee & Park, 2014).

Several studies found that perceived security plays an essential role in determining users’ attitude toward their usage and perceived usefulness of CCS. Arpaci and others (2015) investigated the determinants of cloud computing usage in education and examined the role of security and privacy concerns on user behavior. The authors considered these factors as critical predictors of students’ attitude toward using CCS. Widjaja and Chen (2012) stated that privacy policy is relevant to subjective norms and may influence cloud computing environment and users’ beliefs in the services. From the prior literature, we noticed that security and privacy effects are not considered in evaluating behavioral intention toward CSS usage. Therefore, an extended model for the UTAUT will be proposed in our study by importing security and privacy concerns to evaluate the behavioral intention.

Cloud computing adoption theories

Cloud computing adoption behavior was explored by applying multiple models and theories (Alharthi et al., 2015; Arpaci et al. 2015; Bhattacherjee & Park, 2014; Lin & Chin, 2012; Oliveira et al., 2014; Park & Kim, 2014; Park & Ryoo, 2013; Ratten, 2014; Widjaja & Chen, 2012; Wu et al., 2013).

Security and privacy concerns on the educational use of cloud have been addressed by Arpaci et al. (2015) who proposed a research model based on the theory of planned behavior (TPB). They hypothesized that students’ attitudes toward using cloud computing are predicted by security and privacy perceptions, and this was supported by their results. Widjaja and Chen (2012) studied user’s perception regarding information security and privacy issues in cloud computing using the theory of reasoned action (TRA). The theory was used to explain the attitude and intention to use cloud services. The authors implied that if users trust service providers, they would have a positive attitude toward using the service.

Based on the TRA and the TPB, the technology acceptance model (TAM) has evolved and proved to be one of the most widespread models that investigate user’s acceptance of new computer technology innovation (Davis, 1989). Park and Kim (2014) conducted a study to investigate the cognitive factors affecting user perception and attitude toward mobile CSS. The authors explored the effect of perceived usefulness, perceived connectedness, perceived security, and system quality on attitude toward using the service. The authors stated that although cloud computing availability and immediacy, privacy of data stored and accessed are considered critical issues. As a result, they hypothesized that perceived security has positive effects on attitude toward mobile cloud services in addition to services quality.

Information technology literature is characterized by rich research and models that describe users’ acceptance. Venkatesh, Morris, Davis, and Davis (2003) reviewed the literature intensively and compare eight common models namely are: TRA, TAM, TPB, motivational model (MM), combined TAM and TPB (CTAM-TPB), model of PC utilization (MPCU), diffusion of innovation theory (DOI), and social cognitive theory (SCT), to formulate the UTAUT. The UTAUT was built on four core elements which are performance expectancy, effort expectancy, social influence, and
facilitating conditions in addition to four moderators which are gender, age, experience, and voluntariness of use (See Figure1).

Figure1. The UTAUT – Adapted from Venkatesh et al. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425-478.

RESEARCH MODEL
In this paper, an extension to the UTAUT is proposed to explore cloud computing adoption taking into consideration perceived security and perceived privacy as new determinants of behavioral intention. Even though this model has been applied in several technological areas to explore users’ adoption behavior, limited studies were proposed to investigate users’ adoption behavior in cloud computing, especially students. We decided to exclude the voluntariness of use from the proposed model since the use of this technology is not mandatory and the decision left to the students to share and store their information. Figure 2 represents the proposed model.

Figure 2. Proposed research model
CONSTRUCTS AND RESEARCH HYPOTHESIS

Performance expectancy
According to Venkatesh and others (2003), performance expectancy is defined as “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (p. 447). The authors implied that this construct is the strongest determinant of behavioral intention. Venkatesh and others indicated that the relationship between performance expectancy and intention is moderated by gender and age. Therefore:

H1: There will be a significant positive relationship between performance expectancy and behavioral intention to use CSS, and this relationship will be moderated by student’s gender and age.

Effort expectancy
Venkatesh and others (2003) defined effort expectancy as “the degree of ease associated with the use of the system” (p. 450). The authors found that this construct is more salient for women and older workers and affected by users’ level of experience, therefore:

H2: There will be a significant positive relationship between effort expectancy and behavioral intention to use CSS, and this relationship will be moderated by student’s gender, age, and level of experience.

Social influence
In the original model of UTAUT, Venkatesh and others (2003) defined social influence as “the degree to which an individual perceives that important others believe he or she should use the new system” (p. 451). Venkatesh and others found that this construct is influenced by gender, age, and the level of experience, therefore:

H3: There will be a significant positive relationship between social influence and behavioral intention to use CSS, and this relationship will be moderated by student’s gender, age, and level of experience.

Facilitating conditions
Venkatesh and others (2003) defined facilitating conditions as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (p. 453). According to literature, it is implied that facilitating condition has an insignificant effect on behavioral intention. When mediated by experience and age, facilitating condition was found to influence the usage behavior. Therefore:

H4: There will be a significant positive relationship between facilitating conditions and use behavior of CSS, and this relationship is moderated by student’s age and experience.

Behavioral intention
Behavioral intention has been used by Davis, Bagozzi and Warshaw (1989) as the main determinant of actual system use which basically built upon attitudes and perceived usefulness. In the UTAUT, this construct has a direct influence on usage behavior and influenced by several constructs as mentioned earlier. Therefore:
H5: There will be a significant positive relationship between behavioral intention and usage behavior of CSS.

Perceived security and perceived privacy
Security adoption behavior is described by the concept of perceived security which defined by Yenisey et al. (2005) as the “degree to which users believe in the security of a particular service” (p. 1). Moreover, Bhattacherjee and Park (2014) defined the concept of security concerns as “users’ beliefs in cloud service providers’ ability to safeguard sensitive personal information from security breaches during transmission and storage” (p. 363). Arpaci and others (2015) defined perceived privacy as “the degree to which students believe that cloud services are safe and protect their sensitive information” (P. 95). In general, privacy reflects users concerns about accessing and storing their information by service providers. These concerns encompass threats occur during service usage (Chen & Chang, 2013) which may affect users’ adoption behavior to technological innovations (Ratten, 2014). Consequently, we propose to extend the UTAUT by hypothesizing the following:

H6: There will be a significant relationship between perceived security and behavioral intention.

H7: There will be a significant relationship between perceived privacy and behavioral intention.

METHODOLOGY

Survey development
Based on the literature, an online-based survey will be used to evaluate students’ acceptance and use of CCS. The survey instrumentations are adapted from questionnaires’ items that have been successfully implemented in prior studies. The constructs of perceived security and perceived privacy have not been integrated together into the UTAUT to evaluate CCS acceptance behavior. Therefore, these items are adopted from studies related to cloud computing acceptance and other technology areas.

Participants
The IRB approval is obtained to conduct this study on the University of North Texas (UNT). As a rule of thumb, at least 5 respondents need to be collected for each construct’s item (Garver & Mentzer, 1999). A convenient sample of students will be recruited to conduct the study. Those willing to participate in the survey need to be users of CCS regardless of the provider. A 5-point Likert scale questionnaire will be prepared to address the constructs’ items. The survey will be distributed either electronically using a survey tool (e.g. Qualtrics) or paper-based by some volunteers.

Data analysis
After collecting results, descriptive statistics for the constructs will be explored. Explanatory factor analysis will be used to evaluate variation sources in observations and Cronbach’s alpha (α) will be used to estimate instruments reliability (AlAwadhi & Morris, 2008; Kim et al., 2011; Bhattacherjee & Park, 2014; Yenisey et al., 2005). Afterward, multiple regression analysis will be applied to test our hypotheses and address the relationship between independent and variables.
taking into consideration the effect of the moderators. Study results will be discussed and the conclusion will be presented relying on the outcomes obtained.

CONCLUSION
Cloud computing is becoming a more mature technology and students from different colleges and backgrounds are increasingly adopting it. Generally, this technology affected information sharing and storage behavior of users and led to growing reliance on service providers to take control over these processes. Although cloud computing technology facilitates the process of utilizing and releasing resources and services, users’ concerns about security and privacy have emerged and affected their adoption behavior. This study aims to address the factors influencing students’ adoption behavior of CSS and determine the effect of perceived security and perceived privacy on that behavior. The factors affecting information storage and sharing behavior will be studied using the UTAUT which has been successfully applied to evaluate acceptance and use of technology in various technological areas.
REFERENCES


