Students' adoption of E-learning platforms: A comparative study in Uganda and Nigeria

Olema Hamiza[1], Sambo Martins[2], Clive Tsuma[3]
[1, 2] ICT University USA, Cameroon Campus, Cameroon
[3] PhD, ICT University USA, Cameroon Campus, Cameroon

Abstract
This study focused on Students' Adoption of E-Learning Platforms in Uganda and Nigeria. The aim of the study was to explore factors affecting students' Adoption of E-Learning Platforms. A questionnaire was developed based on Theory of Planned Behavior (TPB) and Technology-Organization-Environment (T-O-E). Data was collected from 204 university students in Uganda and Nigeria. Kaduna State University students portray a higher degree of e-Learning adoption compared to the Makerere university students. Perceived behavioral control, change agents were very significantly correlated with actual use of e-learning At the Nigerian University. At the Ugandan university, technology development, behavioral intention to use system have significant positive association with Actual use of e-learning. Multiple regression results showed that both planned behavior theory and technology-organization-environment theory constructs are significant predictors of e-Learning adoption in the two universities at 32.5% and 14.4% respectively. Therefore, universities should create an enabling technology environment so as to boost student e-learning adoption.

Keywords: E-learning platforms, theory of planned behavior, technology-organization-environment, actual use, Uganda and Nigeria

1. Introduction

Technological advancements are increasingly changing the way higher learning institutions meet their objectives and knowledge demands of the learners globally. With the introduction of the Internet, it is becoming cheaper for many institutions of higher learning to reach their learners worldwide. Thus, the Internet has given rise to e-learning platforms, which involves carrying out all teaching activities electronically. In this paper, we use the terms e-Learning platforms and e-Learning systems interchangeably. The introduction of e-Learning platforms excited students (Kituyi & Kyeyune, 2012) [24]. E-Learning platforms are believed to have the potential to widen access, reduce costs, and to improve the quality of education in Africa, help institutions meet the demands of a growing student population through technology-enhanced distance learning (Anderson & Grönlund, 2009). E-Learning is also known to enhance student motivation to learn, increase of value of education and enable lecturers to attend to individual student needs (Oyediran & Akintola, 2011) [26].

In light of these benefits, it is not astonishing that many universities in Uganda and Nigeria have developed and implemented e-learning platforms to meet the increasing demand for higher education in their respective countries and the diaspora. For instance, Makerere University, the biggest and oldest university in the country was the first to start an e-learning platform, called Makerere University Electronic Learning Environment (MUELE). Makerere University Business School developed Makerere University Business School Electronic Platform (MUBSEP), Muni University acquired and implemented Muni Blended learning platform (MBELP). Other universities such as Mbarara University of Science and Technology, Uganda Management Institute, Kyambogo University, Gulu University, and Soroti University have also followed suit (Guma *et al*., 2019). In Nigeria, Universities such

as University of Uyo, (UNIUYO); National Open University of Nigeria, (NOUN); Usmanu Danfodiyo University, Sokoto; (UDUS), Federal University of Technology Akure (FUTA) and University of Maiduguri, (UNIMAID) among others, have equally embraced the eLearning facility (Kyari; Adiuku-Brown; Abechi; Pyochi & Adelakun, 2018).

Unfortunately, despite the enormous benefits of e-Learning systems and colossal sums of money spent in installing electronic learning platforms by institutions of higher learning in the sub Saharan Africa in a bid to improve learning and alleviate space challenges due to increasing demand for education (Mtebe, 2015) [13], e-learning systems have failed to pick up to date and virtually no serious activity takes place on the e-learning platforms despite the high maintenance cost incurred to keep them running. Student rate of use has remained as low as 15% (Guma *et al*., 2019). In addition, student adoption rate seems to decline from university to university, country to county as lamented by the Principal Makerere University Business School, Kampala, Uganda.

In an attempt to address the challenge, quite a good number of local researchers have examined the state of the art of e-learning systems. In Uganda, Kituyi and Tusubira (2013) [23] designed a framework for integrating e- learning in Higher educational institutions of developing countries. Mbabazi and Guma (2016) [16] assessed the level of user satisfaction and usability issues associated with e-learning systems in Uganda. Okwoko (2017) studied ICT in Education: Adoption of Moodle as a Learning Management System at Public Universities in Uganda – A Case of Gulu University. Mbete (2014) evaluated acceptance and use of e-learning solutions in higher education in East Africa. Guma *et al*., (2019) applied SWOT Analysis of Blended Learning in Public Universities of Uganda: A Case Study of Muni University. While in Nigeria, Olabode; Fasoranbaku and Oluwadare (2015)

Studied Adoption of e-learning Technology in Nigerian Tertiary Institution of Learning. Edemoh and Ogedebe (2014) [19] examined E-Learning in Nigerian Universities: Prospects and Challenges Of e-learning with Nigerian Universities. Kyari; Adiuku-Brown; Abechi; Pyochi & Adelakun, (2018) also studied e-learning in Tertiary Education in Nigeria: Where Do We Stand? And Suleiman (2012) examined the essentialities for e-learning: The Nigerian Tertiary Institutions In Question. It is, however, relevant to note that none of these studies is comparative in nature and hence have failed to compare and contrast the rate of usage of e-learning systems. Thus, this study examines students' adoption of e-Learning platforms: A Comparative Study in Uganda and Nigeria based on Theory of Planned Behavior (TPB) and Technology-Organization-Environment (T-O-E) to analyze the factors influencing the students' adoption and use of e-learning systems. In doing this, the following research questions were addressed:

1) To what extent do students adopt and interact on the e-Learning platforms?
2) Is there a relationship between planned behavior, technology-organization-environment constructs and student's adoption of e-learning systems?
3) Is student's e-learning adoption rate in Uganda the same or different from that of Nigeria?

2. Theoretical underpinning
2.1 Theory of Planned Behavior (TPB)
The theory of planned behavior has been extensively useful and applied to study information systems acceptance and usage, with roots in social psychology. TPB was postulated by Ajzen (1985) as an extension of the Theory of Reasoned Action. The theory argues that actual behavior is determined by behavioral intention which in turn is influenced by an individual's attitude, subjective norm and perceived behavioral control (Teo & Pok, 2003). TPB, unlike the Technology Acceptance Model, is not specific to the Information System field and therefore a more general theory of explaining behavior. In addition to attitudinal beliefs, TPB adds two more important constructs in explaining behavior; subjective norm and perceived behavioral control.

Subjective norm refers to the influence of others in determining an individual's adoption and use of technology. Subjective norm which is analogous with social influence has been found to be a significant factor in influencing the adoption and use of information systems (Al-Somali et al., 2009). In the e-learning context, social influence can play a significant role in deterring or facilitating the adoption and use of eLearning systems. The core concepts of the theory are defined in table 1.

Table 1: Definition of core constructs of TPB (Theory of Planned Behavior) used in the study

Theory	Core construct	Definition
TPB	Subjective norms	A person's perception that most people who are important to him think he should or should not perform the behavior in question (Fishbein and Ajzen, 1975, p. 302) [1].
TPB	Perceived behavioral control	People's perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1991)
TPB	Behavioral intensions to use the system	The attitudes toward using the system (Ajzen, 1991)

2.2 Technology-Organization-Environment (T-O-E)
Another important model is the Technology-Organization-Environment framework of Tornatzky and Fleischer (1990) [28]. The framework assumes a generic set of factors to predict the likelihood of system adoption. The theory suggests that adoption is influenced by technology development (Kauffman & Walden, 2001) [29], Sociocultural environment, Adopter Characteristics, Change Agents and Leaders.

Technologists content that adoption depends on the pool of technologies inside and outside the firm as well as the application's perceived relative advantage, compatibility complexity, triability and observability. Studies by Kwon & Zmud (1987) show that the successful adoption of IT depends on the importance of internal technology resource-infrastructure, technical skills, developers, and user time; therefore firms with higher levels of technology competence show more likelihood to adopt e-commerce. Technology relates to IT platforms, internet skills/technical know-how, and e-commerce know-how (business and managerial skills) to apply the e-commerce facilities effectively (Zhu & Kraemer, 2002; Zhu, Kraemer, & Xu, 2002).

Technology competence goes beyond physical assets; it includes intangible resources, which perhaps generate competitive advantages for innovators since skills and know-how complement physical assets and are more difficult to imitate by rivals (Metaxiotis, 2009; Scupola, 2009). Perhaps TAM is likened to the above construct on the grounds of the postulates of PU and PEOU.

User characteristics such as perceived risk perceived control, and Internet experience can have a direct impact on eLearning adoption. A number of recent studies (Holland and Baker, 2001 [9]; Wind et al., 2002; Shanker et al., 2003; Wind and Rangaswamy, 2001) have found significant interaction effects between certain characteristics of online users (e.g., Internet experience) and various online strategies (e.g., personalization, customization, and community). Warkentin et al. (2002) argue that experience influences a citizen's trust of e-Government. Users with prior experience, especially if satisfied, would be more likely to return to use e-Government services. The core constructs of model are defined in table 2.

Table 2: Definition of core constructs of TOE (Technology-organization-environment)

Model	Core construct	Definition
TOE	Technology development	Sound information technology infrastructure and sufficient Internet talents (Tornatzky and Fleischer 1990) [28].
TOE	Sociocultural environment	Norms, superstitions, values and beliefs of the society (Tornatzky and Fleischer 1990) [28].
TOE	Adopter characteristics	Perceived risk, control, IT competence and Internet experience (Tornatzky and Fleischer 1990) [28].
TOE	Change agents	Presence of individuals who act as catalyst; solution giver; process helper and resource linker (Hunsaker, 1982).

3. Literature Review on Electronic Systems and Technology Adoption Models

3.1 Conceptualization of e-Learning

Due to the emergent nature of e-learning and the fact that evidence on the educational value of e-learning is sparse, a collective understanding of what constitute e-learning is being defined. According to Okah (2011) and Turban (2010) [20], e-learning can be defined as the online delivery of information for the purpose of education, training or knowledge management or performance management. It is the integration of learning with technology, and instruction delivered through purely digital technologies such as CD ROM, the internet and private networks (Landon and Landon, 2010). Sekakubo (2011) [910] also defined E-learning as a learning supported or enhanced through the application of ICT. It has also been defined as a mode of learning aimed at improving the quality of teaching and learning through the use of ICT (Begicevic & Divjak, 2006), laying emphasis on learning management system (LMS) as a platform that connects lecturers and students (Adzharuddin and Ling 2013). The commission of Technology and Adult Learning (2001) defines e-learning as the delivery of instructional content or learning experiences by electronic technology. E-learning requires that the learners use the internet, collaborate with peers and interact with the trainer for support. (Hsbollah and Idris, 2009) [98] also defined e-learning as a web-based educational system that utilizes IT and computer networks internet and intranet. In the same vein Unwin *et al* (2010) [12] defined eLearning platform as a 'software application or web-based technology that is used to plan, deliver or access a particular learning process', and Dagger *et al*, (2007) for defined the e-learning systems as a web-based software application platforms that use web technologies and the internet services to support: online course creation, maintenance and delivery; student enrolment and management; and education administration and student performance reporting.

Another definition of interest is tele-education that goes by a number of terms including e-education, distant learning, distributed learning and online learning that uses various forms of IT like chat rooms, video-conferencing, e-mails, and the internet (Hagg *et al*. 2000). However, it is not the intention of the paper to provide a universal definition of e-learning but putting together all these definitions, this paper would contribute to the definition of e-learning as a web-based technology for the purpose of education. Hence for such technology to improve productivity in the learning environment, it should be accepted and used by the students. A number of eLearning platforms have been developed and can be categorized into applications including virtual learning environments, course management systems, and collaborative learning environments (Monarch Media, 2010). Examples include but not limited to some commercial systems like BlackBoard and WebCT and open source e-learning systems like Moodle, Atutor, Sakai, and Kewl.

3.2 The Contemporary Status of E-learning in Africa.

There are many reasons for encouraging e-learning in Africa. According to a study by Prakash (2003), access to education in developing countries is limited with less than 5% of students in tertiary education compared to the world average of 16%. The demand for formal education in Africa far exceeds the ability to deliver and is not offered to significant portions of the population. Many African countries including Tanzania, Zimbabwe, Nigeria, Ghana and Kenya have established Open and Distance Education programmes using the dual mode institutional arrangement and thus complementing their campus based teaching with distance education in order to ease the pressure on institutional amenities. In his studies to ascertain the status of e-learning in Africa, Tim (2008) found that the status of e-learning in Africa is at its lowest ebb. Tim collected data from three hundred and sixteen (316) respondents who were people on the e-learning Africa database. Tim's study identified key constraints in seeking to implement and develop e-learning strategies and practices in Africa. These are lack of infrastructure, the need for appropriate training and capacity development, a lack of relevant digital content and the cost of implementing e-learning. The study further found much enthusiasm amongst respondents for developing the potentials of e-learning in their respective countries.

Again, there is a wide variety of different e-learning practices in Africa; the overriding evidence is that the majority of those claiming to be using e-learning is not actually using integrated formal learning management systems, but are rather using basic digital technologies to enhance their learning, more often than not interpreting e-learning simply as accessing information from the Web. Tim concluded that e-learning in Africa is still very much in its infancy across most of the African countries. The findings of Tim corroborated with Leary and Berge (2006). Leary and Berge found that nearly all countries in Africa are rapidly increasing the adoption and utilization rates of e-learning. Countries like Senegal, Ghana, Uganda, Cameroon, Kenya, Tanzania, Malawi, Zambia, Botswana, Gabon, and Zimbabwe, among others, contain populations with growing dependence on the internet. However, slow rate of e-learning adoption is evident across the length and breadth of Africa. Thus, a lot still ought to be done to meet international standards. On his part, Yusuf (2006) recommended that electricity, internet, computers, telecommunications and postal services must be developed to the levels that can support the desired scale of open and distance education in Africa. In sum, it was observed from the available relevant literature that e-learning adoption and utilization is yet to take a firm root in African universities. There might be some factors accounting for these phenomena. Universities in Africa need to identify these factors and analyze the extent to which they influence the adoption and utilization of e-learning in their institutions.

3.3 Prospect of E-Learning with Nigerian Universities:

While e-learning is not new, only in recent years has it received substantial interest from Nigerian educators and the government. Internet-based platform has empowered Nigerians to support and facilitate many historically interactive processes like shopping, dating, and banking. Attaining a university education might be the next frontier for web-based pragmatism and there are a lot of reasons why this is envisaged.

1. **Convenience:** Since e-learning systems allow students to take courses at their own time and pace, it is more convenient than their in-person counterparts. Turban *et al*. (2010) [20] connotes the flexibility of e-learning stating that students can even refer back to previous lectures without affecting the learning pace of other students. Forums and communities built around the massive online open courses add to the usability of these e-learning programs (UNESCO and COL, 2012) [6].

2. **Accessibility:** For profit, some universities in the developed countries were early adopters of e-learning especially within the PITAD framework as long as there is a learning management system that supports e-learning (Landon and Landon, 2010) especially with delivery, since it allowed them to attract who were unlikely to attend any sort of higher education. E-Learning systems attract and retain a diverse mix of student's backgrounds, geographies, experiences, and motivations

3. **Customizability:** E-learning affords students greater flexibility to choose when, where, what, and how much they learn. It was deduced that learners are in control after reviewing an analysis of some Havard working papers (2013) involving eight hundred and forty-one thousand, six hundred and eighty-seven registrants in seventeen open online courses. Students were found to have varied reasons for using e-Learning platforms. Some were hoping to learn, some were looking for resources to aid in other classes they were taking, and others were teachers seeking understanding on how to teach their own classes.

3.3 Challenges of E-Learning with Nigerian Universities
According to Nacetem report, the most common challenges of implementing e-learning with Nigerian universities are management's attitude, erratic electricity supply in most part of the country and non-inclusion of ICT programs in teachers' training curricula at the basic levels of education. Liverpool *et al.*, (2009) [21] identified a challenge as advancing innovation in an era of budget cost. Even with the developed countries, e-learning technologies have seen lackluster results in terms of adoption and course completion rates; however, e-learning proponents assure us that the traditional classroom is on the cusp of a dramatic change.
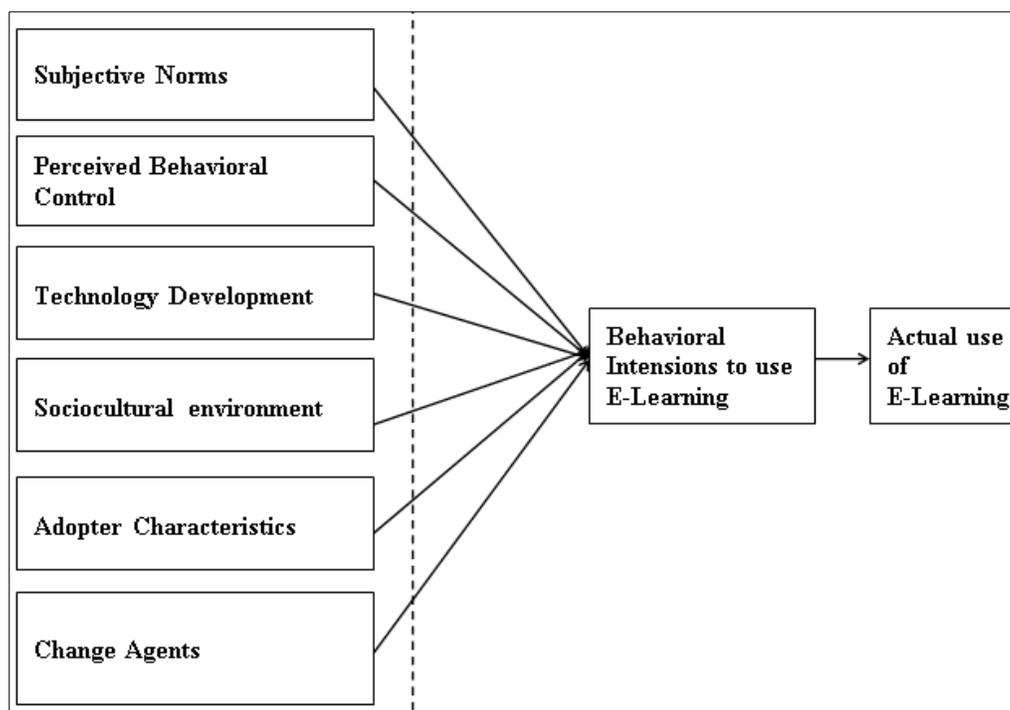
Source: Adopted and modified from Fishbein & Ajzen (1985), Tornatzky and Fleischer (1990) [28]

Fig 1: Conceptual Framework Showing Factors Influencing Adoption and Use of Electronic Learning

The framework explains how factors: technology development, Perceived usefulness, Behavioral Intentions to Use (BIU) relates with students adoption of e-learning under the lens of the Theory of Planned Behavior (TPB) and the Technology-Organization-Environment (TOE).

Description of the Model
The Theory of Planned Behavior (TPB) and the Technology-Organization-Environment (TOE) framework of Tornatzky and Fleischer (1990) [28] are the underpinning theories of this research work. Proponents of TPB posit that a behavioral intention to use the system is determined by the attitudes toward using the system. Accordingly, behavioral intentions to use (BIU) in turn determine actual system use (Fishbein and Ajzen, 1985).

The Technology-Organization-Environment (TOE) framework of Tornatzky and Fleischer (1990), assumes a generic set of factors to predict the likelihood of system adoption. The theory suggests that adoption is influenced by Technology support infrastructure, socio-cultural environment, Adopter Characteristics, Change Agents (Kauffman & Walden, 2001) [29] as depicted by the conceptual framework above.

3.4 Research Model and Hypotheses
The Theory of Planned Behavior (TPB) and the Technology-Organization-Environment (TOE) framework of Tornatzky and Fleischer (1990) [28] are the underpinning theories of this research work. TPB, unlike TAM is not specific to IS field and therefore a more general theory of explaining behavior. In addition to

attitudinal beliefs, TPB adds two more important constructs in explaining behavior; subjective norm and perceived behavioral control. Whereas the Technology-Organization-Environment (TOE) framework of Tornatzky and Fleischer (1990) [28], assumes a generic set of factors to predict the likelihood of system adoption. The theory suggests that adoption is influenced by technology development (Kauffman & Walden, 2001) [29], Sociocultural environment, Adopter Characteristics, Change Agents and Leaders.

Subjective Norm (SN)
Subjective Norm is defined as a "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein and Ajzen, 1975, p. 302) [1]. In cyberspace, the important referents of online service users are often other users in the virtual communities (Smith, 2005; Gounaris and Dimitriadis, 2003; Szmigin et al., 2005). SN's direct effect on behavioral intention has been validated in many studies based on TRA and TPB (Ajzen, 1991; Ajzen and Fishbein, 1980; Pavlou, 2003). However, its contribution to BI is not consistently significant in research on TAM. TRA has been successfully applied in online consumer behavior, technology acceptance and system use (e.g. Fishbein and Ajzen, 1975 [1]; Ajzen and Fishbein, 1980; Pavlou, 2003).

H1: Subjective norms about electronic learning will positively influence online learning behavior.

Perceived behavioral control (PBC)
Perceived behavioral control refers to people's perception of the ease or difficulty of performing the behavior of interest. Perceived behavioral control is a function of skills, resources, and opportunities to achieve outcomes. Ajzen (1991) viewed it to be closely related to efficacy belief concept. This concept has to do with the belief of people and their capacity to produce effects (Bandura, 1986). The theory of planned behavior (TPB) extends the theory of reasoned action (TRA) by including perceived behavioral control. This accounts for users' agility shaped by cognate resources needed to exploit the potentials of planned applications (Yi, Jackson, Park, & Probsf, 2005). The skills, opportunities, and resources for operating the systems must be strategically analyzed before adoption is finalized. This, therefore, theorizes perceived behavioral control as a determinant of behavior though prior research shows that it might influence perceived ease of use. Venkatesh (2000) [5] found perceived behavioral control to be very strong determinants of perceived ease of use and intention to use an innovation.

H2: Perceived behavioral control is a significant determinant of students' adoption of e-learning.

Behavioral Intentions to use eLearning
Consistent with Fishbein and Ajzen, behavioral intentions to use the system is determined by the attitudes toward using the system. Accordingly, behavioral intentions to use (BIU) in turn determine actual system use. A positive relationship between "attitude" and "intention to adopt" has been generally supported in a variety of research contexts (Sheppard et al., 1988; Yousafzai et al., 2007). This relationship indicates that a decision-maker who develops a

favorable attitude towards the adoption of the system is more likely to develop the intention to adopt and use the system.

H3: Behavioral Intentions to Use (BIU) eLearning system will have a significant positive effect on the adoption and actual use of e-learning platform by students

Technology development
Obviously, sound IT infrastructure and sufficient Internet talents in one country can be key factors affecting an institutions' e-commerce adoption (Hsu et al., 2006). As one of the first countries in Asia to target IT as a strategic sector for promoting economic development, the government of Singapore has made dramatic investment in IT infrastructure which pushes students to be fast adopters (Wong, 2003). Besides, a lack of widely accepted technical standards (Davila et al., 2003) and internet security (e.g. credible payment channels, Oxley and Yeung, 2001) may hold back students from adopting eLearning.

H4: Students in a favorable macro technology environment are more likely to adopt e-learning than those in poor technology environment.

Sociocultural environment
National culture determines not only whether social entities in a particular country would adopt a certain technology, but also the degree to which technology innovation is accepted and the ways in which it is used (Thatcher et al., 2006). The more compatible the sociocultural environment is the more extensive use of e-commerce in business (Zhu and Thatcher, 2010). In China, personal network "Guanxi", which plays a key role in business, hinders firms' e-commerce adoption (Tan et al., 2007). On the contrary, Singapore's openness to cultural influences from both the West and the East appears to be very conducive for adoption of e-commerce (Wong, 2003)

H5: Open sociocultural environment favors students' adoption of e-learning in the country.

Adopter Characteristics
User characteristics such as perceived risk, perceived control and Internet experience can have a direct impact on Internet adoption. A number of studies (Holland and Baker, 2001; Wind et al., 2002; Shanker et al., 2003; Wind and Rangaswamy, 2001) have found significant interaction effects between certain characteristics of online users and various online strategies. Warkentin et al. (2002) argue that experience influences a citizen's trust of e-systems. Users with prior experience, especially if satisfied, would be more likely to use eLearning platforms. The variables used to measure Internet experience include duration of experience (Miyazaki and Fernandez, 2001; Cho, 2004), frequency of use (Miyazaki and Fernandez, 2001; Cho, 2004; Kolsaker et al., 2004), and usage pattern (Cho, 2004; Kolsaker et al. (2004). Perceived risk could be defined as the risk of exposing and losing personal information through online interaction. The various dimensions of perceived risk, as empirically tested by various authors (Pires et al., 2004, Ueltschy et al., 2004), are financial risk, performance risk, psychological risk, social risk, convenience risk, and overall risk. Perceived risk leads to security

And privacy issues that could discourage the use of online services

H6: Adopter characteristics will influence the adoption of e-learning by students.

Change Agents and Leaders
Persistence; a sense of timing; recognition of others' contributions; excellent communication and analysis skills; and pursuit of win-win strategies. With these skills, the internal change agent is well placed to identify and meet the needs of the organization and the adopting unit effectively without compromising either party. To do this, they must act interchangeably in one of four change agent roles, i.e.: catalyst; solution giver; process helper; or resource linker (Hunsaker, 1982).

H7: The role of change agents correlates with adoption and use of e-learning

4. Research Methodology
This study used a descriptive research design. The target population was university students from the two universities in Uganda and Nigeria. In Uganda Makerere University, the biggest and oldest university in the country and the first to embrace the e-learning platform, called Makerere University Electronic Learning Environment (MUELE) was our unit of analysis. While in Nigeria, Kaduna state university was used. An approximate population of 500 master students in both universities formed the target population. A sample size of 217 students based on Krejicie and Morgan (1970) table for determining sample size was used. The respondents included continuing students dully registered by the university who are believed to be using the e-Learning platform and have knowledge in the subject matter.

Data was collected using a self-administered questionnaire anchored on a five-point Likert scale ranging from strongly disagree to strongly agree with close-ended items. Seven core constructs of e-Learning adoption based on the two theories were used. The constructs included Subjective Norms, Perceived behavioral control, Behavioral Intensions, Technology development, sociocultural environment, Adopter Characteristics and Change Agents.

The quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS version 16). The descriptive analysis covered the study objectives. The mean (M) and standard deviations (SD) of the variables are presented in form of cross-tabulations to showcase the comparative aspects of the study with the view of determining the statistically significant differences between Makerere University and Kaduna State University. Furthermore, inferential statistics, specifically correlation and multiple regression analysis were conducted to establish the influence and prediction power of planned behavior, technology-organization-environment constructs on actual use of e-Learning system.

5. Results
5.1 Reliability and Validity Test
We tested for reliability of the questionnaires using Cronbach's α coefficient. According to Hair, Anderson, Tatham and Black (1998), the generally agreed upon lower limit for Cronbach's α is

0.70. Cronbach's α values for this study were all above 0.7 and thus the instrument was reliable.

5.2 Makerere University, Uganda
Descriptive statistics revealed that most of the students are male (68%), compared to female who are the minority (32%). Majority of the students are in the age bracket of 20 - 30 (54%), and 92% are pursuing bachelor's degree. Only 8% are studying post graduate diploma and master's degree, 71% are in second year and third year respectively, meaning have an experience of the e-Learning platform in the university.

Means and standard deviations of students' adoption of e-Learning platform constructs, correlation matrix and regression results for Makerere University are displayed in table 3 and table 4 respectively. The means of each core construct ranged from 2.97 to 3.83 on a scale of 1 to 5. The standard deviations of the constructs ranged from 0.54 to 0.75.

Significant correlations between planned behavior, technology-organization-environment constructs and actual use of e-Learning were found. Specifically, the results showed a significant positive association of technology development with Actual use of e-learning (r=.17**), and behavioral intention to use with Actual use of e-learning (r=.27**). Furthermore, subjective norms and Actual use of e-learning were positively correlated (r=.22*), as were perceived behavioral control (r=.18*), sociocultural environment (r= .13*), adopter characteristics(r= .11) and change agents (r= .15).

Multiple regression analysis was used to test if planned behavior, technology-organization-environment constructs predicted actual use of e-Learning system. The results indicate a model fit of 14.4% (R^2 = .144). This means that 14.4% of actual use of e-Learning platform is explained by planned behavior and technology-organization-environment. The results further indicate that the model significantly and linearly predicted the 14.4% of actual use of e-Learning system (F = 2.722, *p* = .008). This result supports all the hypotheses *(H1, H2, H3, H4, H5, H6 and H7)*.

5.3 Kaduna State University, Nigeria
Descriptive statistics revealed that (52%) of the students are male and (48%) female who are female students. Majority of the students are in the age bracket of 20 - 25 (87.3%), and 82% are pursuing bachelor's degree. 18% are studying post graduate programmes, 55.9% are in second year and third year respectively, meaning have an experience of the e-Learning platform in the university.

Means and standard deviations of students' adoption of e-Learning platform constructs, correlation matrix and regression results for Kaduna State University are displayed in table 5 and table 6 respectively. The means of each core construct ranged from 3.73 to 4.33 on a scale of 1 to 5. The standard deviations of the constructs ranged from 0.46 to 0.91.

Significant correlations between planned behavior, technology-organization-environment constructs and actual use of e-Learning were found. Specifically, the results showed a significant positive association of perceived behavioral control and Actual use of e-learning (r=.38**), and change agents with Actual use of e-learning (r= .24**). Furthermore, technology development positively correlated with Actual use of e-learning (r=.30*), as were behavioral intention to use (r=.33*), adopter

characteristics (r= .26*), subjective norms (r=.19) and sociocultural environment (r= .15).

Multiple regression analysis was used to test if planned behavior, technology-organization-environment constructs predicted actual use of e-Learning system. The results indicate a model fit of 32.5% (R^2 = .325). This means that 32.5% of actual use of e-Learning platform is explained by planned behavior and technology-organization-environment. The results further indicate that the model significantly and linearly predicted the 32.5% of actual use of e-Learning system (F = 2.388, p = .012). This result supports all the hypotheses *(H1, H2, H3, H4, H5, H6 and H7).*

Table 4: Means and standard deviations of students' e-Learning adoption constructs and correlation matrix for Makerere University

	Mean	Standard Deviation	NSM	PBC	TDV	SCE	ADC	CHA	BIU	AUE
SNM	3.53	0.75	1.00							
PBC	2.97	0.56	0.15	1.00						
TDV	3.17	0.67	0.03	0.02	1.00					
SCE	3.29	0.54	0.09	0.01	0.22	1.00				
ADC	3.24	0.63	0.11*	0.23**	0.04	0.09	1.00			
CHA	3.40	0.75	0.28	0.30	0.05	0.34	0.03	1.00		
BIU	3.83	0.74	0.83	0.15	0.22	0.79	0.75	0.25	1.00	
AUE	3.23	0.63	0.22*	0.18	0.17**	0.13*	0.11	0.15	0.27**	1.00

* Correlation is significant at the 0.05 level (p < 0.05). ** Correlation is significant at the 0.01 level (p < 0.01).

Table 5: Multiple regression results of e-Learning adoption constructs and actual use of e-Learning for Makerere University

Coefficients								
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**	**Collinearity Statistics**	
	B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
(Constant)	0.584	0 .255		2.722	0.008		
Subjective norms	0.504	0.605	0.091	0.834	0.150	0.835	1.197
Perceived behavioral control	0.337	0.766	0.182	1.746	0.011	0.912	1.097
Behavioral intention to use the system	0.614	0.081	0.637	2.104	0.000	0.9/26	1.080
Technology development	0.623	0.645	0.100	0.965	0.337	0.912	1.097
Sociocultural environment	0.159	0.811	0.150	1.430	0.156	0.889	1.125
Adopter characteristics	0.066	0.681	0.010	0.097	0.923	0.942	1.062
Change agents	0.008	0.585	0.002	0.014	0.989	0.898	1.113
R Square = 0.178, Adjusted R Square = 0.144, F= 2.722, sig.=0.008							
Dependent Variable: Actual use of e-Learning							

Table 6: Means and standard deviations of students' e-Learning adoption constructs and correlation matrix for Kaduna State University

	Mean	Standard Deviation	NSM	PBC	TDV	SCE	ADC	CHA	BIU	AUE
SNM	4.33	0.46	1.00							
PBC	3.91	0.65	0.46**	1.00						
TDV	3.78	0.76	0.25**	0.23*	1.00					
SCE	3.99	0.66	0.52**	0.51**	0.33**	1.00				
ADC	3.85	0.69	0.24*	0.31**	0.54**	0.41*	1.00			
CHA	3.73	0.78	0.29**	0.47**	0.15*	0.83**	0.43*	1.00		
BIU	4.17	0.91	0.34*	0.29	0.42	0.15*	0.78	0.53**	1.00	
AUE	4.21	0.56	0.19	0.38**	0.30*	0.15	0.26*	0.24**	0.33*	1.00

* Correlation is significant at the 0.05 level (p < 0.05), ** Correlation is significant at the 0.01 level (p < 0.01).

Table 7: Multiple regression results of e-Learning adoption constructs and actual use of e-Learning for Kaduna State University

Coefficients								
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**	**Collinearity Statistics**	
	B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
(Constant)	0.297	0.896		2.565	0.012		
Subjective norms	0.429	0.232	0.217	1.853	0.067	0.667	1.499
Perceived behavioral control	0.408	0.170	0.292	2.403	0.018	0.619	1.616
Behavioral intention to use the system	0.067	0.145	0.056	0.464	0.644	0.619	1.616
Technology development	0.047	0.200	0.034	0.235	0.815	0.430	2.326
Sociocultural environment	0.109	0.142	0.083	0.771	0.442	0.789	1.268
Adopter characteristics	0.336	0.147	0.288	2.286	0.024	0.578	1.730
Change agents	0.497	0.222	0.321	2.111	0.033	0.412	1.565
R Square = 0.359, Adjusted R Square = 0.325, F= 2.388, sig.=0.012							
Dependent Variable: Actual use of e-Learning							

6. Analysis and Discussion

The degree of students' e-Learning platform adoption differs between the two universities. Differences between Kaduna State University, Nigeria and Makerere University, Uganda are displayed in table 8 below. Kaduna State University students portray a higher degree of e-Learning adoption compared to the Makerere university students. Similarly, the rating of the core constructs of e-Learning adoption is somehow different.

Although Makerere University students have rated behavioral intention to use the system highly (rating 1), this did not translate in to the actual use of the e-Learning platform. This implies that there are other factors other than behavioral intention that encourage the actual use of the system. Further, much as the rating for technology development and adopter characteristics in both universities is the same, this does not mean students rate of adoption is similar. This denotes that perhaps external aspects such as sociocultural environment matter in the issue of e-Learning adoption.

Table 8: Differences in means and rating of core constructs of e-Learning adoption between Kaduna State University (KSU) and Makerere University (MU)

Core constructs	Mean KSU (rating)	Mean MU (rating)	Difference
Subjective norms	4.33 (1)	3.53 (2)	0.80
Perceived behavioral control	3.91 (4)	2.97 (7)	0.94
Technology development	3.78 (6)	3.17 (6)	0.61
Sociocultural environment	3.99 (3)	3.29 (4)	0.70
Adopter characteristics	3.85 (5)	3.24 (5)	0.61
Change agents	3.73 (7)	3.40 (3)	0.33
Behavioral intention to use the system	4.17 (2)	3.83 (1)	0.34

When analyzing relationships between the constructs, different patterns emerge at the two universities. At the Nigerian, perceived behavioral control, change agents were very significantly correlated with actual use of e-learning. Technology development, behavioral intention to use, adopter characteristics and Actual use of e-learning were positively correlated, as were subjective norms and sociocultural environment. At the Ugandan university, technology development, behavioral intention to use system have significant positive association with Actual use of e-learning. Subjective norms and Actual use of e-learning were positively correlated, as were perceived behavioral control, sociocultural environment, adopter characteristics and change agents.

In relation to the prediction power of the study variables, multiple regression results have shown that planned behavior and technology-organization-environment (Table 5 and 7) are predictors of e-Learning adoption. At the Kaduna state of university of Nigeria, 32.5% of actual use of e-Learning platform is explained by planned behavior and technology-organization environment. This implies that a unit change both planned behavior and technology-organization –environment will result to 32.5% change in students' adoption of e-Learning platforms. Whereas, at the Makerere University of Uganda, only 14.4% of actual use of e-Learning system is predicted by planned behavior and technology-organization-environment, meaning a unit change both planned behavior and technology-organization – environment will result to 14.4% change in students' adoption of e-Learning platforms. This findings are in agreement with Venkatesh, Fishbein and Ajzen (2000) [5] who found perceived behavioral control and behavioral intentions to be very strong determinants of actual system use. Furthermore, the findings corroborate with Hsu *et al*., (2006) and Davila *et al*., (2003) who content that sound IT infrastructure and sufficient Internet talents in one country can be key factors affecting an institutions' e-commerce adoption and a lack of widely accepted technical

standards and internet experience may hold back students from adopting eLearning. In respect of the hypotheses, the study accepted all the hypotheses H1, H2, H3, H4, H5, H6 and H7 (Table 9). The study supports both planned behavior theory (Fishbein and Ajzen 1985) and technology-organization-environment theory (Tornatzky and Fleischer 1990) [28] in explaining student e-Learning system adoption.

Table 9: Summary of results of hypotheses testing

Research Hypotheses		Decision
H1	Subjective norms about electronic learning will positively influence online learning behavior.	Accepted
H2	Perceived behavioral control is a significant determinant of students' adoption of e-learning.	Accepted
H3	Behavioral Intentions to Use (BIU) eLearning system will have a significant positive effect on the adoption and actual use of e-learning platform by students.	Accepted
H4	Students in a favorable macro technology environment are more likely to adopt e-learning than those in poor technology environment.	Accepted
H5	Open sociocultural environment favors students' adoption of e-learning in the country.	Accepted
H6	Adopter characteristics will influence the adoption of e-learning by students.	Accepted
H7	The role of change agents correlates with adoption and use of e-learning	Accepted

7. Conclusion
This study sought to establish the level of student e-Learning adoption in two universities, and whether students' adoption of e-Learning is influenced by planned behavior theory and technology-organization-environment theory constructs. The present study implies the following conditions:

The level of students' e-Learning adoption varied between the two universities. The Nigerian students displayed a higher degree of e-Learning adoption than the Ugandan students, Although Makerere University students have rated behavioral intention to use the system highly (rating 1).

Perceived behavioral control, change agents significantly correlated with actual use of e-learning at the Kaduna State University. Whereas, at the Ugandan university, technology development, behavioral intention to use system have significant positive association with Actual use of e-learning, hence different constructs influence e-Learning adoption in the two universities. Planned behavior theory and technology-organization-environment theory constructs are significant predictors of e-Learning adoption in the two universities at 32.5% and 14.4% respectively. Therefore, universities should create an enabling technology environment so as to boost student e-learning adoption. The results from this study should be viewed as a contribution to the knowledge on e-Learning adoption.

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