



Received: 14.05.2018
Received in revised form: 02.10.2018
Accepted: 19.10.2018

Kisanjara, S. B., Tossy, T. M., Sife, A. S., & Msanjila, S. S. (2019). E-learning uptake among academicians and students in Tanzanian universities. *International Online Journal of Education and Teaching (IOJET)*, 6(1),18-35.

<http://iojet.org/index.php/IOJET/article/view/429>

E-LEARNING UPTAKE AMONG ACADEMICIANS AND STUDENTS IN TANZANIAN UNIVERSITIES

Research Article

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Abstract

The purpose of this study was to ascertain the extent of current e-learning uptake in Tanzanian universities. The quantitative approach involving survey design was adopted in the collection of data. Data were collected through a questionnaire survey of 400 respondents, with a rate of return 85.5%. The average reliability of variables 0.949 was determined using Cronbach's Alpha. Fuzzy Logic model and t-test were adopted for data analysis. The findings revealed that the average extent of current e-learning uptake among students and academicians were less than half of threshold amounting to 50% (i.e. level of awareness was 16%, availability was 20.6%, accessibility was 17%, attitude was 15% as variables used). There was no statistically significant difference in e-learning uptake among students and academicians as the value of $p > 0.05$. The findings of this study established a base ground and guidelines to inform the e-learning stakeholders and policymakers to find and establish suitable policy as well as mechanism to adopt and encourage sustainable use of e-learning systems for life-long teaching and learning. The originality of this study is based on the addition of new variables and methodologies employed as empirical evidence based on the extent of e-learning uptake in Tanzanian universities.

Keyword: ICTs, e-learning uptake, fuzzy logic model, students, academicians

1. Introduction

Developments in the area of information and communication technology (ICTs) caused the establishment of educational technology particularly among higher learning institutions. Many universities all over the world have in one way or another adopted e-learning systems to enhance the provision of their programs. In Africa, there is evidence that many higher learning institutions have adopted some form of e-learning (Mtebe & Kissaka, 2015) although studies have reported low uptake of e-learning system in these institutions. For instance, Mayoka and Kyeyune (2012) reported that only 0.15% of students and academic staff used learning management systems (LMS) at Makerere University in Uganda. Similarly, less than 0.016% of students and academicians were reported to use LMS at the University of Nairobi in Kenya (Ssekakubo, Suleman, & Marsden, 2011). Only 0.11% of students and academicians were reported to use LMS at University of Zambia (Ssekakubo et al., 2011). In Tanzania, Mtebe (2014) reported the same that only 3.48% of students and academic staff used e-learning platforms at University of Dar es Salaam.



E-learning has the potential to improve the learning environment for students and to introduce modern modes with which teaching and learning can take place. E-learning technologies offer learners control over content, learning sequence, the pace of learning, time allowing them to tailor their experiences to meet their personal learning objectives (Jethro, Grace, & Thomas, 2012). Advancement of the mode of delivery, in relation to other factors, can impact on students' education performance, equips students' knowledge and skill, improve institutional productivity, and create new employment opportunities, among many students.

There are concerns that e-learning uptake has been explained and interpreted subjectively and further conquered by promises than reality (Jethro et al., 2012; Pinpathomrat, Gilbert & Willis, 2013). Most studies that have reported on the usage of e-learning have focused mainly on the availability of e-learning platforms and facilities to ascertain the e-learning uptake (Lwoga, 2012; Ssekakubo et al., 2011). Nevertheless, other critical variables to ascertain e-learning uptake such as attitudes, awareness, and accessibility of e-learning have been scarcely considered (Al-Alak & Alnawas, 2011; Kisanjara, 2014; Pinpathomrat et al., 2013). While there are many well-documented studies in e-learning employed various research methodologies, there is also an absence of appropriate and reliable research methodology employed to investigate the uncertainty phenomena of the extent of e-learning uptake in Tanzanian universities. In addition, previous studies in Tanzania were not based on empirically grounded evidence on e-learning uptake, and that is why they provided a subjective conclusion, which yet warrants further research on the topic (Lwoga, 2012). This study, therefore, ascertained the extent of current e-learning uptake in Tanzanian universities using fuzzy logic membership function as a stochastic model that handles uncertainties taking on board variables such as attitudes, awareness, accessibility, and availability of e-learning platforms and facilities. The study establishes a solid ground of current e-learning uptake in Tanzanian universities by providing factual based information using more than one variable including attitude, awareness, accessibility, and availability as explained in the related literature review.

2. Literature review

It is evident that the adoption of e-learning in the developing world has increased in the past few years. Scholars (Isaacs, Hollow, Akoh & Harper-Merrett, 2013; Mtebe & Raisamo, 2014; Ssekakubo et al., 2011) indicate that universities in Africa increasingly continue to adopt e-learning technologies. However, Ssekakubo et al. (2011) argue that the uptake of e-learning technologies is uncertain across Africa. According to this e-learning in Africa is used mainly as *add-on* functions both in campus-based and distance learning universities based on the availability of e-learning platforms and facilities. This is due to lack of understanding the current extent of e-learning uptake, differences in understanding of the e-learning concepts in relation to its application (Al-Alak & Alnawas, 2011). It is therefore vital to ascertain the extent of current e-learning uptake by considering more than one variable.

Attitude towards e-learning: attitude can be defined as a favourable or unfavourable factor, which depends on users' judgments when performing behavior towards a particular event or action. Attitude towards e-learning attributed to perceptions, personal and psychological factors influence the use of e-learning (Al-alak, 2011). Idris and Osman (2017) reported that the loss of control and qualities of e-learning systems were also attributes of attitudes towards e-learning. Fishbein and Ajzen (1975) assert that the most immediate precursor of motivation towards specific behavior is attitude, which is the function of

personal belief. Pinpathomrat et al. (2013) revealed that students and academicians attitude guaranteed to influence the e-learning uptake in the context of education.

Awareness of e-learning: awareness means having knowledge of the existence and usefulness of something (Ndinechi & Omoni, 2015). Awareness of e-learning among students and academicians is very important in encouragement intention to continue using the e-learning system. Variables used to measure the awareness of e-learning include e-learning confidence, training, knowledge of distance education for increasing the rate of e-learning accessibility (Weber, 1996).

Accessibility of e-learning (effort expectancy): accessibility as effort expectance is the extent to which users find it simple or hard to use technology. Accessibility in relation to e-learning means that; e-learning system should be accessible to a variety of users (Tarus & Gichayo, 2015). Arrigo (2005) showed variables such as usability of e-learning, pedagogic issues and student learning styles in addition to technical and resource issues have positive influence on e-learning usage.

Availability of facilitating conditions: facilitating condition is defined as the extent to which students and academicians perceive that the supports and commitments and e-learning infrastructures are in place to facilitate the uptake of e-learning facilities and platforms (Venkatesh, Morris, Davis, & Davis, 2003). Ndonje (2015) argues that availability of e-learning refers to facilities and platforms in place to ensure access to appropriate e-learning for all users and continue to provide for the development of their technical skills. Such facilities and platforms include computer hardware and software and other ICT

2.1. Current situation of E-learning in Tanzania

In many developing countries, Africa is one example where the adoption and usage of e-learning is at the infant stage. The rate of implementation of e-learning in Tanzania is still very slow despite the potential opportunities provided by open source technologies and the favourable environments created by the respective governments (Kisanjara, Tossy, Sife & Msanjila, 2017). Effort and initiatives have been made by the respective governments to establish and formulate ICT policy as a roadmap to implement e-learning technologies. Moreover, a number of roundtables conferences and establishment of the so-called Tanzania Commission of Universities (TCU) have been made to support and deliberate on the common new way of delivering education. In Tanzania for example, all taxes to acquire computers and related equipment have been eliminated. License fees, as well as royalties payable by the telecommunication operators, have been reduced too (McPherson & Nunes, 2005; Morrison & Khan, 2003). Specifically, in Tanzania, some of the universities have been taking initiatives to implement e-learning platforms and facilities on an ad-hoc basis. The implementations in these universities have been done by employing, for instance, WEBCT, Blackboard, Moodle, Joomla and so forth. However, other universities are at the infant stage of attempting to establish the ICT facilities and infrastructure including local area network implementation, Internet and building computer labs, in order to support the implementation of e-learning (Kisanjara, et al., 2017; Sife, Lwoga & Sanga, 2007). Thus, based on this situation students and academicians have been obligated to accept and use the so-called blended learning mode in teaching and learning. The blended learning mode is a practice of employing both online and face to face (f2f) learning (Tarus & Gichayo, 2015).

2.2. Conceptual model

A number of theories have been established to explain technology uptake and users' intention to use it. This study employed the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) over other models and theories significantly to

explain the uptake of the e-learning system. The unified theory of acceptance and use of technology (UTAUT) has gained popularity in Information system (IS) studies and gives a hypothetical basis for studying usage of e-learning technology. UTAUT has been widely engaged and used to study acceptance and usage of IS/IT as argued by Dwivedi et al. (2011), where 43 empirical studies that employed UTAUT were meta-analysed. Diverse studies have employed UTAUT to study the acceptance and usage of e-learning in higher learning institutions across the world (Bhrommalee, 2012; Chen, Wu, & Yang, 2008; Fidani & Idri, 2012; Jairak, 2009; Ma & Yuen, 2011; Munguatosha, Muyinda, & Lubega, 2011; Padumadasa, 2012; Pardamean & Susanto, 2012). However, studies that have employed UTAUT to study the degree of current uptake of e-learning among students and academicians in Tanzania universities, in particular, are few. UTAUT incorporated views to significantly explain the e-learning uptake based on the following technology acceptance models and theories: Theory of Reasoned Action (TRA); Motivational Model (MM); Theory of Planned Behaviour (TPB); Technology Acceptance Model (TAM); Combined TAM and TPB (C-TAM-TPB); Model of PC Utilisation (MPCU); Innovation Diffusion Theory (IDT); and Social Cognitive Theory (SCT) (Venkatesh et al., 2003). UTAUT consists of four core variables that play a crucial role as direct influence user technology acceptance and usage behaviour these include: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The conceptual model for this study depicted in Figure 1 was formulated based on modification of UTAUT and it consists of four constructs namely effort expectancy (Accessibility), facilitating conditions (availability of e-learning platforms and facilities), awareness and Attitude. The original UTAUT was modified by adding two other constructs (i.e. awareness and attitude) and removing two constructs (i.e. performance expectancy and social influence). In this study, awareness and attitude of the e-learning system were adopted from a theory of planned behavior (TPB) (Ajzen, 1991). These were included as a measure for e-learning uptake among students and academic staff in Tanzanian universities.

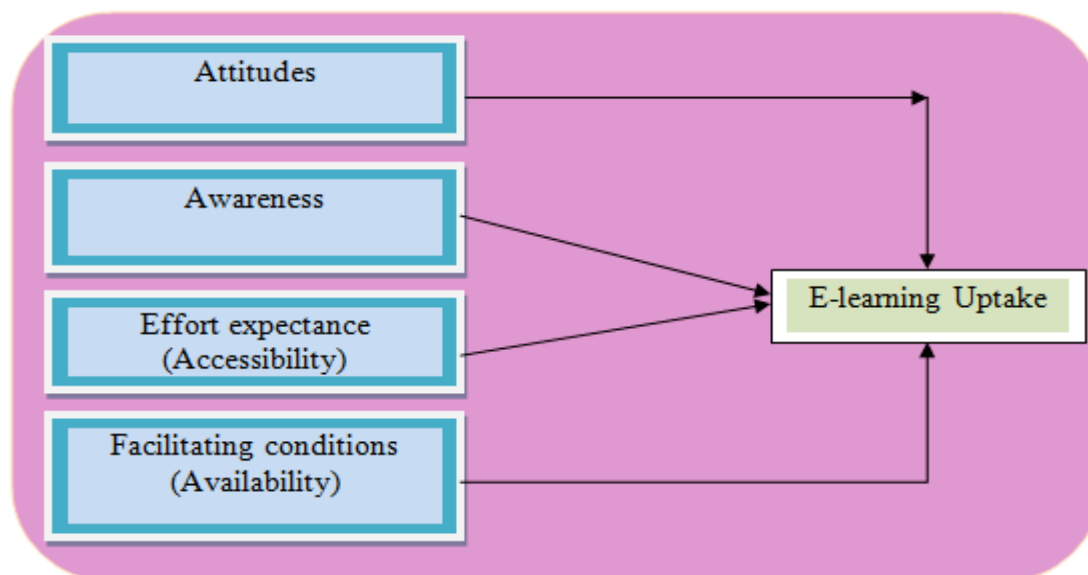


Figure 1. A modified conceptual model (Venkantesh et al., 2003)

Ascertaining the extent of uptake of e-learning among students and academicians in Tanzanian universities in this study has great significance. First, the study findings provide information about the status of current e-learning with facts in order to provide key information among universities to make a decision based on the total investment made. In the

same way, the study provides knowledge and guidelines that may be of help to policymakers. This study provides an input to stakeholders and researchers in the areas of e-learning.

Research works are embarked upon with a view to extending the frontier of knowledge. The present study was therefore carried out with this same purpose, especially in the field of e-learning. It has, therefore, contributed to the extension of the frontier of knowledge as follows. The study has shown the predictive power of extending the variables and methodologies employed as empirical evidence based on the extent of current e-learning uptake in Tanzanian universities. Thus, this study ascertained the extent of e-learning uptake among students and academicians in Tanzanian universities. The following were the specific research questions of the study:

- (1) To what extent do awareness among students and academicians influence e-learning uptake level?
- (2) To what extent do attitude among students and academicians influence e-learning uptake level?
- (3) To what extent do accessibility among students and academicians influence e-learning uptake level?
- (4) To what extent do availability of e-learning facilities and platforms influence e-learning uptake level?

3. Methodology

3.1. Setting and participants

This study was carried out in eight public and private universities purposively selected from among 30 universities in Tanzania. These were the University of Dar-es Salaam, Sokoine University of Agriculture, State University of Zanzibar, University of Zanzibar, University of Iringa, the Open University of Tanzania, St. Joseph University of Tanzania and Mbeya University of Science and Technology. These are the Universities which have invested in ICT infrastructure and have implemented similar e-learning platforms and facilities to enhance its teaching and learning activities. The use of purposive sampling technique was to ensure selection of a sample of universities with characteristics based on the nature of this study and gather a large amount of information enabled a researcher to generalise the findings. Such characteristics include; nature of the university (such as biological sciences, social sciences, technology and comprehensive). Other characteristics include mode of delivery (campus-based and distance learning), geographical location (urban and rural), age (old and new) and ownership (private and public). These eight universities had a total population of 58, 000 and 6,896 students and academic staff respectively.

3.2. Sampling procedure and sample size

Proportional stratified sampling technique was used to stratify a sample of 400 of students and academia to their subgroups as indicated in Table 1. This study also employed simple random sampling technique to obtain students and academic staff differently from their subgroups with specific size using lottery method. Each member of their subgroups was assigned a number using small piece of paper. These pieces of papers were folded and mixed into a box. Lastly, samples were taken randomly from the box by choosing folded piece of paper in a random manner. The simple random sampling particularly the lottery method was employed in this study in order to minimize bias from selection procedure and resulted in representative sample. In addition, the population was divided into subgroups in which the lottery method was reliable compared to computer-generated process (random number generator software) (Saunders, Lewis & Thornhill, 2012)

The sample size of each sub-group was proportionate to the population size of the disjoint groups. The sample size of each subgroup was determined by the equation: $n_h = (N_h / N) * n$. Where n_h is the sample size of the sub-group h , N_h is the population size for the sub-group h , N is the total population size and n is the total sample size adopted from similar existing studies (Trochim, 2006).

Table 1. Study population and sample size

CATEGORY						
UNIVERSITY	STUDENTS		ACADEMIC STAFF		Total Population	Total Sample Size
	Population	Sample Size	Population	Sample Size		
	UDSM	17,500	103	2350	18	19,850
SUA	8,988	53	1500	13	10,488	69
OUT	10,684	63	663	5	11,347	68
SJUT	4,883	29	400	3	5,283	31
UOI	5786	34	850	7	6,636	41
SUZA	2,704	16	330	3	3034	19
ZU	2,544	15	300	3	2,844	18
MUST	4,909	29	503	4	5,412	33
TOTAL	58,000	342	6,896	58	64,896	400

3.2. Data collection instruments

Data were collected using a structured questionnaire that contained scales to measure e-learning uptake with items ranging from 1 (Strongly disagree) to 5 (Strongly agree). A total of 342 (291 for students and 58 for academic staff) questionnaires were received back which was a response rate of 85.5%.

3.3. Validity and reliability

To determine the reliability and validity of the study, a pilot study was undertaken at Mzumbe University in Morogoro using a sample of 30 respondents. The reliability of each variable was determined using Cronbach's Alpha. The Cronbach's Alpha values were calculated using Predictive Analytic Software and the score was found to be 0.949 which is acceptable (Krishnan & Ramasamy, 2011). In ensuring the validity of the variables, the items of the questionnaire were ranked against a review of related literature (theoretical and empirical).

3.4. Data analysis

The collected data were processed and analysed using the (PASW). Descriptive analysis was done to obtain the demographic characteristics of respondents as well as means and standard deviations. The t-test analysis technique was employed to test whether differences in mean scores were statistically significant. The means and standard deviations were subsequently analysed using a fuzzy logic model. Fuzzy Logic (FL) is a multivalued logic that allows intermediate values to be defined between conventional evaluations like

true/false, yes/no, high/low, etc. Fuzzy systems are an alternative to traditional notions of set membership and logic that has its origins in ancient Greek philosophy (Hellmann, 2002). The fuzzy membership function adopted model in this paper can be specified as follows.

$$\mu_x(x) = \begin{cases} 0: Y(x) \leq 3.60 \\ 0.05 + [1 + ((Y(x) - 3.6)/\text{Stdev})^2]^{-1} \dots Y(x) \geq 3.60 \end{cases}$$

Where, $\mu_x(x)$ is a membership function, the mean value $Y(x)$ and Standard deviations (Stdev) were calculated descriptively using the PASW analytical tool. The value of membership functions were generated from SPSS software using the model above. These values were the extent of e-learning uptake in percentages per each variable measured as indicated in Table 2 for students and academic staff.

3.5. Characteristics of respondents

The study findings show that there were more male students 193(66%) and academic staff 46(79.3%) than females. This is usual since the male enrolment rate in Tanzanian universities is often higher than that of the female. With regard to the area of specialisation, findings show that the survey sample was more dominated by students in social sciences 100(34%) followed by biological science 70(24%). In terms of academic staff, more were those teaching IT/Computer science 18(31%) followed by those teaching arts and social sciences 15(25.9%).

4. Results and discussion

4.1. The extent of e-learning uptake

Based on the fuzzy logic model, mean and standard deviations of each variable calculated descriptively were used to estimate the membership functions in terms of percentage. The threshold of the extent of e-learning uptake based on the model is amounting to 50% implying that the extent of e-learning uptake is high if $x \geq 50\%$, otherwise is low (Alshaher, 2014). These values indicate the level of e-learning uptake for each variable measured on students and academicians in Table 2. The comparison of the average means for e-learning uptake among students and academicians are presented in Table 3 and Table 4 showing the results of t-test analysis to reveal whether differences in mean scores of e-learning uptake among the two groups are statistically significant.

The findings show that all fuzzy logic values were below 50%. This suggests that there is a low level of e-learning uptake among students and academic staff in Tanzanian universities. The average e-learning uptake among students and academicians were found to be 16% for awareness, 20.6% for accessibility, 17% for availability and 15% for attitude towards e-learning. It is deduced from the findings that the least variable was the attitude towards e-learning which got the average extent closer to a quarter of the threshold (50%) while accessibility of e-learning is above a quarter of the cutting fuzzy logic values amounting to 50%.

Table 2. Results of the Fuzzy Logic analysis for each factor

Variables	STUDENTS			ACADEMICIANS			AVERAGE OF UPTAKE LEVEL
	Mean	Standard Deviation	Uptake Level in%	Mean	Std Deviation	Uptake Level in%	
Awareness of E-learning							
Awareness on computer usage	4.23	0.88	39.00	3.98	1.00	18.00	28.50
Flexibility using e-learning	4.01	0.97	20.00	3.62	1.14	5.00	12.50
Online academic materials	4.08	0.93	26.00	3.55	1.14	5.00	15.50
Participation on online courses	3.64	1.08	5.00	3.97	0.88	20.00	12.50
Online library resources	3.07	1.36	18.00	3.53	1.31	5.00	11.50
Average	3.81	0.83	22.00	3.73	1.09	10.00	16.00
Accessibility of E-learning							
Easy access to computers	4.10	1.14	21.00	3.76	1.13	7.00	14.00
Access to computer internet	4.04	1.10	19.00	3.88	0.94	13.00	16.00
Access to online time table	3.93	1.21	12.00	3.53	1.03	5.00	8.50
Submit & receive feedback on online assignments	3.47	1.40	6.00	3.55	1.26	5.00	5.50
Access university info. Online	4.38	0.99	43.00	2.64	1.25	42.00	42.50
Online academic results	4.59	0.82	64.00	3.78	1.11	8.00	36.00
Average	4.09	1.11	28.00	3.52	1.12	13.30	20.60
Availability of E-learning							
Functioning Computer labs	3.68	1.30	5.00	3.12	1.11	21.00	13.00
Internet connectivity	3.86	1.09	10.00	4.24	0.68	52.00	31.00
Online group discussion	3.13	1.32	16.00	3.88	1.29	10.00	13.00
Online assign and exams	3.41	1.30	7.00	3.07	1.32	19.00	13.00
Online materials from instructors	2.78	1.37	32.00	3.66	1.31	5.00	18.50
Online library resources	3.73	1.20	6.00	3.40	1.42	19.00	12.50
Average	3.43	1.05	13.00	3.56	1.14	21.00	17.00
Attitude towards E-learning							
Experience using e-learning	4.18	1.01	30.00	3.34	1.19	10.00	20.00
Perception using e-learning	3.95	1.04	15.00	3.84	4.19	5.00	10.00
Preference on e-learning	3.76	1.05	7.00	3.78	1.08	8.00	6.5.00
E-learning enhances practice	4.03	0.99	21.00	3.91	0.96	14.00	17.50
Usefulness of e-learning	4.08	1.05	22	3.97	0.92	19.00	20.5
Average	4.00	1.03	19	3.77	1.67	11.00	15.00

4.1.1. Awareness of e-learning

The study findings in Table 2 show that the average e-learning uptake level among students and academicians is 16%. Students were aware of computer usage by 39% followed by online academic materials by 26%. Academicians were aware of online courses by 20% followed by awareness of computer usage by 18%. These findings suggest that, yet the average level of e-learning uptake on the aspect of students and academicians' awareness towards e-learning is below the threshold of the cutting fuzzy value, amounting to 50%. With this, there is an evidence of low extent of e-learning uptake in terms of awareness in most of students and academic staff. The study findings revealed that, awareness of e-learning is very crucial factor in e-learning implementation for successful uptake among students and academic staff. The other way round in improving e-learning uptake would be to give appropriate training among students and lecturers on the importance of employing the e-learning technologies in their activities (Njenga, 2011; Taha, 2014). Awareness among university students and academic staff can be established using printed leaflets, posters, university web site, social media, and library catalogues (Lwoga & Komba, 2015).

Despite the importance of awareness among students and academic staff, the study findings indicate that the average of the extent of current e-learning uptake among students and academic staff is low. This situation has been due to lack of clear descriptions of benefits and usefulness as well as functions and knowledge on how to use e-learning among e-learning users before applying the technology and this is similar to the previous study by Kayoed, Ekwunife & Tian-Lih (2014). In line with these findings, some students knowledge, experience, training, and accessibility on using the technology in relation to online courses; some of them have no confidence in using the technology in education (Weber, 1996). Therefore, from these findings, students' and academic staffs' awareness need to be created prior to e-learning implementation. User skills, training, and participation on how to use e-learning facilities and platforms are essential for users to deal with e-learning environment; in turn, they increase the attitude and hence increase the accessibility and frequency of usage.

4.1.2. Accessibility of e-learning

The results in Table 2 show that the average extent of e-learning among students and academicians staff was 20.6% for accessibility of e-learning. It is deduced from the findings that students use e-learning more to access online academic results by 64% above the threshold cutting of fuzzy logic value than access online information by 43%. On the other hand, academicians had more access to online information by 42% above half of the threshold compared to the rest variables. Based on these findings, it is indicated that the average extent of e-learning accessibility among both student and academicians is lower than the threshold. The findings of this study in relation to previous studies revealed that e-learning accessibility has the significant influence on the extent of e-learning uptake (Taha, 2014; Tarus & Gichayo, 2015; Zhu & Mugenyi, 2015). This has been noted in developing countries especially Tanzania, Kenya and Uganda where factors of e-learning implementation rely on computer and Internet accessibility (Zhu & Mugenyi, 2015).

Despite the importance of e-learning accessibility revealed in various study towards e-learning accessibility, the average extent of e-learning accessibility among students and academic staff is still low. In line with the study conducted by Kisanjara (2014), the findings show that 97.5% of students responded negatively saying that they have inefficiencies of online printers which are connected directly to their computers. Furthermore, 70% of the students responded negatively on the assessment by saying they do not have access to the computer with necessary software installed as well as internet connectivity. Studies by Idris and Osman (2017) and Hew and Kadir (2016) support this by saying that, in developing

countries, most students and academic staffs do not have their own computers. Cheok (2017) found that 80% of the teachers used ICT less than one hour per week, and this was also mostly limited to word-processing. Similarly, the study by Papadakis and Kalogiannakis (2017) highlighted that e-learning platforms present usability and compatibility problems while users trying to access websites meant for desktop or laptop computers. Difficulty in access to computers affects negatively the e-learning uptake. It has been reported that unequal access to online teaching and learning leads to inequality among the socio-economic groups within the society (Idris & Osman, 2017).

Similar to the findings of this study which declared that despite the effort made to implement various e-learning solutions in Africa universities their extent of e-learning accessibility is reported to be low across the continent (Ssekakubo et al., 2011). For instance, Internet speed and reliable access, as well as limited ICT and e-learning infrastructure which lead to lack of access to e-learning, are also critical factors in this context (Othman & Musa, 2012; Tarus & Gichayo, 2015). Despite the low extent uptake of e-learning revealed among both students and academicians, however, there is an interrelationship between learning and accessible e-learning facilities and platforms as shown in the current study findings. For instance, the findings of the current study revealed more extent of e-learning uptake (28%) among students compared to that of academicians by 13%. According to the study by Zayat (2016), it is evidenced the same that, though the majority of students (nearly 85%) who have access to the internet enabled PCs in the interview study sample said they believed there is an interrelationship between learning and accessible e-learning. It is concluded from these findings that, if Tanzanian universities are to implement and adopt e-learning a lot of improvement is needed for the accessibility of ICT and e-learning infrastructure to ensure success at the high level of e-learning in the context of teaching and learning.

4.1.3. Availability of e-learning

The availability of e-learning platforms and facilities has an average uptake level of 17%. The findings in Table 2 show that availability of functioning computer laboratories (5%) and online library (6%) had very low average uptake among students. The availability of internet connectivity is found to be 52% above the threshold of fuzzy logic value followed by the availability of functioning computer laboratories (21%) among academicians. Previous studies in line with the findings of this study have indicated that availability of ICT facilities including e-learning facilities and platforms play a vital role in uplifting e-learning implementation by increasing the extent of e-learning uptake for successful teaching and learning process (Cheok, 2017; Tarus & Gichayo, 2015; Zhu & Mugenyi, 2015). The availability and setting up the required ICT infrastructure including e-learning facilities and platforms terrify e-learning uptake success.

Regardless of the notable role of availability of e-learning facilities and platform, for successful e-learning uptake, the findings of this study revealed that there is the inadequacy of e-learning platforms and facilities in most Tanzanian universities. This is due to the fact that e-learning implementation was done in the universities on an ad-hoc basis. The inadequacy of e-learning platforms and facilities is found to influence the status of e-learning by lowering the extent of its uptake among students and academic staff. It is found that e-learning facilities and platforms were there but not working properly. This situation has been discouraging students and academicians from e-learning usage. In the same story, for example, factors revealed in other studies that facilitate effective web-based LMS usage as mentioned by the respondents include stable internet connectivity, availability of functioning desktop computers and laptops to faculty and students (Lwoga & Komba, 2015). The study by Tarus and Gichayo (2015) and that of Zhu and Mugenyi (2015) agree with the findings of

this study that, developing countries like Kenya, Tanzania and Uganda still face a lot of challenges such as inadequacy of ICT facilities and platforms while implementing e-learning for high extent of uptake.

In contrast with these findings, the study by Munguatosha et al. (2011) contends that, in Tanzania, almost 80% of the relevant institutions had installed various e-learning systems by the end of 2011 which ensure the availability of e-learning facilities. The question is “are these e-facilities and platforms implemented adequately for sustainable and high uptake among students and academicians?” Based on the findings of this study the answer to such question is definitely not. Munguatosha et al. (2011) argued against the findings of this study in the sense that the previous study lack empirical evidence from e-learning users in Tanzanian universities as explained subjectively. Thus, the findings from this study in Table 2 indicate that inadequacy of e-learning facilities and platforms have a negative influence on e-learning uptake. This study used a stochastic model to ascertain the extent of uptake of e-learning in terms of availability of e-learning facilities and platforms as it is observed to be uncertain in Tanzanian universities. These findings suggest that the role of e-learning facilities and platforms would help users and decision makers to implement and increase high uptake of e-learning in the near future. Therefore, it can be concluded with no doubt that successful implementation of e-learning is influenced by the adequacy of e-learning facilities and platforms which in turn ensure high level e-learning uptake.

4.1.4. Attitudes towards e-learning

The average uptake level among students’ and academicians’ attitude towards e-learning was 15%. The study findings in Table 2 show that students experience in using e-learning had uptake level of 30% followed by usefulness of using e-learning (22%). Surprisingly, academicians’ perception (8%) and preferences (5%) in using e-learning were found to be extremely low. This shows that, there is a low attitude towards using e-learning platforms and facilities among students and academicians.

The findings of this study indicate that students’ and academic staff’s attitudes influence extent of e-learning uptake. The extent of e-learning uptake revealed among students and academicians is 15% based on their attitude towards e-learning usage. The findings of this study have also supported the previous studies such as Fageeh (2011) and Zewayed (2012). Fageeh (2011) points out the same that students’ and academic staff’s attitudes towards e-learning influences the level of e-learning uptake particularly in teaching and learning process and also established users’ readiness for accepting and using e-learning as a mode of learning and delivery. The low level of e-learning uptake among students and academic staff was due to the fact that, other academic staff have a negative attitude in essence that they are afraid of losing control and quality of teaching if they use e-learning platforms and facilities (Idris and Osman, 2017).

In addition, the findings told a similar story and showed that low extent of e-learning is caused by lack of e-learning resources, perception and preferences in using e-learning in various universities that could help students and academic staff to have positive attitude towards e-learning. Further the study by Idris and Osman (2017) insists that lack of experience in using e-learning platforms and facilities results into negative attitude among e-learning users. Similar to these findings, Robertson et al. 1996 point out that user perceptions, experience and usefulness of e-learning were factors that were found to influence users’ attitude towards using e-learning for attaining higher extent of e-learning uptake in education context. These findings suggest that the role of students’ and academic staffs’ attitudes towards e-learning would help users and decision maker to implement and develop successfully e-learning. Therefore, it can sensibly be said that high extent of e-learning

uptake and its successful implementation are influenced by the students' and academic staffs' attitudes such as experience, preference, usefulness and perceptions which are very crucial.

In general, the finding of this study have revealed low e-learning uptake among students, academic staff and management. There is no statistical difference in e-learning uptake among the respondents. These findings correlate with the findings from a study by Ndonje (2015) who revealed that there is no statistical difference in e-learning usage implemented in their Tanzanian universities among students and academicians. In contrast with the findings of this study the earlier study by Taha (2014) revealed that there is a statistically significant difference between students and academic staff in their perceptions when it comes to usage of e-learning implemented in their universities. The findings of Taha (2014) are against in the sense that they were based on subjective opinions from students and academic staff lacking factual based data.

4.2. Comparison of e-learning uptake among academicians and students

A t-test was conducted to assess whether the e-learning uptake ascertained and discussed in the previous paragraphs is different among students and academicians. Prior to running the t-test, means of e-learning uptake for each group were compared based on five (5) Likert scales. Using frequencies, the items each with a range of 1 to 5 combined together with data that was generally converted the ordinal measures into metric data for parametric tests. The average means of e-learning uptake for students and academicians separately from each variable are indicated in Table 3. The results show that there was a no significant difference in the scores for students (M=3.8, SD=1.0) and academicians (M=3.6, SD=1.0). The findings suggest that the mean scores for the two different groups of e-learning users are close to each other. This implies that there is no statistically significant difference in means of students and academicians.

Table 3. Means for e-learning uptake among students and academicians

Students and Academic Staff	<i>n</i>	<i>M</i>	<i>SD</i>	Std. Error Mean
Students	4	3.832	1.000	0.13573
Academic Staff	4	3.645	1.000	0.13573

Parametric tests, namely independent t-test was employed with p-value in order to quantify the idea of the statistical significance of evidence to whether differences in mean scores of e-learning uptake between these two groups are statistically significant. This is based on data collected from students and academician who are using e-learning facilities and platforms implemented in their universities. There was no statistically significant difference in the mean scores for students (M=3.8, SD=1.0) and academic staff (M=3.6, SD=1.0) conditions; $t(16) = -2.35$, $p = 0.23$. The result indicates that $p > 0.05$, it suggests that e-learning really has been used equally among students and academicians. Specifically, our findings suggest that students and academicians have interrelated activities in the teaching and learning process. This has been caused by e-learning uptake among students and academicians assessed in terms of more than one variable such as awareness, accessibility, availability, and attitudes.

Table 4. *Independent samples t-test*

	Levene's Test for Equality of Variances				t-test for Equality of Means		
	<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>	Mean Difference	Std Error Diff.
Equal variances assumed	0.000	1.000	-2.35	16.000	0.23	-0.187	0.04675
Equal variances not assumed			-2.35	16.000	0.23	-0.187	0.04675

5. Conclusion and recommendations

5.1. Conclusion

E-learning plays a vital role in teaching and learning. For instance, it permits greater learner interactivity and promotes learners' efficiency, motivation, cognitive effectiveness, and flexibility of learning style context. Additionally, e-learning is a channel and tool through which teachers can improve their teaching styles through innovation, efficient, time-saving, flexibility and just to mention a few. E-learning provides academicians and students in learning context with liable and easy modes of delivery, thereby increasing their ability to access course material and learn anywhere and anytime to overcome traditional learning. E-learning presents an entirely new teaching and learning environment for academicians and students and, thus requiring positive user perceptions for successful uptake. However, the use of e-learning among students and academicians is not promising in Tanzanian universities. Lack of awareness and attitudes among students and academicians is a causal factor. Inadequate and accessible e-learning facilities and platforms discourage students and academicians from using e-learning effectively in teaching and learning context.

The findings of this study have shown that e-learning uptake in Tanzania universities is low among students and academicians. The low uptake of e-learning among academicians and students was ascertained using variables such as awareness, attitude, accessibility and availability. The extent of e-learning uptake in each variable observed to be below the fuzzy logic membership function value amounting to 50%. Despite the low e-learning uptake in Tanzanian universities, the findings in this study have shown that there is no statistically significant difference of e-learning uptake among students and academicians. This indicates that e-learning in Tanzania have been adopted without taking onboard more than one variable. First creating awareness could increase the accessibility and raise positive attitude towards e-learning among students and academicians. Awareness increases users' ability to access the available e-learning facilities and platforms effectively and efficiently thereby increasing productivity in teaching and learning. Secondly, availability of e-learning platforms and facilities encourage and motivate e-learning users by creating positive attitude among them. Thirdly, the higher the accessibility of e-learning platforms and facilities the higher the attitude towards e-learning, which in turn encourages the management to improve and increase availability of e-learning infrastructures. Therefore, these variables are interdependent and must be considered together when ascertaining the extent of e-learning uptake.

5.2. Recommendations

On the basis of the findings above, this paper recommends the followings: First, the Universities in Tanzania should take a serious move to create awareness and sensitisation of users on e-learning facilities and platforms prior to applying it in teaching and learning. For

instance, universities should create awareness to students and academicians through printed leaflets, posters, university web site, social media, and library catalogues. Secondly, benefits of e-learning in relation to individual and organizational impact need to be explained during e-learning training. In other countries for instance, France and German, this has been done to address managers and those who are interested in implementing e-learning in education context through training and capacity-development. Thirdly, universities should also provide detailed guidance to academicians on creating interactive e-content. The University of Tanzania should also ensure that e-learning facilities and platforms as well as ICT infrastructures are in place and working properly to increase accessibility. Fourth, so long as the application of e-learning is still low there should be a regular evaluation on the extent of uptake of e-learning in developing countries including Tanzania in order to realise where we are and where are we going for competitive advantages in provision of quality education. Lastly, further researches need to be done by adding new variable from social and environmental contexts to extend the proposed conceptual model in ascertaining the extent of uptake of e-learning in universities.

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