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Antecedents of continued usage intentions of web-based learning management system in Tanzania

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Abstract

Purpose – The purpose of this paper is to examine factors that predict students' continued usage intention of web-based learning management systems (LMS) in Tanzania, with a specific focus on the School of Business of Mzumbe University. Specifically, the study investigated major predictors of actual usage and continued usage intentions of e-learning system, and challenges of using the e-learning system.

Design/methodology/approach – Data were collected through a questionnaire survey of 300 third year undergraduate students, with a rate of return of 77 per cent. A total of 20 faculty members were also interviewed. The unified theory of acceptance and use of technology (UTAUT) was utilized in the study.

Findings – The results show that actual usage was determined by self-efficacy, while continued usage intentions of web-based learning system was predicted by performance expectancy, effort expectancy, social influence, self-efficacy, and actual usage. Challenges for using web-based LMS were related to information and communications technology (ICT) infrastructure barrier, LMS user interface was not user friendly, weak ICT policies, management and technical support, limited skills, lack of awareness, resistance to change, and lack of time to prepare e-content and use the e-learning system.

Practical implications – The study findings are useful to e-learning managers and university management to identify important factors and develop appropriate policies and strategies to encourage long-term usage of e-learning systems for future studies and lifelong learning.

Originality/value – By using UTAUT in the context of continued usage intentions and the integration of an additional construct ("self-efficacy"), the extended UTAUT model fits very well in the web-based learning systems in Tanzania, in particular where such studies are scant. The findings can be used in other institutions with similar conditions in investigating the continued usage intentions of e-learning systems.

Keywords e-Learning, Africa, University, Tanzania, UTAUT, Learning management system, Technology acceptance, Higher learning institutions, Web-based learning management system

Paper type Research paper



Introduction

The rapid developments of information and communications technologies (ICTs) have improved access to and efficiency of learning processes in tertiary education institutions. e-Learning is defined as education and training provided through ICTs to support individual learning (Maldonado *et al.*, 2011). Web-based learning management systems (LMS) are considered as important tools in enhancing e-learning in the higher education institutions. Such systems enable students to access course materials

without being limited with time or location, and use communication features in their learning activities, which in turn boost their academic performance and productivity (Fidani and Idrizi, 2012). However, e-learning systems alone cannot guarantee that students will be motivated to use the system. It is important to determine factors that motivate students to adopt and continue using the e-learning system in order to enhance usage of the system (Ma and Yuen, 2011).

The adoption of e-learning systems is becoming popular in higher learning institutions across the world including African universities. The study was conducted in Tanzania and Mzumbe University (MU) in particular, because it is among the public university that has invested in ICT infrastructure to enhance its teaching and learning activities since the early 2000s. MU is among the 36 full-fledged universities in the country. Currently all university campuses offices, lecture theatres, and seminar rooms are connected to fast and reliable local area networks through fibre backbone. Students, staff and other stakeholders have the choice to use wireless or wired network services. In 2009, the university deployed the LMS by using Moodle open source software, whereby 20 per cent of university modules are delivered in combination of e-learning system and the normal class sessions. The School of Business of MU is among the schools that have been at the fore front to adopt e-learning technology, where most of the faculty members use the LMS to deliver e-courses, assignments, and announcements. In 2011, the University deployed the Academic Record Information System that provides core information base related to student general information, academic programs and results, accommodation, and financing. Further, the university hosts a library system responsible for storing bibliographic details of books as well as controlling book circulation.

Various studies have been conducted particularly on the students' and lecturers' intention to adopt e-learning systems in the African context (Adeyinka and Mutula, 2010; Chitanana *et al.*, 2008; Eke, 2011; Farahat, 2012; Petit dit Dariel *et al.*, 2013; Tagoe, 2012; Venter *et al.*, 2012; Wambui and Black, 2008). However, there are few empirical studies in Tanzania regarding students' motivation to continue using the web-based LMS. It is important to note that there are different institutional cultures and characteristics (Fidani and Idrizi, 2012), and thus a deep understanding of an institution can help the global community to widen their perspective regarding the factors that influence students' decision to continue using web-based LMS. It is therefore imperative to assess factors that can enhance students' intention to continue using LMS, with a specific focus at MU in the Tanzanian context.

The unified theory of acceptance and use of technology (UTAUT) has received much attention in IS literature and provides a theoretical basis for investigating student's intentions to continue using e-learning systems in this study. UTAUT has been widely used to study acceptance and usage of information system/information technology as revealed by Dwivedi *et al.* (2011), where 43 empirical studies that used UTAUT were meta-analysed. Various studies have used UTAUT to investigate the acceptance and usage of e-learning in higher learning institutions across the world (Bhrommalee, 2012; Chen *et al.*, 2008; Fidani and Idrizi, 2012; Jairak, 2009; Ma and Yuen, 2011; Maldonado *et al.*, 2011; Munguatosha *et al.*, 2011; Nassuora, 2012; Padumadasa, 2012; Pardamean and Susanto, 2012). However, studies that have used UTAUT to investigate the continued usage intention of e-learning systems in Tanzania, in particular, are few.

This study sought to establish the determinants of students' actual usage of the web-based LMS and to investigate how these determinants can shape the students'

continued intention to use web-based LMS at MU. The following were the objectives of the study:

- (1) investigate the major predictors of actual usage of an e-learning system; and
- (2) examine if the major determinants of actual usage can predict continued usage intentions of an e-learning system.

Conceptual model and research hypotheses development

Technology acceptance theories are commonly used in many studies that investigate determinants of the adoption of e-learning technologies. Several theories have been developed to explain users' intention to use technology. This study used the UTAUT (Venkatesh *et al.*, 2003) over other models and theories to better explain the acceptance and usage of the e-learning system at MU. UTAUT was chosen among other theories because of its comprehensiveness and higher explanatory power than other similar theories and models in technology acceptance (Venkatesh *et al.*, 2003). Further, UTAUT has rarely been applied in the continued usage intentions of e-learning in higher learning institutions, especially in a developing country environment like Tanzania. UTAUT, therefore, seemed an applicable theory to examine factors contributing to the continued usage intentions of e-learning among undergraduate students at MU.

UTAUT presents a unified view to better describe the user acceptance of technology 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 Utilization (MPCU); Innovation Diffusion Theory (IDT); and Social Cognitive Theory (SCT) (Venkatesh *et al.*, 2003). UTAUT comprises four core constructs that play a significant role as direct determinants of user technology acceptance and usage behaviour: performance expectancy, effort expectancy, social influence, and facilitating conditions. In addition to core variable, the following variables play a specific moderating role to indirectly and directly determine technology usage behaviour (gender, age, voluntariness, and experience).

The research model for this study was formulated based on UTAUT, and it is comprised of five constructs as illustrated in Figure 1. The original UTAUT was modified by adding one construct (i.e. self-efficacy). Various studies found self-efficacy as an important determinant of the users' actual usage of e-learning system (Padumadasa, 2012), and continued usage intention of e-learning system (Cho *et al.*, 2009). In this study, actual usage and continued usage intention of e-learning system were included as measures for e-learning sustained usage. The research model hypothesizes that continued usage intention of e-learning system is affected by actual usage, which, in turn, is influenced by effort expectancy, self-efficacy, performance expectancy, social influence, and facilitating conditions as shown in Figure 1.

Performance expectancy

Performance expectancy refers to the degree to which students perceive that the system will enable them to perform better in their course programmes. Previous studies have acknowledged the strength of the performance expectancy factor in determining the use of technology in both voluntary and mandatory settings (Dwivedi *et al.*, 2011; Pušnik *et al.*, 2011; Venkatesh *et al.*, 2003). Performance expectancy had significant impact on continued usage intention of e-learning system in various studies

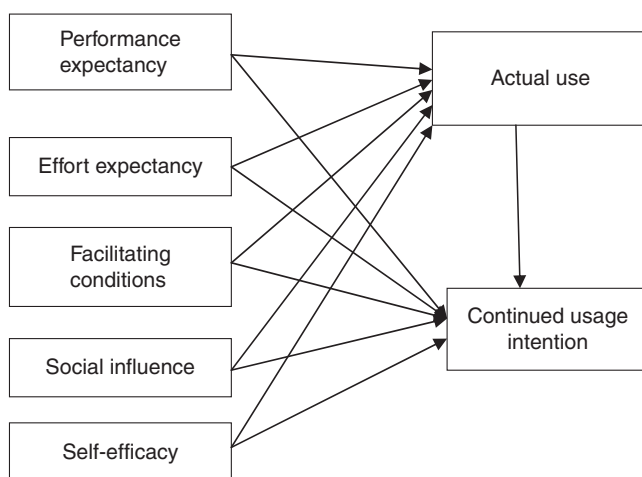


Figure 1.
Research model

(Chiu and Wang, 2008; Islam, 2011). The literature shows that the more students believe that the use of e-learning technologies would result in better achievements in their course programmes, the more they will continue to use the e-learning platform. Based on the literature, the following hypotheses are proposed:

- H1.* Performance expectancy has a significant positive relationship with actual usage of e-learning systems.
- H2.* Performance expectancy has a significant positive relationship with continued intention on usage of e-learning systems.

Effort expectancy

Effort expectancy construct refers to the degree to which students find it easy or difficult to accept and use e-learning systems. Previous studies on technology acceptance have demonstrated that effort expectancy is significant in both voluntary and involuntary setting during the initial stages of technology adoption, and it becomes insignificant over time of sustained usage (Venkatesh, 2000). Similarly, as perceived ease of use of TAM, effort expectancy was found to have a significant relationship with users' actual use of e-learning system (Ifinedo, 2006). This means that the more students believe that the e-learning platform would be easy to use, the more they would continue to use it in future. The following hypotheses were proposed:

- H3.* Effort expectancy has a significant positive relationship with actual usage of e-learning systems.
- H4.* Effort expectancy has a significant positive relationship with continued intention on usage of e-learning systems.

Facilitating conditions (FC)

Facilitating conditions refer to the degree to which students perceive that the institutional and technical infrastructures are available to support the use of e-learning system. Although, the original UTAUT shows that facilitating conditions have significant impacts on actual usage only, other studies such as a meta-analysis of 43 technology

acceptance studies revealed that facilitating conditions had positive impacts on behavioural intention as well (Dwivedi *et al.*, 2011). Moreover, prior studies on e-learning acceptance show that facilitating conditions have positive effects on continued usage intention (Bakar *et al.*, 2013). Indications are that the better the organizational and technical support and ICT infrastructure as perceived by students, the more they will continue to use the e-learning system. The current study conceptualized facilitating conditions to have significant positive effects on both actual usage, and continued usage intention of e-learning systems. Based on the literature, the following hypotheses were proposed:

- H5. Facilitating conditions have a significant positive relationship with actual usage of e-learning systems.
- H6. Facilitating conditions have a significant positive relationship with continued intention on usage of e-learning systems.

Social influence

Social influence relates to how people significant to the student, including colleagues, course instructors, institution, government, and others believe that the student should continue to use the e-learning system. Research shows that social influence significantly predicts the adoption of technology in both voluntary and mandatory settings (Venkatesh *et al.*, 2003). Other studies also found that social influence had significant positive effects on continued usage intention of e-learning systems (Bakar *et al.*, 2013; Cho *et al.*, 2009). Similarly, subjective norm from the TPB had significant influence on continued intention to use web-based learning programme of National Pingtung University in Taiwan (Lee, 2010). Based on the literature, the following hypotheses were proposed:

- H7. Social influence has a significant positive relationship with actual usage of e-learning systems.
- H8. Social influence has a significant positive relationship with continued intention on usage of e-learning systems.

Self-efficacy

Self-efficacy construct refers to the “judgment of one’s ability to use a technology (e.g. computer) to accomplish a particular job or task” (Venkatesh *et al.*, 2003, p. 432). Learning self-efficacy had a significant influence on continued usage of e-learning system among university students in Hongkong (Cho *et al.*, 2009). Padumadasa (2012) also found that self-efficacy had positive effects on acceptance and usage of technology. Indications are that the more students believe that they have the ability to operate in e-learning environment, the more they will use the e-learning systems. The present study also conceptualized self-efficacy to affect students’ decisions towards actual usage and continued usage intention of e-learning systems. Based on the literature, the following hypotheses were proposed:

- H9. Self-efficacy has a significant positive relationship with actual usage of e-learning systems.
- H10. Self-efficacy has a significant positive relationship with continued intention on usage of e-learning systems.

Actual use (USE) and continued usage intentions of e-learning system

There has been increasing attention to assess the effect of continued usage intention of e-learning system (Ifinedo, 2006; Lin and Wang, 2012). Continued usage intention of technology refers to the long-term usage or continuous use of a technology (Cho *et al.*, 2009). In blended learning, the student's intentions to continue using the e-learning system is driven by the tendency that the system can provide critical benefits in improving learning (Lin and Wang, 2012). Studies have demonstrated that there is a positive relationship between actual usage and continued usage intention of e-learning system (Ifinedo, 2006). In the context of this study, the intention to continue using LMS was put as a dependent variable to assess whether these students who are about to complete their studies would be willing to continue using the system for future studies such as postgraduate studies or lifelong learning. Thus, the following hypothesis was proposed:

- H11. Actual usage has a significant positive relationship with continued usage intention of e-learning systems.

Methodology

The case study research methodology was used in this study. This study was conducted at the School of Business of MU because most of the academic staff use the LMS to deliver e-courses, assignments, and announcements. The questionnaires were physically distributed to all third year undergraduate students ($n = 300$) during the end of second semester, 2012/2013 at the School of Business of MU. The rate of response was 77 per cent. The major aim of the survey was to establish the undergraduate students' intention to continue using e-learning system at MU. The study developed survey questions based on existing, tested and verified instruments. The scales included the following: performance expectancy was measured with four items and adapted from Tselios *et al.* (2011) and Venkatesh *et al.* (2003). Effort expectancy was assessed with five items, which were taken from several scholars (Tselios *et al.*, 2011; Venkatesh *et al.*, 2003; Wang and Shih, 2009). Four items were used to measure facilitating conditions, and they were taken from the works of Venkatesh *et al.* (2003). Social influence was measured with four items which came from Wang and Shih (2009) and Venkatesh *et al.* (2003). Six items were used to assess self-efficacy, and they were adapted from several studies (Jan *et al.*, 2011; Venkatesh *et al.*, 2003). Actual use was measured with two items and adapted from Ifinedo (2006) and Wang and Shih (2009), while continued intention was measured with six items, and adapted from the literature (Lin and Wang, 2012; Masrom and Teknologi, 2007; Venkatesh *et al.*, 2003). The questionnaire consisted of the following three sections: demographic data including gender, age, and study programme; level of e-learning use; and factors affecting actual use and continued usage intentions of e-learning.

The empirical data were analysed by using multiple regressions. Statistical Package for Social Science (SPSS) was used to analyse the hypotheses generated. This study used the two-step analytical procedure, including the exploratory factor analysis (EFA) which assessed the validity and reliability of the measurement model; and the multiple regressions which analysed the hypothesized relationships conceptualized in the research model. The first dependent variable assessed the actual use of e-learning system, by measuring the frequency of using the e-learning system. This variable was measured by using a seven-point Likert scales ranging from (1) infrequent users to (7) extremely frequent users (see Appendix). The second dependent variable assessed the intention to

continue using e-learning system. The intention to continue using LMS was put as a dependent variable to assess whether these students who are about to complete their studies would be willing to continue using the system for future studies such as postgraduate studies or lifelong learning. This variable was measured by using a five-point Likert scales ranging from (1) strongly disagree to (5) strongly agree (see Appendix).

The EFA was conducted by using principal components analysis and varimax rotation. The indicators to measure the five research constructs are listed in the Appendix. A five-point Likert scale, ranging from “1 = strongly disagree” to “5 = strongly agree”, was used for all the items in the survey questionnaire. Each construct measured between four to six items. Factor analysis enabled the study to determine the items for creating the summated scales. Before proceeding with factor analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett’s test were conducted to determine whether or not it was appropriate to conduct factor analysis. The KMO values should be greater than 0.5 and Bartlett’s test should be significant with a value less than 0.05 (Field, 2006). In this study, the determined KMO measure of sampling adequacy was 0.885. The Bartlett’s test of sphericity was found to be significant ($\chi^2 = 2764.066$, $df = 253$, $p = 0.000$). The results suggested that the data could support factor analysis. The varimax rotation was used to obtain factor loading values and cumulative proportions of variance. EFA yielded five constructs with a total of 24 items as designed in the survey questionnaire.

The factor loadings, Cronbach’s α , eigenvalues, and variances explained of all indicator variables are shown in Table I. All items achieved a minimal communality of 0.5, with eigenvalues greater than 1. All items loaded onto the factors that represented their constructs and all factor loadings of the individual items ranged from 0.6 to 0.8, which were above the criterion level of 0.5 (Hair *et al.*, 2010). In this study, the average score of the factors was used for further analysis.

The internal consistency of each factor identified in the principal component analysis was further examined through calculation of Cronbach’s α ’s. The criterion level for the definition of a scale was set at an α coefficient of 0.70 (Cronbach, 1951). In this study, all factors showed alphas greater than 0.70, which is the accepted level of internal consistency for items in social science research (see Table I). Multiple regression analysis was therefore used to examine the research hypotheses by using the SPSS software version 20.

Factor	1 (EE)	2 (PE)	Component 3 (SE)	4 (FC)	5 (SI)
Items factor loadings	EE1 0.745 EE2 0.764 EE3 0.797 EE4 0.802 EE5 0.709	PE1 0.742 PE2 0.861 PE3 0.847 PE4 0.702	SE1 0.607 SE2 0.623 SE3 0.611 SE4 0.701 SE5 0.707 SE6 0.602	FC1 0.757 FC2 0.834 FC3 0.784 FC4 0.731	SI1 0.801 SI2 0.876 SI3 0.68 SI4 0.626
Eigenvalue	8.14	2.417	1.874	1.621	1.182
Total variance explained (%)	35.39	10.509	8.147	7.05	5.141
Cumulative variance explained (%)	35.39	45.899	54.046	61.095	66.236
Cronbach’s α	0.892	0.884	0.805	0.804	0.821

Table I.
Factor analysis
and reliability

Notes: EE, effort expectancy; PE, performance expectancy; SE, self-efficacy; FC, facilitating conditions; SI, social influence

In addition, a total of 20 faculty members from School of Business were interviewed in order to supplement and corroborate results from questionnaire survey. The main purpose of the interviews was to determine factors that enable and disable usage of web-based LMS at the University. The semi-structured interview consisted both closed and open ended questions. These questions focused assessing the usage of e-learning system by faculty members, factors that enhance usage of e-learning system, and challenges faced by faculty members in using the e-learning system.

Results

The characteristics of the respondents and actual usage of web-based LMS are shown in Tables II and III. Among the 231 students, 50.2 per cent ($n = 116$) were female and 49.8 per cent ($n = 115$) were male. The average age was 24 years old. Almost half the students used the e-learning system slightly frequent (46 per cent, $n = 103$). Over half of the respondents (56 per cent, $n = 127$) were frequent users of the e-learning system, using the e-learning system between a few times a week to several times a day.

More male faculty members (75 per cent) participated in the interview as compared to female as shown in Table III. Most of study participants (60 per cent) were aged between 40 and 49 years old. About 45 per cent had used the e-learning system between one and three years. About 50 per cent ($n = 10$) were frequent users of the e-learning system, using the e-learning system between a few times a week to several times a day. Thus, the usage rate of e-learning system among faculty members is the same as compared to students. In addition, one-third (35 per cent) of the respondents spent an average of one to two hours when they use the web-based LMS.

	Frequencies	Percentages
<i>Gender</i>		
Female	116	50.2
Male	115	49.8
<i>Age</i>		
25 years and below	196	84.8
26-30 years	33	14.3
31 years and above	2	0.9
<i>Degree programmes</i>		
Accounting and Finance	114	49.4
Business Administration and Entrepreneurship Development	35	15.2
Business Administration in Marketing Management	31	13.4
Business Administration in Procurement and Logistics Management	51	22.1
<i>How many times do you use e-learning system?</i>		
Once in 3 months	25	11
Once in two months	9	4
Once a month	21	9.3
A few times a month	45	19.8
A few times a week	76	33.5
About once a day	34	15
Several times a day	17	7.5

Table II.
Respondent
data: students

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	Frequencies	Percentages
<i>Gender</i>		
Female	5	25
Male	15	75
<i>Age</i>		
30-39	7	35
40-49	12	60
50-59	1	5
<i>Designation</i>		
Tutorial assistant	2	10
Assistant lecturer	6	30
Lecturer	7	35
Senior lecturer	4	20
Assistant Professor	1	5
<i>How many years have you been using the online e-learning system?</i>		
1-6months	3	15
6 months-1 year	2	10
1-2 years	5	25
2-3 years	6	30
3 or more years	4	20
<i>On average (for the period that you were using e-learning platform), how many times do you use it?</i>		
Once in three months	4	20
Once in a month	1	5
A few times a month	5	25
A few times a week	4	20
About once a day	4	20
Several times a day	2	10
<i>On average working day that you use e-learning platform, how much time do you spend on the system?</i>		
Quarter an hour	3	15
1/2 hour	7	35
1/2-1 hour	2	10
1-2hours	7	35
2-3hours	1	5
<i>Do you allow students to submit their assignments online through online e-learning system at your university?</i>		
Yes	12	60
No	8	40
<i>Do you assess students' assignments by using online discussion forum?</i>		
Yes	5	25
No	15	75
<i>What is your self-assessment about using e-learning at Mzombe University?</i>		
Low experience	7.0	35
Moderate experience	11	55
High experience	2.0	10

Table III.
Respondents data:
faculty members

Further, more than half of the respondents (60 per cent) allowed their students to submit their assignments online, while few faculty members (25 per cent) assessed students' assignments in online discussion forums. Slightly over half of the respondents (55 per cent) felt that they had moderate experience on using e-learning platform.

Almost half the students used the e-learning system slightly frequent (46 per cent, $n = 103$). Over half of the respondents (56 per cent, $n = 127$) were frequent users of the e-learning system, using the e-learning system between a few times a week to several times a day.

Hypotheses testing

Standard multiple regression analysis was conducted to explore the effects of five factors (i.e. EE, FC, SE, SI, PE) on students' continued intention to use and actual usage of web-based LMS. The results of effects of five factors (i.e. EE, FC, SE, SI, PE) on students' actual usage of e-learning system are shown in Table IV. One of the five hypotheses are supported. Self-efficacy ($\beta = 0.301$, $p < 0.000$) is positively related to students' actual usage of e-learning system, and thus *H9* is supported. Facilitating conditions ($\beta = -0.048$, $p < 0.478$), effort expectancy ($\beta = -0.016$, $p < 0.85$), social influence ($\beta = 0.105$, $p < 0.153$), and performance expectancy ($\beta = 0.112$, $p < 0.157$) are not positively related to actual usage of e-learning system as hypothesized. Thus, hypotheses *H1*, *H3*, *H5*, and *H7* are not supported. The model accounted for 14.4 per cent of the variance explained in actual usage of e-learning systems.

On student's continued intention of using web-based LMS, the results show that five of the six hypotheses are supported (see Table V). effort expectancy ($\beta = 0.157$, $p < 0.016$), self-efficacy ($\beta = 0.159$, $p < 0.013$), social influence ($\beta = 0.143$, $p < 0.01$), performance expectancy ($\beta = 0.372$, $p < 0.000$), and actual use ($\beta = 0.1$, $p < 0.05$) are positively related to continued intention to use e-learning system as hypothesized.

Thus, hypotheses *H2*, *H4*, *H8*, *H10*, and *H11* are supported. Facilitating conditions ($\beta = 0.061$, $p < 0.227$) is not positively related to students' continued intention to use e-learning system, and thus *H6* is not supported. The model accounted for 41 per cent of the variance explained in continued usage intention (Figure 2).

Enablers and challenges on the use of web-based LMS

The results from the interviews with faculty members revealed the improvement in local area network and internet speed as the major factor that can enhance usage of

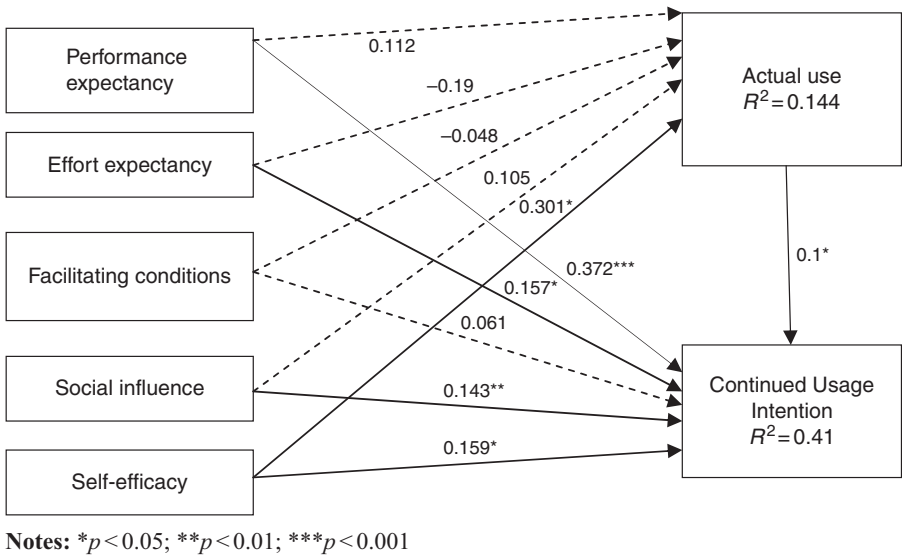
Table IV.
Results of multiple regression analysis regarding student's actual usage of web-based learning management system

	R^2	Adjusted R^2	Standardized coefficient, β	t -Value	F	Sig.	Collinearity statistics tolerance
EE	0.163	0.144	-0.016	-0.19	8.534	0.85	0.517
FC			-0.048	-0.711		0.478	0.853
SE			0.301	3.676		0	0.568
SI			0.105	1.432		0.153	0.717
PE			0.112	1.421		0.157	0.613

Table V.
Results of multiple regression analysis regarding student's continued usage intention of LMS

	R^2	Adjusted R^2	Standardized coefficient, β	t -Value	F	Sig.	Collinearity statistics tolerance
EE	0.533	0.52	0.157	2.431	41.239	0.016	0.516
FC			0.061	1.21		0.227	0.854
SE			0.159	2.512		0.013	0.535
SI			0.143	2.598		0.010	0.709
PE			0.372	6.242		0.000	0.605
USE			0.1	1.97		0.050	0.837

Figure 2.
Results of the
regression analyses



e-learning system at MU. For instance, one respondent said that, “[...] there must be a reliable networked environment. The library, offices and computer labs should be connected through a Local Area Network”. The development of e-learning policy was also a key issue that was mentioned by respondents. Currently, the University does not have the e-learning policy which is an important tool to guide both faculty and students on the use of web-based LMS. Typical responses were as follows:

[...] the University should establish e-learning policy for people to use the e-learning system.

[...] It should be mandatory for both lecturers and students to use e-learning to for assignment and evaluation purpose.

Other factors that can enable usage of web-based LMS as mentioned by respondents include the following: support from the technical IT staff, availability of desktop computers and laptops to faculty and students, user friendliness of the system, and improvement on skills on how to use the e-learning system. The improvement of e-learning usage skills can be done through continuing development professional workshop and seminars.

Major challenges as indicated by faculty members were related to poor ICT infrastructure, which is related to unreliable internet connection, unstable local area network, frequent electrical power cuts, and lack of enough computers for both students and staff. Typical responses include the following:

[...] The number of computers is slightly lower as compared to number of students and lecturers.

[...] The University does not offer adequate extra source of power supply.

Other challenges on the usage of e-learning system at MU as identified by faculty members include the following: lack of awareness on the existence of web-based LMS system among faculty and students, resistance to change from the traditional system to electronic system of learning, limited skills/knowledge, the e-learning system is not user

friendly and thus it is difficult to navigate the system, and lack of time to prepare e-content and use the e-learning system. For instance, one respondent said that, “[...] there is lack of teaching preparedness culture. Lecturers do not take time to prepare and document their classes”. Another respondent also said the following: “[...] most academic staff have many responsibilities, and thus they feel that using the system is a kind of another task”.

Discussion of study findings

The results suggest that variables from UTAUT are important in explaining student's continued usage intention of e-learning systems. Overall, UTAUT was partially supported, whereby six out of 11 hypotheses in the research model were supported. All study factors were important in determining continued usage intention of e-learning system with the exception of facilitating conditions. Among other variables, self-efficacy was a strong determinant of actual usage of LMS in the study. Self-efficacy also predicted continued usage intention of e-learning system. This finding suggests that students who believed they had the ability to operate the e-learning system intended to re-use it in future, as it was revealed in other studies (Cho *et al.*, 2009; Padumadasa, 2012; Zhang, 2012).

Performance expectancy was a strong predictor of continued usage intention of LMS, but had no effects on actual use of the system. The evidence suggests that students find web-based LMS useful in increasing their effectiveness, productivity in their course works, and accomplishing their course tasks quickly. This means that a student with high performance expectancy is more likely to use e-learning system than a student with lower performance expectancy. Students are therefore willing to adopt e-learning system because of the perception that it would improve their learning performance. This result confirms prior works of Chiu and Wang (2008). This finding, however, is contrary to Bakar *et al.* (2013) who found that performance expectancy had no effects on continued usage intention of student portal.

Social influence had a positive relationship with continued usage intention of e-learning system, but had no effects on actual usage of the system. This implies that students would agree to continue using the e-learning system due to external influence such as a lecturer's instructions or peer pressure. Other studies also reported similar findings (Bakar *et al.*, 2013; Cho *et al.*, 2009; Lee, 2010). This finding is also supported by the results of the interview (Table III) which show that more than half of the lecturers (60 per cent; $n = 12$) allowed students to submit their assignment through the online system at MU. However, most of the faculty members (75 per cent; $n = 15$) did not assess students' assignment by using online discussion forum. Kearsley (2000) is of the opinion that the most significant applications of computer-mediated communication in e-learning environments are discussion forums. Web discussion forums provide a way for students to extend the classroom discussions and thus adopt e-learning.

Effort expectancy also predicted continued usage intention, but had no effects on actual usage of e-learning system. Indications are that students will continue to use the system if the system has helpful and user-friendly features. The results of this study corroborate other studies elsewhere (Bakar *et al.*, 2013). These results are also consistent with findings from faculty members who also indicated that user friendliness of the system as one of the factor that can enhance usage of e-learning system at MU.

Further, this study found that actual usage had a positive significant relationship with continued usage intention of e-learning system, which is in agreement with results reported by Ifinedo (2006). Unlike previous studies (Bakar *et al.*, 2013), facilitating conditions had no significant relationship with actual usage and continued usage

intention of e-learning system. Results from interviews with faculty members showed that the University has poor ICT infrastructure, which is related to unreliable internet connection, unstable local area network, frequent electrical power cuts, and lack of enough computers for both students and staff.

This may explain why facilitating conditions is not positively and significantly related to continued usage intention of e-learning system. It is, therefore, important to improve the ICT infrastructure to enable students to use the e-learning system.

It can be deduced that both faculty member and students identified the following as common factors that can enhance usage of web-based LMS at MU related to knowledge and skills, effort expectancy, social influence and facilitating conditions as common factors which enhance e-learning usage at MU.

Practical and theory implications and limitations

The study provides useful findings that e-learning managers and universities can use to develop strategies to encourage continuous usage of e-learning systems for future studies or lifelong learning among final year students and lecturers in higher learning institutions. First, the findings showed that students' perception of the performance expectancy is crucial in fostering intention to continue using e-learning system. Some ways of improving performance expectancy would be to create awareness and provide proper training to students and lecturers on the benefits of using the e-learning technologies. Awareness among university students can be created through printed leaflets, posters, university web site, social media, and library catalogues.

Second, the positive effects of effort expectancy on continued usage intentions indicate that e-learning system should have consistent ease to use and user-friendly functions to encourage students and lecturers to re-use the system. E-learning developers should hide the complexity of the hardware and software involved by providing easier-to-use user interfaces in order to attract more students and lecturers to use web-based LMS. Otherwise, students and lecturers will discontinue using an e-learning system, if it is difficult to use for their learning purpose, even if other conditions are fulfilled.

Third, social influence was important in influencing student's decision to continue using the e-learning system. It is clear that people responsible for e-learning should take advantage of social influence in promoting use of e-learning by encouraging course instructors to use e-learning system, since they can influence students to use the system. E-learning managers can also focus on educating students and lecturers to use e-learning through training, word of mouth, printed leaflets/posters, and electronic means such as university web site, and social media. In addition, the university should formulate a policy to guide e-learning development and usage. For example, it should be mandatory to deliver courses, assignment, and feedback to students by using web-based LMS. Furthermore, the e-learning policy should emphasize the importance of partnership between Faculties and Universities' department in providing e-learning infrastructure, IT technical support, and support to lecturers and students. Resistance to change is therefore, likely to be overcome if academic staff and students are fully involved or have full ownership in the design, development, and implementation of these changes.

Fourth, it is important to improve the self-efficacy of students to enhance their participation in the e-learning system. Instructors can improve the self-efficacy of student to participate in online learning by praising and confirming their achievements when they use web-based LMS functions such as online discussions. The e-learning

developers should also design the e-learning system to have various assigned tasks which will enhance the self-efficacy of students and lecturers to continue using the system. They should also train students and lecturers on how to use the e-learning system to enhance their computer self-efficacy and knowledge, which will, in turn, increase the adoption and usage rate of web-based LMS, in the long run.

Lastly, the university should ensure that the ICT infrastructure is suitable for e-learning systems in order to eliminate the obstacles to e-learning usage, which were revealed through interviews with academicians. For example, the University should improve local area network and internet connection, build sufficient number of computer labs, and ensure that all lecturers and students have access to computers, and reliable power supply.

From a theoretical perspective, by utilizing UTAUT, as a base theory in the context of continued usage intentions and integrating an additional construct ("self-efficacy"), the extended UTAUT model fits very well in the web-based learning circumstances. The self-efficacy construct helped to explain why students are willing to continue using web-based learning system. Since the present study used UTAUT theory in the continued usage intentions context, the findings of the present study provide possible opportunities for future studies on the assessment of various theoretical perspectives to understand information system continued usage intentions. The study has also contributed to the body of knowledge on the continued usage intentions of e-learning systems because there are scant studies in the Tanzanian context. Thus, the UTAUT theory can be adapted to investigate the usage intentions of web-based LMS in other institutions with similar conditions. The results can provide better understanding into how to plan and implement a successful web-based LMS in academic institutions.

The study further contributes to theory by revealing factors that do not have effects on actual usage and continued usage intentions of e-learning systems. These included facilitating conditions that did not have effects on both actual usage and continued usage intentions, while performance expectancy, effort expectancy, and social influence had no significant relationship with continued usage intentions. Although these factors were found to significantly predict continued usage intentions of e-learning systems in previous studies (Bakar *et al.*, 2013; Chiu and Wang, 2008; Islam, 2011), these factors were found to be not significant in the context of the Tanzanian web-based LMS. These findings suggest that future research could examine why these factors have no effect in the Tanzanian web-based LMS context and if changes in the institutions could foster effects of these factors, like in other contexts.

This study has several limitations. The study used case study research design, where the data were collected at the same point of time from students' perceptions on continued usage intentions of e-learning system from a single university. The study was conducted to only third year undergraduate students and because they had more experience in using the e-learning system at MU. The study sought to assess whether these students who are about to complete their studies would be willing to continue using the system for future studies, such as postgraduate studies or lifelong learning. The results are only limited to university students in Tanzania, and to a particular e-learning system adopted by a specific university and generalization of these findings to other countries or cultures will need further research.

Conclusions and future research

Based on UTAUT, the present study empirically tested a theory that explains students' continued participation in web-based learning environment. The results show that actual

usage was determined by self-efficacy, while continued usage intentions of web-based learning system was predicted by performance expectancy, effort expectancy, social influence, self-efficacy, and actual usage. Overall, UTAUT theory was partially supported in continued usage intentions of e-learning technology. The findings show the importance of UTAUT in the context of higher learning institutions which specify factors that can motivate students to continue using in e-learning for their future studies or lifelong learning. By using UTAUT in the context of continued usage intentions and integrating an additional construct ("self-efficacy"), the extended UTAUT model fits very well in the web-based learning systems in Tanzania, in particular, where such studies are scant. The findings can be used by other studies with similar conditions in the continued usage intentions of e-learning systems. In addition, this study seems to indicate that there is a slow rate of adoption of e-learning by university lecturers. The use of e-learning in MU has not been fully embedded into the University's teaching culture and practice. For example, only 25 per cent ($n = 5$) lecturers, assessed students assignments by using online discussion forum. Furthermore, 55 per cent ($n = 11$) lecturers indicated that they have moderate experience in using e-learning systems. Challenges for using web-based LMS were related to ICT infrastructure barrier, LMS user interface was not user friendly, weak ICT policies, management and technical support, and limited skills, lack of awareness, resistance to change, and lack of time to prepare e-content and use the e-learning system. The study findings are useful to e-learning managers and university management to identify important factors and develop appropriate policies and strategies to encourage long-term usage of e-learning systems in higher learning institutions.

Further studies with different e-learning platforms, and which includes students and lecturers from different year of study and that cover multi-institutions would improve the generalizability of the findings. Furthermore, other studies should also assess the continued usage intentions of web-based LMS not only among students and lecturers, but also among other categories of respondents such as ICT technical support, and university administrators. Other studies should also investigate the effects of moderating factors such as age, gender, and voluntariness of use of continued usage intentions of LMS. Future studies should use mixed methods and longitudinal research design to capture all dynamics of the continued usage of e-learning over time.

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Effort expectancy	EE1	My interaction with the e-learning system would be clear and understandable
	EE2	It would be easy for me to become skilful at using the e-learning system
	EE3	I would find the e-learning system easy to use
	EE4	Learning to operate the e-learning system is easy for me
	EE5	Overall, I find e-learning system easy to use
Social influence	SI1	People who influence my behaviour think that I should use the e-learning system
	SI2	People who are important to me think that I should use the e-learning system
	SI3	The management of this university has been helpful in the use of the system
	SI4	In general, the university has supported the use of the system
Performance expectancy	PE1	Using e-learning would enhance my effectiveness in learning
	PE2	Using e-learning would increase my productivity in my coursework
	PE3	The e-learning system provides some good functions to help me complete my learning tasks
	PE4	The use of e-learning system will enable me/enables me to accomplish academic tasks more quickly
Facilitating conditions	FC1	There are enough computers to use and practice on the e-learning system at the university
	FC2	I can rely on the computer network at the university to access the e-learning platform
	FC3	The university internet speed is satisfactory for using the e-learning system
	FC4	I have no difficulty accessing computers for using e-learning system at the university
Self-efficacy	SE1	I can use the e-learning platform if system manuals are available
	SE2	I can access course content on the e-learning platform even if there is no one around to show me how to use it
	SE3	I feel confident finding information in the e-learning system
	SE4	I can use the e-learning platform without detailed instruction on its use
	SE5	I can overcome obstacles that occur when I use the e-learning platform
	SE6	In general, I am competent in using the e-learning platform
Continued usage intention	CUI1	I intend to continue using the e-learning system for knowledge gathering
	CUI2	I intend to continue using the e-learning system for knowledge construction
	CUI3	I intend to continue using the e-learning system for knowledge sharing
	CUI4	I intend to continue using e-learning system for my coursework in this semester
	CUI5	I will frequently use the e-learning system in the next semesters
	CUI6	Overall, I intend to continue using the e-learning system
Usage behaviour	USE1	On average (for the period that you were using e-learning platform), how many times did you use it? 1 = [] Once in 3 months 2 = [] Once in two months 3 = [] Once a month 4 = [] A few times a month 5 = [] A few times a week 6 = [] About once a day 7 = [] Several times a day
	USE2	On average (for the period that you were using e-learning platform), how frequently do you use it? 1 = [] Extremely infrequent 2 = [] Quite infrequent 3 = [] Slightly infrequent 4 = [] Neither 5 = [] Slightly frequent 6 = [] Quite frequent 7 = [] Extremely frequent

Table AI.
Instrument: all items were measured on a five-point Likert scale with exception to usage behaviour variable that used seven-point Likert scale

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