



E-learning Adoption by Lecturers in Selected Zimbabwe State Universities: An Application of Technology Acceptance Model

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Abstract. The Technology Acceptance Model has widely been used in various studies in understanding information systems. However, this has been used intensively in developed economies with little application in developing economies like Zimbabwe. The rapid diffusion of the Internet has generated a rejuvenated interest and motivation in the role of new information and communication technologies in higher education and learning in Zimbabwe. The major purpose of the study was to explore the attitude of Zimbabwean lecturers in universities towards e-learning systems by applying TAM. Five hypotheses were developed basing on this model. The results indicated that significant relationships were recorded for perceived usefulness, perceived ease of use, attitude and behavioural intention to use e-learning. However, the relationship between perceived usefulness was not supported. A path model was developed to analyse the relationships between the variables that explain the attitudes of lecturers towards acceptance of the e-learning system. This study was important in that it was able to gauge the preparedness of state university lecturers towards e-learning use and it also discussed the benefits and challenges of the system to university communities and their employees. The outcomes of e-learning will enhance the lecturers' appreciation of e-learning acceptance and will assist the Zimbabwean government decision makers in planning, evaluating and implementation of e-learning at various levels of learning establishments.

Key words: Adoption, Attitude, E-learning, Lecturers, Technology Acceptance Model (TAM), Zimbabwe State Universities

Introduction

The sharp rise in academic digitalisation programmes has resulted in booming enrolment in online higher education and the rapid adoption of self-paced e-learning and Africa has become the most dynamic e-learning market in the world (Ambient Insight, 2011). E-learning has become a more significant type of learning in higher institutions but there is scanty empirical evidence regarding the preferences of this technologically based learning system by both the students and lecturers in most developing economies. The origins of the term e-Learning is not certain, although it is suggested that the term most likely originated during the 1980's (Moore, Dickson-Deane and Krista 2010) in the same time frame of the delivery mode of online learning. Despite this wide spread adoption of e-learning in university education, research on e-learning adoption suggests that it has not reached its full potential. This new approach to teaching and learning has taken root in developing economies despite the digital divide and gaps (Barclay and Bryson, 2012). Studies have shown that e-learning has emerged as a new paradigm of modern education (Sun, Tsai, Finger, Chen, and Yeh, 2008; Martins and Kellermanns, 2004) as cited by Barclays and Bryson (2012).

E-learning is significant in that it improves flexibility in education delivery, enhances focus on learner centeredness. Again, brings greater access to knowledge, improves archival capability of knowledge and general improvements in knowledge management, and potentiality for increased global audience (Zhang, Zhao, Zhou, and Nunamaker, 2004); and lecturers develop the social responsibility to motivate students and increase their level of involvement in the learning process and these roles may be considered impediments towards e-learning utilisation (Al-alak and Alnawas, 2011). Chigona and Dagada (2011) strongly argue that whilst the integration of e-learning in tertiary education is consummately beneficial and significant, the benefits can only be realised if the technology is successfully adopted and utilised. They also notes that even if lecturers may be familiar with the new learning systems they may still not be prepared to integrate the newer technology.

Studies have highlighted the challenges and failures of e-learning. For example, there is evidence of failures due to high cost of technology, insufficient supportive processes, competition and absence of a clear business strategy (Ellouni, 2004); and difficulties in acceptance and adoption of courses (Saadé, 2003). Low adoption and success rates may be attributed to increased instructors' involvement and time, increased preparation time for the instructor, low comfort levels for users, potentially more frustration, anxiety, and confusion for users.

Aa-alak and Alnawas(2011) assert that instructors are perceived to be important agents that contribute to the success of e-learning systems since their knowledge about using technology and attitude toward utilisation of such systems plays an important role in diffusion of e-learning. The Learning Management System (LMS), or the virtual learning environment (VLE), is an e-learning system that has been widely adopted by universities (McGill and Klobas, 2009) in the developed world but the numerous efforts to implement the e-learning initiatives are still in their infancy and little research has been paid to the examination of that concept in Zimbabwean State Universities. Campbell and Swift (2005) demonstrated that both lecturers and students need to change their attitudes, behaviour and habits if e-learning systems are to be adopted successfully. The main purpose of this paper is to explore the determinants that influence the adoption of e-learning services by university teachers in government universities in Zimbabwe by applying Technology Acceptance Model (Davis, 1989)

Literature Review

An Overview of E-Learning

Nichols (2003) views E-Learning as strictly accessibility to learning by using technological tools that are either web-based, web-distributed, or web-capable. e-Learning is the use of technology to enable people to learn anytime and anywhere. e-Learning refers to “the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration”(Holmes and Gardener, 2006 pp.14).

Therefore e-learning is an inclusive term that describes educational technology that electronically or technologically supports learning and teaching in higher institution of learning. Bernard Luskin, a pioneer of e-learning, advocates that the "e" should be interpreted to mean "exciting, energetic, enthusiastic, emotional, extended, excellent, and educational" in addition to electronic. "e-Learning can be defined as learning that is facilitated and supported through the use of information and communications technology. It can cover a spectrum of activities from the use of technology to support learning as part of a 'blended' approach (a combination of traditional and e-learning approaches), to learning that is delivered entirely online. Whatever the technology, what is vital is learning" (Journal of International Science and Computers Media (2014). The term 'e-learning' therefore essentially covers the use of computers and technology as a vehicle for knowledge exchange within teaching and learning in education that is facilitated by the Internet.

Previous research indicated that teachers were reluctant to use computer-based teaching due to the lack of experience in utilisation of information and communication technology (Rosen, Sears, and Weil, 1995) and the instructor's attitude and perceptions toward significantly influence that adoption of the system (Al-alak and Alnawas, 2011). Again, Dillion and Morris (1996), as cited in Al-alak and Alnawas (2011), noted that educator's attitudes towards technology and control over the technology had a significant effect on the learning outcomes. Despite these discoveries, e-learning has been observed by users to be of great importance in that it has provided a new environment which result in students getting individualised learning support and a more convenient situation for them separate from other learners. Al-alak and Alnawas (2011) noted that the critical success of e-learning is on the positive attitude of users towards the e-learning system. Basing on the above views, this study used the Technology Acceptance Model to help address the adoption of e-learning by lecturers in State Universities in Zimbabwe.

The Theoretical Framework of Technology Acceptance Model

This model was developed from the Theory of Reasoned Behaviour originally proposed by Fishbein and Ajzen (1975). As pointed out by Fishbein and Ajzen (1975), a person's attitude is determined by his/her perceived view about the expected consequences of performing the behaviour and the evaluation of those consequences, therefore if an individual's intent is strong, then that expected behaviour will be performed really. The premise upon which TAM was developed is that people's behavioural intention to use e-learning is determined by perceived usefulness and perceived ease of use (Davis, Bagozzi and Warshaw, 1989). Lee, Hsieh and Hsu (2011) commented that a considerable number of researchers have grappled with this study area and conducted empirical studies to examine the explanatory and predictive power of the TAM, which produced relatively consistent results on the acceptance behaviour of IT end users (Igbaria, Zinatelli, Cragg, and Cavaye, 1997; Venkatesh & Davis, 2000; Horton, Buck, Waterson, & Clegg, 2001).

The Technology Acceptance Model

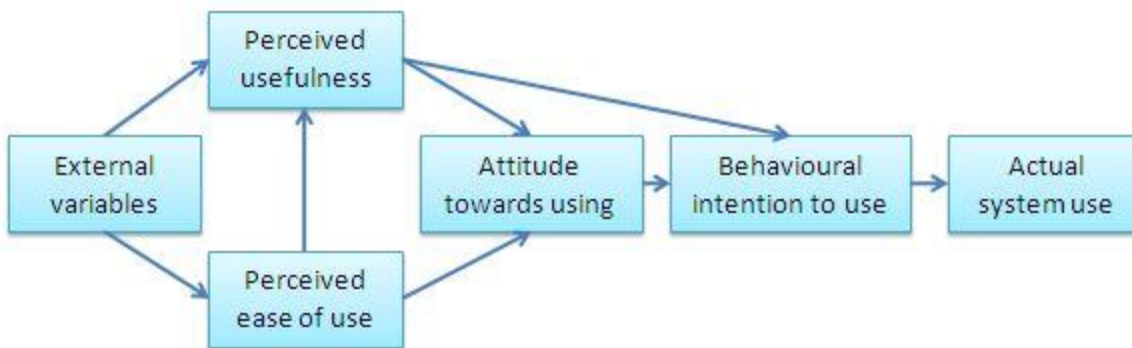


Figure 1. Technology Acceptance Model by Davis *et al.* (1989).

Perceived Ease of Use

Although the perceived ease of use is an important determinant of behavioural intention, instructors have adequate capability to overcome the related difficulties. So system usefulness is a more influential factor than easiness factor for instructors'

decision to e-learning use. These two factors have become evident to have direct effects on behavioural intention to use e-learning. The perceived ease of use of e-learning is defined as “the degree to which an instructor believes that the system will be used easily” (Davis *et al.*, 1989). Davis (1989) concluded that PEOU has a significant direct effect on PU, and most of the recent studies verified the relationship empirically in the context of e-learning use (Lee *et al.*, 2011). Elliott and Fu (2008), cited in Al-alak and Alnawas (2011), argued that it is believed that perceived ease of use helps in reducing the uncertainty of innovations leading individuals to adopt e-learning technology. PEOU was discovered to indirectly influence intention to use through increased perceived usefulness (PU) and Teo (2009) notes that perceived usefulness mediates the impact of PEOU on attitudes towards use. Basing on these observations the following hypotheses are formulated:

H1: Perceived ease of use has a positive influence on attitude of lecturers to use e-learning services in state universities.

H2: Perceived ease of use has a positive influence on perceived usefulness by lecturers when adopting e-learning systems by lecturers at state universities.

In the proposed research model, PU of Learning Management System is defined as “the degree to which an instructor believes that using such systems will enhance his or her teaching performance” (Davis *et al.*, 1989). Al-Adawan, Al-Adawan and Smedly (2011) in their research “exploring students’ acceptance of e-learning using Technology Acceptance model in Jordanian universities”, concluded that perceived usefulness had a significant influence on intention to use and therefore directly impact on behavioural intention to use e-learning. In the same vein, the perceived usefulness from lecturers’ perspective influence their attitude and behaviour to use e-learning. Barclays and Osei-Bryson (2012) concluded that statistical results proved that PU had a positive significant relationship with BI. This result leads to similar conclusions with some previous studies in the literature (Saade and Bahli, 2005). Given the above discussion the following hypotheses are developed:

H3: Perceived usefulness has a positively influence on attitude to adopt e-learning systems by lecturers at state universities.

H4: Perceived usefulness has a positive influence on behavioural intention to use e-learning systems by lecturers at state universities.

Attitude

Attitude refers to an individual's overall affective reaction to using an e-learning system. Studies have indicated that attitude directly and significantly influences behavioural intention to use a particular technology (Davis *et al.*, 1989; Geroge, 2002 and Venkatesh, Morris, Davis and Davis, 2003). However, too few studies (Liaw, Huang, and Chen, 2007; Wang and Wang, 2009) verify the relationship between attitude and intention from higher education instructors' perspective empirically in the context of e-learning systems. E-learning successfully engaged requires lecturers to develop a positive attitude towards it (Hu and Liaw, 200). Given these views, the following hypothesis is therefore developed:

H5: Attitude positively influences behavioural intention to adopt e-learning systems by lecturers at state universities.

Methodology

To achieve the objectives, previous researches were reviewed to ensure that a comprehensive list of measures was included (Khraim, Al Shoubaki and Khraim, 2011). The TAM constructs of perceived ease of use (PEOU), perceived usefulness (PU), attitude (A), behavioural intention (BI) and actual use (AU) were adopted (Davis, 1989). A survey methodology was used for data collection (Malhotra and Birks, 2003). The data were collected by means of well developed, structured and verified scales using questionnaires and the constructs had items measured on a 5 point likert scale ranging from (1= strongly agree to 5=strongly disagree) (Aaker, Kumar and Day, 2004). A pilot study was conducted to improve questionnaire

structure and content and these were dispatched to more seasoned experts in information technology in the selected universities who were asked to verify the aspects of clarity, redundancy, reliability and completeness. After the feedback and discussions with the experts in information technology and education, the researcher reconstructed, added and deleted questions that were not necessary in order that the questions were complete and easy to understand. A random sample of 4 universities in Zimbabwe was used namely: Zimbabwe Open University, Harare Institute of Technology, University of Zimbabwe and Great Zimbabwe University. Participants in this research were composed of lecturers. The researcher distributed 278 questionnaires physically for self-administering by the respondents. The study considered a sample of 278 from a population of 1025 using Krejcie and Morgan's sample table. With a population of 1025 of lecturers and to have a sample sufficient enough to generate a 95% confidence interval that will predict the proportion of lecturers with a plus or minus 5%, the needed sample would be 278 (Krejcie and Morgan, 1970). From this sample, the response rate was 71%. The researcher used a judgemental sampling approach to identify respondents. This sampling approach was based on who the researcher thought would be appropriate and thought to be better (more knowledgeable, more willing for the study) than others to interview. Judgemental sampling technique involved low costs and less time when selecting prospective sampling university lecturers compared to many other alternative methods. However, it was associated with low reliability levels and high levels of bias.

Data Analysis and results

Statistical Package for Social Sciences (SPSS) was used to analyse the relationship of the proposed model and the properties of the scale (Daud, Kassim, Said and Noor, 2011). The researcher used Cronbach's Alpha to determine the reliability of the variables used in the instruments. The main purpose of reliability analysis is to determine how well a set of items taps into some common sources of variance (Viswanathan, 2005) as cited by Daud *et al.*, (2011). A Cronbach's Alpha coefficient

of 0.7 to 1.0 are considered good in reliability and those that are 6.0 and below are viewed as poor (Sekeran and Boogie, 2010). Correlation and regression analysis were used to analyse the data obtained from the universities.

Demographic Analysis

Table 1. Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	181	68.0	91.4	91.4
	Female	17	6.4	8.6	100.0
	Total	198	71.3	100.0	
Missing	System	80	28.7		
Total		278	100.0		

Source: SPSS Output.

Table 2. Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-30 years	36	13.5	18.2	18.2
	31-40 years	44	16.5	22.2	40.4
	41-50 years	57	21.4	28.8	69.2
	>50 years	61	22.9	30.8	100.0
	Total	198	71.3	100.0	
Missing	System	80	24.7		
Total		278	100.0		

Source: SPSS Output

Table 3. Education Level

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Degree	28	10.5	14.1	14.1
Postgraduate	170	63.9	85.9	100.0
Total	198	71.3	100.0	
Missing System	80	24.7		
Total	278	100.0		

Source: SPSS Output

Table 4. Cronbach's Alpha

Scale	Cronbach's alpha
Perceived Usefulness (PU)	0.684
Perceive Ease of Use (PEOU)	0.556
Attitude Towards Use (ATU)	0.896
Behavioural Intention to Use (BITU)	0.686
TOTAL	0.713

Hair *et al.* (1998) recommended that a Cronbach's alpha with a cut-off point of generally 0.6 is fair. Accordingly all predictors with the exception of PEOU have values above 0.6. However, the total value is above 0.7 with a value of 0.713. Therefore the survey is considered generally a reliable measurement instrument.

The Influence of Perceived Usefulness and Perceived Ease of Use on Attitude about e-Learning Systems Usage

To maintain consistency with earlier studies that have developed, applied and extended TAM the hypothesis were tested using linear regression.

Table 5. Regression results for H1 and H3**Coefficients^a**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.473	.124		3.827	.000
	PEOU	.294	.041	.520	7.131	.000
	PU	.394	.054	.527	7.229	.000

a. Dependent Variable: ATTITUDE. Source: SPSS output.

As seen from the table 5 above, *perceived ease of use* (PEOU) has significantly influenced attitude (ATT) since $p < 0.05$. Therefore perceived ease of use has an impact on attitude to adopt e-learning by lecturer and consequently hypothesis 1 is supported. Again, *perceived usefulness* (PU) has also a positive influence on attitude since $p < 0.05$. Therefore hypothesis 2 (H2) has been confirmed.

The influence of Perceived Ease of Use on Perceived Usefulness About e-Learning

Table 6. Correlation results for H 2**Correlations**

		PEOU4	PU5
PEOU4	Pearson Correlation	1	.435**
	Sig. (2-tailed)		.000
	N	198	198
PU5	Pearson Correlation	.435**	1
	Sig. (2-tailed)	.000	
	N	198	198

Correlations

		PEOU4	PU5
PEOU4	Pearson Correlation	1	.435**
	Sig. (2-tailed)		.000
	N	198	198
PU5	Pearson Correlation	.435**	1
	Sig. (2-tailed)	.000	
	N	198	198

**Correlation is significant at the 0.01 level (2-tailed). Source: SPSS Output.

Table 7. Regression results for H2

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.773	.143		5.404	.000
	PEOU	.391	.060	.566	6.505	.000

a. Dependent Variable: PU Source: SPSS output.

Table 6 on correlation results indicates that perceived ease of use (PEOU) has an intervening effect on perceived usefulness (PU) although the relationship is not very strong because it is below 0.05. From the table 7 it can be observed that PEOU significantly influence PU since $p < 0.05$.

The Role of Attitude and Perceived Usefulness on Behavioural Intention to Adopt e-Learning

Table 8. Regression results for H 4 and H5.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.726	.186		3.914	.000
	ATT	.910	.104	.697	8.712	.000
	PU	.001	.059	.001	.189	.851

a. Dependent Variable: Intention to Use. Source: SPSS output

Regarding hypothesis 4 (H4), the regression results indicate that perceived usefulness does not significantly influence intention to use since $p > 0.05$ therefore the hypothesis H4 is not supported and PU has no influence on the intention of lecturers' to adopt e-learning. However, finally attitude to adopt e-learning has strong and positive influence on the intention of university lecturers to accept e-learning. Given these results, hypothesis 5 is confirmed and supported since $p < 0.05$.

Table 9: Summary of the Hypothesis Testing

Hypotheses	Path	Path coefficient	t-value	Results
H1	PEOU-ITU	0.294	7.131	Supported ($p < 0.05$)
H2	PEOU-PU	0.391	6.505	Supported ($p < 0.05$)
H3	PU-ATU	0.394	7.229	Supported ($p < 0.05$)
H4	PU-ITU	0.0011	0.0015	Not Supported ($p > 0.05$)
H5	ITU-ATU	0.910	8.712	Supported ($p < 0.05$)

The summarised results above show that there was statistical correlation between the predicted directions of the study model. 80 % of the hypotheses set were

confirmed with the exception of perceived usefulness' impact on behavioural intention to use e-learning.

Discussion

The findings of this study have suggested that attitude plays a significant role in determining the adoption of e-learning in Zimbabwe's State Universities through the use of theoretical basis derived from behavioural intention and technology acceptance models. The results above confirmed that there was a statistical correlation between the predicted directions of the research model. In summary, four out of five hypotheses were supported by the data collected. The results on the impact of perceived ease of use on attitude to adopt e-learning was consistent with the results discovered by TAM and extended TAMs (Davis *et al.*, 1989; Venkatesh *et al.*, 2003; Yang, 2004; Al-Adwam *et al.*, 2013; and Al-alak and Alnawas, 2011). In addition, perceived ease of use proved to have a relationship with perceived usefulness (Lu, 2002; and Norzid and IntanSalwani, 2009). Davis (1989: p.34) notes that "from a causal perspective, the regression results suggest that ease of use may be an antecedent of usefulness, rather than parallel, direct determinant of usage." Therefore basing on these results it may be concluded that lecturers in state universities in Zimbabwe have a positive attitude towards learning may be this will increase their degree to deliver their services quite easily.

Perceived usefulness proved to a better predictor of the lecturers' attitude to adopt e-learning considering its beta coefficient of 0.394 against a value of 0.294 for PEOU. Davis (1989) and Barclays and Osei-Bryson (2012) discovered similar results. Davis (1989) further notes that potential users perceive a technology to be useful, but it is possible for them to believe that technology is too complicated to use in terms of skills development and time. By the same note university lecturers may perceive so. However, perceived usefulness proved to have insignificant relationship with behavioural intention to adopt e-learning by lecturers for the hypothesis was not supported and this was contrary to TAM assertions. This is supported by the work of Lucas and Splitter (1999) who argue that the finding of a

non-significant relationship between perceived usefulness and behavioural intention was quite mesmerising. Therefore it can be concluded that perceived usefulness does not predict enough the behavioural intention of lecturers to adopt e-learning. This finding may be due to the fact that lecturers do not foresee indulging in long term use of the new model since they are acclimatised to the traditional way of teaching. Another possible reason could be that lecturers lack the ability to use the new system. However, the influence of perceived usefulness on behavioural intention can only be significant if the results may be analysed through focusing on the impact of this construct via attitude.

Attitude's influence on behavioural intention to use was quite strong indeed. This is supported by (Davis, 1989, George, 2002 and Venkatesh *et al.*, 2003) who found that attitude directly and significantly influences behavioural intention to use a particular technology. Chau and Hu (2001) found that attitude seemed to be the second most important determinant of physician's intention for accepting telemedicine technology. In the same vein these results found significant effects of attitude towards intention to adopt e-learning by lecturers.

However, Davis (1989) and Venkatesh *et al.*, (2003) admit that attitude's influence tends to be modest since the effect of attitude will have been captured by the performance and effort expectancies and therefore attitude has no significant effect on users' behavioural intention.

Conclusion

The current trend worldwide is the consideration of utilisation of e-learning in most higher learning institutions. Despite the fact that e-learning is still at its infancy in Zimbabwe, the government has made tremendous efforts to ensure implementation of information and communication technology in higher institution of learning. The findings of these results have shown that TAM is a significant theory whose lens may be used to observe the preparedness of lecturers to use e-learning in Zimbabwe. It has been noted that for the system to be adopted quite easily there is need to make it less complicated through otherwise proper and intensive training of the

lecturers concerned. Another approach that could be pursued by universities is to give incentives to lecturers that pioneer e-learning projects and having workshops for those who have not used the system.

However, e-learning systems adoption may be hampered by lack of capital to purchase the architecture required to bankroll the projects. Again, there is a great need for top management support for e-learning projects and there is need to align universities strategic plans towards use of information and communication technology. It is hoped that the Zimbabwe Agenda for Sustainable Socio-Economic Transformation is going to help harness the networking and cooperation at national level

The researcher recommends that management need to facilitate support by ushering in resources to enable a quick acceptance of e-learning systems in their universities. Again, it must be noted that management should encourage the use of traditional approach and the e-learning system thus promoting blended learning in universities. This makes it easy for the change to be adopted since it will be a gradual approach until lecturers are fully familiar with the system. Technologists, education and curriculum developers in learning need to ensure that e-learning interfaces are user-friendly by having active participation by lecturers and their students to ensure effectiveness and efficiency of the system. Again, the Zimbabwean State Universities should use those lecturers with experience in e-learning technology to assist those without prior knowledge and experience of e-learning system. These eventually would encourage change in attitude, beliefs, behaviour, perceptions and habits of lecturers and quality teaching and results will be realised as a result.

Further Research

Further studies may focus their attention on extending the TAM by adding other predictive factors since this study merely applied the TAM constructs as defined by Davis (1989). Again, this research mainly focused on selected universities, future researches may consider all state universities by applying TAM for the sample will

have increased. Again, prospective researches may consider on the preparedness of lectures by examining the effect of their qualifications, gender, academic position and age.

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