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Determinants of Learning Management System (LMS) Adoption by University Students for Distance Learning

Yohane Soko^{1,*}, Mubanga Mpundu², Tryson Yangailo¹

¹University of Zambia, Zambia

²University of the Western Cape, South Africa

*Correspondence: E-mail: ayoso2003@gmail.com

ABSTRACT

Gone are the days when face-to-face teaching was the only dominant way of delivering education to learners worldwide. The advent of ICT has enabled the provision of enriched online learning experiences. Since the beginning of 2020, the role of ICT in education has been highlighted globally and in Zambia due to the lockdown to counter the spread of the coronavirus. In response to the COVID-19 pandemic, public and private universities in Zambia quickly developed and expanded online learning to ensure continuous education for learners. In this context, a study of the determinants of learning management systems was designed and implemented. The study collected primary data from two public and five private universities in Zambia. The study tested twelve hypotheses using a novel structural equation modelling approach using SPSS Amos 24 and SPSS 26 software. The theoretical basis of the study was a modified unified theory of technology acceptance and use model. The results of the study indicated that performance expectancy and facilitating conditions had statistically insignificant influences on behavioural intentions to use learning management systems. Effort expectancy, social influence and hedonic motivation positively influence behaviour intentions. Facilitating conditions, behavioural intentions and course evaluation positively influence actual LMS use. However, instructor characteristics and course design negatively influence actual LMS use. Finally, course evaluation has a negative effect, while course design has a positive effect on performance expectancy. The study contributes to the literature by providing information on how to strengthen e-learning. It is recommended that the government of Zambia should provide an enabling environment for online learning to flourish. Universities should adopt convenient and easy-to-use learning management systems.

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1. INTRODUCTION

The COVID-19 pandemic caught the education sector off guard, especially in developing countries. Teaching students face-to-face in a physical classroom environment was not possible. Most educational institutions were closed and students were forced to stay at home to reduce the spread of the coronavirus. Sarfraz et al. (2022) claim that 191 countries experienced nationwide school closures, affecting nearly 1.6 billion students and at least 63 million teachers worldwide. The decline in COVID-19 cases led to the lifting of the lockdown, which would have allowed students to return to school. However, parents were reluctant to allow their children to have direct interactions between teachers and students and the students themselves, which led to the courses being offered in a blended form (Nuankaew & Nuankaew, 2021). Zambia, like other countries, was negatively impacted by national and global COVID-19 school closures. Both public and private universities in Zambia adapted to the circumstances and started offering online programmes to ensure continuity of education.

It has long been argued that education determines the economic well-being of a country and its citizens. All developed countries today have one thing in common: high investment in human capital. In general, education increases the human capital of the labour force, which has a direct impact on increasing labour productivity. Additionally, education promotes the spread of knowledge required to comprehend and assimilate new information as well as to use newly created technologies from others, all of which enhance economic growth. In addition, education increases a country's innovative capacity to generate new technologies, products and processes that enhance economic growth. Education, as embodied in human capital, helps explain trade patterns between countries (Gruzina et al., 2021). Developed countries produce knowledge-intensive goods and services that keep them competitive in the global marketplace, in part because of their educated workforce (Ozturk, 2001). Zambia has identified education as an enabler for achieving its short-, medium-, and long-term national development goals, including the Sustainable Development Goals.

The age distribution indicates that 46% of the population is below 15 years of age and about 80% of the population in Zambia is below 35 years of age. The impact of the age distribution on education is enormous, as more resources are needed to provide adequate education to the young population, starting with early childhood education. It has been noted that access to education in Zambia has taken the form of a pyramid where several thousands of students enter the basic education system and secondary school can only accommodate 40% of the secondary school-age population due to limited resources such as school infrastructure (desks, classrooms, boarding), teaching and learning materials and teachers. Similarly, about 8% of basic education students have access to public universities.

The drive towards a knowledge-based economy has led both developed and developing countries to invest heavily in information and communication technologies to improve the delivery of goods and services. In addition, COVID-19 provided countries with a rationale for increasing the use of technology in the education sector to continue to deliver curricula virtually, as face-to-face delivery of education was not possible during the early stages of the pandemic. Both private and public higher education institutions adapted and began to offer their courses and programmes online, in addition to traditional face-to-face delivery.

Zambia formulated its first information and communication technology (ICT) policy in 2006, which includes an ICT policy for education that highlights how ICT would enhance the delivery of distance education. Specifically, the policy recognises that ICT would improve and expand access to education, training and research facilities through the introduction and use

of electronic-based distance education, training and learning systems in the Zambian education system to complement and supplement residential education and training.

Despite this global trend of diversifying the delivery of education through online mechanisms, it is not yet known whether students are making full use of their learning management system (Al-Mamary, 2022). Therefore, this study answers this question which has never been researched in Zambia. The study uniquely answers this question using a novel structural equation modelling methodology. The results of the study will enrich the educational discourse in Zambia as the 2006 ICT policy is soon to be implemented and reviewed.

Specifically, the study answers the following questions:

- (i) Does social influence, effort expectancy, performance expectancy, facilitating conditions, and hedonic motivation impact behavioural intention to use a learning management system?
- (ii) Does course design, and course assessments impact performance expectancy and actual use of a learning management system?
- (iii) Does instructor characteristics and facilitating conditions impact the adoption of a learning management system?

The study modified the extended Unified Theory of Acceptance and Use of Technology (UTAUT2) model to meet the research objectives. In its complete form, the UTAUT2 model contains nine core constructs of intention and technology usage. These are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Hedonic Motivation (HM), Price Value (PV), Habit (HT), and Facilitating Conditions (FC), which affect the Behavioural Intention (BI) to use technology (UB) (Masimba & Zuva, 2021). Hedonic motivation, price value, and habit are the three key constructs that explain the consumer's behaviour in the use of technology. Individual differences, namely: name, age, gender and experience, are hypothesised to moderate the effects of these constructs on behavioural intention and technology use (ibid). Unlike earlier models, the UTAUT2 inclusion of price value, hedonic motivation and habit has increased the predictive ability to explain the behavioural intentions of consumers to use technologies. The detailed explanation is in **Figure 1**.

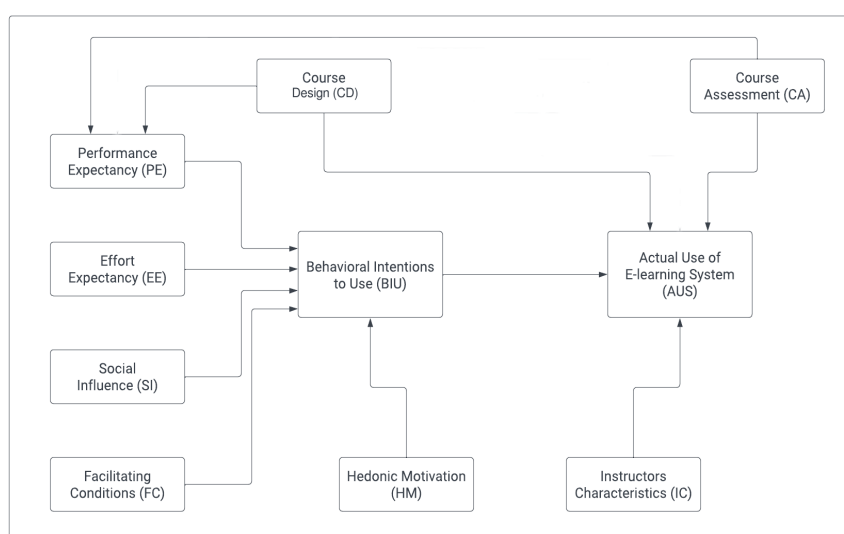


Figure 1. Study's conceptual framework. The figure was modified from Almaiah and Alyoussef (2019).

However, to meet the study's objectives, the UTAUT2 has been modified where age, gender and experience as moderating variables have been excluded due to asymmetrical

distribution (Almaiah & Alyoussef, 2019). Further, habit and price value constructs have also been removed because they are not useful to the research objectives. Three new constructs have been introduced in the modified model: course design, course assessment and instructor characteristics. Almaiah and Alyoussef (2019) believe that including these variables in the UTAUT2 base model increases the percentage of the explained variance of the behavioural intentions to adopt a learning management system in the education sector.

2. METHOD

2.1. Modelling Approach

The study adopted structural equation modelling to test the research hypotheses. The structural model examines the hypothesised dependencies based on path analysis, while the measurement model quantifies latent and composite variables and provides the reliability and validity of latent construct measures due to their complexity (Fan et al., 2016). Structural equation modelling follows five distinct steps: model specification, identification, parameter estimation, model evaluation and model modification (Fan et al., 2016). In addition, the study followed a reflective mechanism that considers latent unobserved constructs to cause the measured variables, such that changes in the measured variables in the model manifest changes in the latent constructs.

2.2. Research Hypotheses

Venkatesh et al. (2012) define performance expectancy as 'the extent to which using a technology will provide benefits to consumers in performing certain activities'. Similarly, in this study, performance expectancy is understood as the extent to which students believe that using a learning management system will enable them to achieve their educational goals. Previous research on the impact of performance expectancy on the intention to use a learning management system has been positive and statistically significant (Raman & Don, 2013; Zwain & Haboobi, 2019).

H1: Performance expectancy positively influences behavioural intention to use a learning management system.

Venkatesh et al. (2012) understand effort expectancy as 'the degree of ease associated with the use of technology by consumers'. In this study, effort expectancy is defined as the extent to which students perceive the learning management system to be user-friendly. Previous studies have supported the positive relationship between effort expectancy and behavioural intention. One such study was conducted by Eneizan et al. (2019), who investigated customer acceptance of mobile marketing in Jordan. However, other studies have failed to support the statistical significance of effort expectancy on behaviour intentions, including studies by Zwain and Haboobi (2019), Wu and Wu (2020). Since e-learning is still in its infancy in Zambia and most developing countries, effort expectancy is expected to be a significant positive factor influencing behavioural intention to use learning management systems.

H2: The effort expectancy positively impacts the intention to use the learning management system.

Social influence, in the context of the Unified Theory of Technology Acceptance and Use, is defined as "the extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology" (Venkatesh et al., 2012). It is the real or imagined pressure that students face from their family members, peers and society to use the LMS. Research has confirmed a positive correlation between social pressure and technology adoption (Raman & Don, 2013; Zwain & Haboobi, 2019; Eneizan et al., 2019).

H3: Social influence positively influences behavioural intention to use a learning management system.

Facilitating conditions are enablers that support individuals to use the technologies (Venkatesh *et al.*, 2003). They are "consumers' perceptions of the resources and support available to perform a behaviour" (Venkatesh *et al.*, 2012). Facilitating conditions are physical or environmental conditions that facilitate or hinder students' access to and use of learning management systems. In this research, facilitating conditions are understood to include the availability of reliable electricity to power computers, training on how to use the learning management system, a strong internet to facilitate connectivity between computers, affordable computers and internet data, the ability to use computers, navigate successfully through the learning management system, and the availability of time to study. A positive correlation has been found in empirical studies, including those conducted by Kamalaseena and Sirisena (2021), who investigated elements impacting the adoption of online learning by tertiary learners in Sri Lanka. Similarly, facilitating conditions have a positive impact on the use of eLearning systems.

H4a: Facilitating conditions positively impact the behaviour intention to use the learning management system.

H4b: Facilitating conditions positively affect the use of the learning management system.

Venkatesh *et al.* (2012) extended the Unified Theory of Technology Acceptance and Use to include hedonic motivation, which means 'the enjoyment or satisfaction that comes from using a technology'. This research explores whether a learning management system provides enjoyment when communicating and accessing educational materials and information. Since the extension of the model, research findings have been mixed, with some findings supporting hedonic motivation (Raman & Don, 2013; Eneizan *et al.*, 2019; Wu & Wu, 2020) and others not (Zwain & Haboobi, 2019).

H5: Hedonic motivation positively impacts intentions to use a learning management system.

The quality of course design is judged based on four-course design features: organisation and presentation, learning objectives and assessment, interpersonal interaction, and use of technology (Almaiah & Alyoussef, 2019; Zilinskiene, 2022). It has been recommended that the design of online learning courses should be simple enough for learners and that poorly designed online courses distract and demotivate learners (McGee & Reis, 2012). Therefore, well-designed online courses promote the use of learning management systems (Mtebe & Raisamo, 2014). The hypotheses that course design positively influences performance expectancy and that course design also positively influences learning management system use were supported in a study that examined the impact of lecturer characteristics, course content support, learning assessment and course design on actual learning system adoption (Almaiah & Alyoussef, 2019). The hypothesis that the quality of course design positively influences the use of learning management systems was supported in a study that examined the success of learning management systems in tertiary education in sub-Saharan Africa (Mtebe & Raisamo, 2014).

H6a: Course design positively affects the use of the learning management system.

H6b: Course design has a positive effect on performance efficiency.

Susana *et al.* (2015) argue that learning management systems are web-based learning platforms that support the presentation of information, presentation of course materials, assessment of student work, communication with lecturers and peers, submission of assignments and support for two-way learner discussions between users. Course assessment includes the administration of quizzes, tests, exams and assignments within the learning management system platform (Almaiah & Alyoussef, 2019). Learners also receive feedback

on grades and quiz answers through the same learning management system. Naturally, the learners are compelled to use the learning management system to take a test, exam or quiz and to write and submit the assignment, as the course assessment is essential to measure the learning objectives (Wright, 2003). The empirical study by Almaiah and Alyoussef (2019) found that the course assessment has a positive impact on the actual use of the learning management system and performance expectations.

H7a: Course assessment has a positive impact on the use of a learning management system

H7b: Course assessment has a positive effect on the performance expectancy

The attitude of an instructor is important in the e-learning environment as it can motivate and encourage learning, and it has been shown that instructor-student interaction can reduce dissatisfaction caused by technological glitches and lack of experience with technology (Aloulou & Grati, 2022). Several studies have identified the characteristics of instructors that facilitate online learning, including enthusiasm in teaching, ability to motivate students to use the e-learning system, instructor's ability to use the system effectively, instructor's ability to inspire students to participate in the online group discussion forum, and instructor's teaching style (Alhabeeb & Rowley, 2018). An empirical study by Almaiah and Alyoussef (2019) supported the hypothesis that instructor characteristics positively affect the actual use of the learning management system.

H8: Instructor characteristics positively influence the actual use of the learning management system

Behavioural intention is defined as an individual's subjective probability of performing a behaviour. The unified theory of technology acceptance and use proposes a positive correction between behavioural intention and actual technology use. Several empirical studies have confirmed this relationship, that behavioural intention directly affects actual technology use (Mahande & Malago, 2019; Kamalaseena & Sirisena, 2021). The study collected data on behavioural intentions and the actual use of unobservable constructs.

H9: Behavioral intention positively affects the use/adoption of a learning management system.

2.3. Study Design

The study collected and used primary data to test hypotheses.

2.3.1. Study site

Students enrolled in open and distance learning at the tertiary level in public or private universities in Zambia constituted the sampling frame for the study. Students eligible for the study are those who reside in urban or rural areas of Zambia or any other country in the world as long as they are enrolled in an accredited university in Zambia and are pursuing their education using an online platform to access learning materials, answer questions, submit assignments, access tests and exams, submit tests and exams, engage in online group discussions, access their grades, attend live sessions, and access the online library, among others. Technical colleges are part of tertiary education but were excluded from the study as the focus was on universities offering bachelor, master and doctoral programmes. Students who are legally considered to be receiving a face-to-face university education were excluded from the study because their education does not include the use of a learning management system, which is the focus of the research in this adoption study. However, students benefiting from blended learning were eligible for the study as they use learning management systems. In addition, all non-students, such as lecturers and school administrators, were excluded from participating in the survey.

2.3.2. Data analysis

The gender of the respondents is shown in **Table 1**. In terms of sex disaggregation, 58% of the respondents were male, and 42% were female.

Table 1. Sex of the respondents.

Sex	Total	Percentage
Male	240	58
Female	177	42
Total	417	100

The mode of learning is shown in **Table 2**. The study was interested in the students pursuing either 100% online learning or blended learning. About 74 % of the respondents pursued 100% online studies, while the remainder pursued blended learning. Slightly over 50% of undergraduate students reported to be pursuing blended learning.

Table 2. Mode of learning.

Mode of learning	Undergraduate	Masters	PhD	Total	Percentage
100% online	56	240	14	310	74
Blended	54	44	9	107	26
Total	110	284	23	417	100

2.4. Measurement Model

2.4.1. Model fit indices

Table 3 shows the model fit analysis. All specified model fit indices met their cut-off criteria, which means that the estimated covariance matrix is a close representation of the sample data, i.e. the hypothesised model fits the sample data well (see <https://www.youtube.com/watch?v=5eD8tJUPIHYandt=201s>). In other words, the items measure the corresponding latent constructs of the study well.

Table 3. Model fit indices. The table was adopted from Zainudin in SEM made simple from MPWS Publisher

Fit indices	Criteria	Initial level	Adjusted level
Chi-Square P value	Insignificant	0.0000	0.0000
χ^2 (chi-square)/df (degrees of freedom)	≤ 3	2.314	1.607
Goodness of Fit Index (GFI)	≥ 0.90	0.852	.921
Comparative Fit Index (CFI)	≥ 0.90	0.907	.970
Tucker-Lewis Index (TLI)	≥ 0.90	0.893	.963
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08	0.057	0.039
Standard Root Mean Square of Residuals (SRMR)	≤ 0.08	0.071	0.039

2.4.2. Convergent validity

Convergent validity was achieved in two ways. The first approach used factor loadings to assess convergent validity. For each latent construct, the items were examined for factor loadings. All factor loadings for the items in the fitted model were high and statistically significant at $p < 0.001$. Convergent validity was also assessed using the average variance extracted. Luarn and Lin (2005) postulate that an average variance extract of ≥ 0.5 implies the validity of the individual items and the construct.

2.4.3. Discriminant validity

Discriminant validity was assessed using the Fornell and Larcker criterion. [Fornell and Larcker \(1981\)](#) argued that discriminant validity is achieved when the square root of the average variance extract of a latent variable is greater than its correlation with the other constructs in the study. In the present study, the average variance extracted values along the diagonal were greater than the squared correlations obtained between the constructs. Thus, the measurement model meets the conditions of discriminant validity. The detailed information is in **Table 4**.

Table 4. Fornell and Larcker test results.

	FC	SI	PE	IC	EE	HM	BI	AU	CA	CD
FC	0.805									
SI	0.335	0.823								
PE	0.574	0.541	0.712							
IC	0.381	0.142	0.218	0.826						
EE	0.804	0.448	0.792	0.401	0.716					
HM	0.577	0.497	0.684	0.284	0.690	0.779				
BI	0.587	0.482	0.672	0.407	0.741	0.699	0.852			
AU	0.424	0.168	0.383	0.153	0.427	0.387	0.465	0.775		
CA	0.528	0.260	0.541	0.373	0.672	0.469	0.498	0.541	0.834	
CD	0.656	0.408	0.604	0.451	0.806	0.632	0.672	0.595	0.805	0.753

2.4.4. Reliability test

The study measured reliability using Cronbach's alpha and composite reliability. Composite reliability indicates the reliability and internal consistency of a latent construct - the cut-off point of composite reliability was at least 0.6 ([Zainudin, 2015](#)). The study met the condition of composite reliability, with a minimum composite reliability of 0.755. The detailed information is in **Table 5**.

Table 5. Reliability test results.

	Cronbach Alpha	CR	AVE
FC	0.770	0.785	0.649
SI	0.860	0.863	0.678
PE	0.720	0.755	0.507
IC	0.802	0.809	0.682
EE	0.753	0.759	0.512
HM	0.841	0.819	0.606
BI	0.876	0.887	0.726
AU	0.790	0.818	0.600
CA	0.817	0.820	0.696
CD	0.845	0.839	0.567

Cronbach Alpha also measures the internal consistency and reliability of each construct and helps to test whether a collection of items measures the same construct (see <https://statisticsbyjim.com/basics/cronbachs-alpha/>). The Cronbach Alpha cut-off value adopted for this study was 0.7. The minimum Cronbach Alpha recorded for the latent constructs was 0.753 (effort expectancy), indicating the existence of internal consistency and reliability.

2.4.5. Normality test

Covariance-based structural equation modelling requires that the data is normally distributed (Zainudin, 2015). Data is normally distributed when it follows a bell-shaped curve, where the centre of the curve has the highest frequencies of values and the frequencies decrease towards the two extremes. Structural equation modelling uses general least squares or maximum likelihood to estimate model parameters, which require continuous and normal data. Non-normal data would invalidate tests such as goodness of fit as the chi-square would be inflated and standard errors of parameter estimates would be underestimated. A normality test was performed within the AMOS software. Normality was assessed separately for each latent construct. It is advisable to test for normality before analysing the structural model. When the sample size is greater than 200, a skewness of +/- 3 implies normality (see <https://www.youtube.com/watch?v=5eD8tJUPIHY&t=201s>). Similarly, the kurtosis values can be used to assess normality. A kurtosis of +/-10 implies the normality of the underlying data. Both skewness and kurtosis are within acceptable ranges for normality.

2.5. Structural Model

The study tested twelve hypotheses. The detailed information is in **Table 6**.

Table 6. Hypothesis testing results.

Hypothesised model	Hypothesis	Estimate	S.E.	C.R.	P-value	Remark	
BI <---	PE	H1	-0.092	0.136	-0.672	0.502	rejected
BI <---	EE	H2	0.846	0.199	4.261	***	accepted
BI <---	SI	H3	0.100	0.051	1.979	0.048**	accepted
BI <---	FC	H4a	-0.192	0.127	-1.517	0.129	rejected
AU <---	FC	H4b	0.147	0.088	1.677	0.094*	accepted
BI <---	HM	H5	0.340	0.084	4.063	***	accepted
AU <---	CD	H6a	-0.752	0.366	-2.056	0.040**	accepted
PE <---	CD	H6b	2.145	0.376	5.708	***	accepted
AU <---	CA	H7a	1.178	0.350	3.366	***	accepted
PE <---	CA	H7b	-1.754	0.410	-4.279	***	accepted
AU <---	IC	H8	-0.315	0.090	-3.516	***	accepted
AU <---	BI	H9	0.313	0.084	3.707	***	accepted

Note: ***P value is statistically significant at 1%, **P value is statistically significant at 0.5%, *P value is statistically significant at 0.1%

3. RESULTS AND DISCUSSION

3.1. Performance Expectancy

The research results show a negative and statistically insignificant relationship, meaning that achievement expectancy does not influence behavioural intentions among university students in Zambia. This finding is consistent with Hunde *et al.* (2023) study of behavioural intentions to use e-learning among health science students in Ethiopia. In addition, Al-Mamary (2022) and Haron *et al.* (2020) also found an insignificant relationship between performance expectancy and behavioural intentions to use technology. On the contrary, a positive relationship between performance expectancy and behavioural intentions to use the learning management platform when analysing the acceptance of Canvas e-learning in one of the universities in Hong Kong. Raman *et al.* (2014) study examined the use of a learning management system using a unified theory of acceptance and use technology model among

postgraduate students in Malaysia, and found a positive relationship between performance expectancy and behavioural intentions to use a learning management system. The literature has shown that performance expectancy is the most important factor in technology acceptance theories. However, the current study found that performance expectancy was unimportant in explaining intentions to use learning management systems among university students in Zambia.

3.2. Effort Expectancy

The research findings reveal a statistically significant positive relationship between effort expectancy and behavioural intention to use the learning management system in Zambia. The hypothesis was supported, implying that learning management systems that are easy to use will positively influence their adoption by university students in Zambia. Several studies have shown similar results. For example, [Bansal et al. \(2022\)](#) applied the unified theory of acceptance and use of technology to the use of learning management systems in India and found a positive influence of effort expectancy on behavioural intentions to use learning management systems. Similarly, [Abbad \(2021\)](#) applied the unified theory of acceptance and use of technology to the use of e-learning systems in Jordan. He found that effortfulness positively influenced behavioural intentions to use e-learning, especially the learning management system Moodle. Furthermore, [Alshehri et al. \(2020\)](#) found that effort expectancy positively influenced students' intentions to use the learning management system in higher education in Saudi Arabia. The current study suggests that higher education institutions in Zambia should consider implementing learning management systems that are easy to use to attract more students to use and adopt them.

3.3. Social Influence

The research findings show a positive and statistically significant relationship between social influence and behavioural intention to adopt a learning management system among university students in Zambia. Higher education institutions in Zambia can increase the adoption of e-learning by creating awareness through social media, university websites, and radio and television advertisements that may be necessary for students and their social influencers ([Al-Mamary, 2022](#)). The research result is consistent with the findings of previous studies. [Ikhsan et al. \(2021\)](#) found a positive and statistically significant relationship between social influence and behavioural intention to use mobile learning management systems in Indonesia. A positive and statistically significant relationship between social influence and behavioural intentions to use e-learning systems in the United Arab Emirates while studying the factors affecting students' acceptance of e-learning systems in higher education using the structural equation modelling method and the unified theory of acceptance and use of technology model.

3.4. Facilitating Conditions

Facilitating conditions are physical or environmental conditions that facilitate or hinder students to access and use the learning management system. In this study, facilitating conditions were conceptualized to include the availability of reliable electricity to power computers, training on how to use the learning management system, a strong internet to facilitate connectivity between computers, affordable computers and internet data, the ability to use computers, successfully navigate the learning management system, and the availability of time to study. However, three items were dropped during the confirmatory factor analysis process: internet, electricity and getting help from others.

Facilitating conditions have a positive effect on behavioural intention to use the learning management system. This study failed to support the hypothesis as the results were negative and statistically insignificant between facilitating conditions and behavioural intention to use the learning management platform among university students in Zambia. This may be due to the failure or delay on the part of higher education institutions and policymakers in providing reliable and timely technical support to students or training them in the use of learning management systems (Al-Mamary, 2022). Examples of previous studies that failed to find a statistically significant relationship between enabling conditions and behavioural intentions to use technology include Raza *et al.* (2021) found a statistically insignificant influence of facilitating conditions on behavioural intentions to use learning management systems in Pakistan in social isolation and acceptance of learning management systems during the time of the COVID-19 pandemic study. Al-Mamary (2022) and Alshehri *et al.* (2020) also rejected the hypothesis that facilitating conditions positively affect behavioural intentions to use a learning management system. In contrast, several previous studies accepted the hypothesis that antecedent conditions positively influence behavioural intentions to use e-learning platforms, such as Bansal *et al.* (2022), Reyes-Mercado *et al.* (2022), Abbad (2021) and Haron *et al.* (2020) research.

Facilitating conditions positively influence the use of the learning management system. The study found a positive and significant relationship between facilitating conditions and the use of learning management systems among university students in Zambia. The result of the study supports the research conducted by (Al-Mamary, 2022; Bansal *et al.*, 2022; Ikhsan *et al.*, 2021; Alshehri *et al.*, 2020). The availability of resources, information, knowledge and skills to use the learning management system will determine the actual use and adoption of the learning platform among university students in Zambia. In general, university students will be motivated to use a learning management system if they believe that the technological infrastructure is in place to support its use (Al-Mamary, 2022).

3.5. Hedonic Motivation

Hedonic motivation has a positive effect on intentions to use a learning management system. Venkatesh *et al.* (2012) extended the Unified Theory of Technology Acceptance and Use to include hedonic motivation, which means 'the fun or pleasure derived from using a technology'. This research investigated whether learning management systems provide enjoyment when used by university students to access educational materials and information. The research result indicates a positive and statistically significant relationship between hedonic motivation and behavioural intentions to use a learning management system, supporting the hypothesis. This means that the higher the pleasure and enjoyment of using the learning management system, the higher the probability of accepting such an e-learning platform (Sitar-Tăut, 2021). The results of the study are consistent with the findings of previous studies. Bansal *et al.* (2022), Zacharis and Nikolopoulou (2022), Hartelina *et al.* (2021), Tarhini *et al.* (2017), and Nguyen *et al.* (2014) found a positive correlation between hedonic motivation and behavioural intention to use an e-learning management system.

3.6. Course Design

Course design has a positive effect on the use of the learning management system. McGee and Reis (2012) argue that the design of an e-learning course should be simple enough for learners, and that complicated course designs demotivate and distract learners.

Organisation and presentation, learning objectives and assessment, interpersonal interactions and use of technology are four key design features that determine whether the

course is poorly designed (Almaiah & Alyoussef, 2019; Zilinskiene, 2022). In this study, we found a negative and statistically significant relationship between course design and the continued use of learning management systems among university students in Zambia. The finding may imply that most course designs delivered through e-learning platforms were complex, which negatively affected their learning outcomes, or lacked key design features that facilitated learning and interactions with other learners and instructors. A well-designed course increases interaction between learners and instructors, and among learners themselves, which facilitates the use of a learning management system (Haron et al., 2020). Therefore, instructors need to develop the necessary competencies, skills and time to design effective e-learning materials (Aldowah et al., 2019). Furthermore, Haron et al. (2020) and Almaiah and Alyoussef (2019) found a positive influence of course design on the actual use of technology. A well-designed e-learning course increases the acceptance and success of a learning management system.

The course design has a positive effect on performance efficiency. The research result supports the hypothesis. The course design has a positive and significant effect on performance efficiency at the 1% level of significance. Almaiah and Alyoussef (2019) tested the same hypothesis in Saudi Arabia and explored the impact of course design, course content, course evaluation and instructor characteristics on the actual use of learning management systems and found a statistically significant positive relationship between course design and performance expectancy.

3.7. Course Assessment

Course assessment has a positive impact on the use of a learning management system. Course assessment involves the administration of quizzes, tests, exams and assignments within the learning management system platform. Learners also receive feedback on their grades and quiz answers through the same learning management system (Almaiah & Alyoussef, 2019). The study found a positive and statistically significant relationship between course assessment and the use of the learning management system in Zambia. The learning management system allows for the creation of quizzes and tests with programmed answers, so that as soon as learners submit their answers, they immediately receive their results and corrections for questions they got wrong, and this facilitates learning and adoption of the learning management system. Similarly, this gives the teacher more time to focus on engaging students rather than marking quizzes and tests.

Course assessment has a positive effect on performance expectancy. The research shows a negative but statistically significant correlation between course evaluation and performance expectancy. The finding suggests that learners were given more tests, quizzes and other performance assessments that put pressure on learners. The results of the study do not support this hypothesis. A recent study that explored the relationship between course assessment and performance expectancy established a positive and statistically significant relationship between these variables (Almaiah & Alyoussef, 2019).

3.8. Instructor Characteristics

Instructor characteristics positively influence the actual use of the learning management system. Aloulou and Grati (2022) claim that instructor behaviour can promote technology adoption and diffusion, and it has been shown that instructor-student interaction can reduce dissatisfaction caused by technological glitches and lack of experience with technology. Attitudes towards a learning management system, computer knowledge and anxiety, computer efficacy and instructor competence as key instructor characteristics that have been

studied in the context of e-learning adoption. Empirical studies have identified instructor characteristics that facilitate online learning, including enthusiasm for teaching, ability to motivate students to use the e-learning system, instructor ability to use the system effectively, instructor ability to inspire students to engage in an online group discussion forum, and instructor teaching style (Alhabeeb & Rowley, 2018). Conversely, instructor behaviour can also hinder the adoption of online learning if instructor behaviour demotivates learners to use learning management systems. The current study found a negative and statistically significant relationship between instructor characteristics and the actual use of a learning management platform among university students in Zambia. This implies that instructor behaviour may partly explain the sub-optimal adoption of online learning by university students in Zambia. The studies by Chatti and Hadoussa (2021) and Almaiah and Alyoussef (2019) support the hypothesis that instructor characteristics positively influence the actual use of the learning management system.

3.9. Behavioral Intentions

Behavioural intention positively influences the use/adoption of a learning management system. The study shows a positive and statistically significant relationship between behavioural intention to use a learning management platform and its continued use. Previous studies that support the current findings include Reyes-Mercado *et al.* (2022) found a positive correlation between behavioural intentions and actual use of an e-learning platform in the study "Adoption of digital learning environments during the COVID-19 pandemic: merging technology readiness index and UTAUT model". Using the Unified Theory of Acceptance and Use of Technology model to study digitisation in education in India, Bansal *et al.* (2022) found a positive and statistically significant influence of behavioural intentions on actual technology use. In Pakistan, Raza *et al.* (2021) investigated the social isolation of e-learning management platform adoption during the COVID-19 pandemic. The study found a positive and statistically significant impact of intentions to use the e-learning management platform on actual usage behaviour. Furthermore, the factors that influence students in higher education institutions in the United Arab Emirates and found a positive and significant impact of behavioural intentions on the actual use of the learning management system.

4. CONCLUSION

The current study was the first to examine the adoption of learning management systems among university students in Zambia using a novel structural equation modelling approach. The results of the study have interesting policy implications. The Government of Zambia, through the Ministries of Finance, Basic Education, Higher Education and Information, has a specific role to play in addressing supply and demand constraints and capitalising on opportunities. Education is a cornerstone of any country's socio-economic development and is a human right.

The scope of the study was limited to learners from seven universities. This limits the generalisability of the findings to other universities; on the other hand, a deeper understanding could be gained if a study targeted learner, trainers, school administrators and policymakers. A mixed-method approach could have highlighted the reasons for certain behaviours and explained the findings in more depth.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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