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Low uptake of e-learning at Mzumbe University: Answers and perceptions from students

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ABSTRACT

The purpose of this study is to investigate the issue of low e-learning uptake at Mzumbe University by focusing on the answers and perceptions of students in relation to the e-learning supporting environment, which includes infrastructure, technical support, Internet connectivity, and perceived advantages of using e-learning. Data for this study were gathered using a questionnaire instrument under a quantitative approach. With a total response rate of 80.33%, 241 out of 300 respondents including undergraduate students were considered. The PLS-SEM and CFA were used for data analysis. The results of this study suggest that Mzumbe University students have a negative perception of the use of e-learning. The research also shows that an inadequate availability of Internet connections, low-quality LMS materials and contents, a lack of proper e-learning user training, and slow e-learning system accessibility are all contributing factors to the low uptake of e-learning. These variables were discovered to have a considerable impact on the uptake of e-learning at Mzumbe University, as demonstrated by the model in Figure 2. The results of this study revealed negative perceptions on the use of e-learning at Mzumbe University, which few studies have looked into. It also looked at the causes for Mzumbe University's low uptake of e-learning, and they can be applied to other institutions with comparable characteristics. Such factors consist of unavailable Internet connections, low LMS content quality, inadequate e-learning system training, and slow e-learning system accessibility. Several relevant research studies did not look into these causes of low uptake. This study recommends that significant reformulating of ICT policy to comply with new guidelines or procedures in order to successfully implement e-learning as a cutting-edge technological innovation for services linked to student teaching, learning, and administration is inevitable.

Keywords: *ICTs; E-learning Uptake; Low Uptake; Student Perception; PLS-SEM*

INTRODUCTION

The last decade has witnessed a steady increase in adoption of e-learning among educational institutions across the globe (Palvia et al., 2018). Even though the use of e-learning as a mode of instruction has no bearing on student performance as measured by grade (Ni, 2013), there are still many potential advantages that these institutions can enjoy through the use of e-learning (Njenga & Fourie, 2010).

One obvious advantage of using e-learning is the ability to reach time- and place-bound students. During the COVID-19 pandemic, for example, there was an unprecedented surge in the rate of e-learning adoption by universities across the globe. Many universities switched to online delivery to deal with the strict restrictions on movement and interaction imposed by their respective governments (Zarei & Mohammadi, 2022; Ndibalema, 2022; Egielewa, Idogho, Iyalomhe, & Cirella, 2022). Additionally, studies have shown there is a link between students' motivation to study and the use of e-learning as a means of instruction and assessment. Elshareif & Mohamed (2021), for example, investigated the link between key aspects of e-learning systems (such as teaching materials and assessment) and students' motivation to learn and found that a strong correlation exists between students' motivation and electronic materials as well as electronic assessments.

In another study, Yahiaoui et al., (2022) analysed the impact of e-learning systems on student motivation and outcomes. Specifically, the study used a mixed-method approach to investigate the link between student motivation aspects such as attention, relevance, confidence, and satisfaction and the use of e-learning systems. The results of this study show that these aspects are significantly enacted by the use of e-learning systems.

Because of its considerable potential in higher education, e-learning has been a subject of intense research for many years. Due to its multifaceted nature, different aspects of e-learning have been extensively studied, such as:

- *adoption/implementation and its challenges* - Mutisya & Makokha (2016); Asamoah (2019); Morgan (2020); Adedoyin & Soykan (2020); Asamoah (2021); Ndibalema (2022); Zarei and Mohammadi (2022)
- *stakeholder (students, lecturers, and support staff) experience, acceptance, behaviour and perceptions* - Sharpe & Benfield (2005); Chang & Tung (2008); Handal, Groenlund & Gerzina (2010); Li, Duan, Fu & Alford (2012); Ros et al., (2015); Eraslan Yalcin & Kutlu (2019); Asamoah (2021); Elshami et al., (2021)
- *user experience* - Sharpe & Benfield (2005); Alqurashi (2019); Asamoah (2019); Wei & Chou (2020); Elshami et al., (2021)
- *impact/effectiveness* - Ni (2013); Mtebe & Raisamo (2014); El-Seoud, Taj-Eddin, Seddiek, Mohamed & Nosseir (2014); Noesgaard & Orngreen (2015); Mwalumbwe & Mtebe (2017); Sfenrianto, Tantrisna, Akbar & Wahyudi (2018); Pei & Wu (2019); Yahiaoui et al., (2022), and
- *cross-cutting issues* - Beaudoin (2002); Tham & Werner (2005); Njenga & Fourie (2010); Palvia et al., (2018).

Clearly, this rapid pace of research work as well as lessons learned from the COVID-19 pandemic and increasing access to technologies, such as the Internet and computing devices - mobile phones and computers, are expected to accelerate not only adoption, but also research on the different aspects of e-learning mentioned above (Guppy et al., 2022). The vast nature of the body of literature on the different aspects of e-learning can be attributed to the fact that a great majority of studies on e-learning are context-sensitive, that is, they are conducted in settings (geographical location, culture, and socio-economic conditions) that make it impractical to generalize their results to other areas such as student perception, for example. There is a large volume of literature on this aspect and researchers continue to explore this aspect to date but they focus on their own local context.

Since 2009, the interest in adoption of e-learning among universities in Tanzania has been growing steadily. Mzumbe University (MU) installed its learning management system (LMS) for the first time in 2009 which makes it among early adopters of e-learning in the country. The LMS at MU has largely been used as a platform for students to access study materials uploaded by instructors as well as a means for conducting online quizzes (Almasi, Machumu & Zhu, 2021).

The University has invested considerably in the adoption of e-learning mainly in terms of infrastructure (computers and Internet access) and training of instructors on the effective use of the LMS. Despite these efforts, the level of e-learning uptake at the University is still arguably low compared to the considerable investment made. By low uptake we mean effective use of the LMS by both students and instructors is still insignificant, that is, the impact of the LMS on the teaching and learning processes is insignificant. This observation poses the question: What is holding back uptake of e-learning at MU? Some scholars have tried to address this question from different perspectives and come up with different findings.

A recent study by Almasi et al. (2021), for example, used a quantitative approach to investigate instructors' perspectives, motivational factors, and competence in the use of the LMS at MU and found that while instructors had positive perspectives on the use of the LMS, they had average competence in designing and implementing electronic teaching and learning activities. Likewise, another study by Ghasia & Machumu (2020) revealed that despite some progress in adoption of e-learning at MU, some critical challenges still exist including poor infrastructure and lack of expertise in digital content design and production. These challenges limit the applicability of these systems (Innocent & Masue, 2020).

Students are the main stakeholders when it comes to the success of adoption and uptake of e-learning in any university. Despite this fact, existing studies that sought to establish the reasons behind low uptake of e-learning at MU seem to ignore them as they focus on instructors and infrastructure only. While some of the findings of these studies may apply to students to some extent, there are other more important factors that are specific to students; an example of such a factor is quality of learning materials, which has a direct impact on students' willingness to use an LMS. Thus, the perceptions of instructors and those of students towards use of e-learning are influenced by different factors. This study, therefore, intends to examine the problem of low uptake of e-learning at MU focusing on students' answers and perceptions in connection to the e-learning supporting environment at MU which include infrastructure, technical support, Internet connectivity and perceived benefits of using e-learning. To accomplish the aim of this study, the following are the specific research objectives:

i. To examine the perceptions of students towards e-learning uptake at Mzumbe University. This was accomplished by using questionnaires as the data collection method. SPSS software was used to analyze the data using frequency distributions and means.
ii. To establish the reasons/factors that influences the low uptake of e-learning at Mzumbe University. The data was collected through questionnaires and analyzed using partial least square structural equation modeling (PLS-SEM). The PLS-SEM was used to assess all hypotheses before developing the structural model.

RELATED LITERATURE REVIEW

In order to assess the necessity of performing this study, ascertain how it relates to the body of current information on the subject, and avoid repetition, a literature review was carried out. In this section, key concepts are defined together with relevant ideas that serve as the study's guiding principles. The section also provides an empirical evaluation of similar earlier investigations.

Empirical Review

This section looks at the empirical research on what has already been done. The primary reoccurring literary themes are the section's main focus. The section organizes information on and relevance of the major findings of the studies. These themes cover the variables that affect the adoption of e-learning and how students view it.

Reasons/Factors Influencing E-learning Uptake

The various aspects that affect how different stakeholders in the educational context perceive e-learning have been the subject of numerous studies. For instance, user perception of e-learning is influenced by how useful and simple e-learning systems, such as LMS, are seen to be by users (Nikou & Maslov, 2022). The results, however, showed that students' impressions of e-learning are not directly impacted by how well-prepared the educational institution is. The results also demonstrated that students' training in the usage of e-learning systems influences their opinions of

e-learning (Nikou & Maslov, 2022). Additionally, Benigno & Trentin (2000) noted that elements including knowledge and skills of students on using e-learning and the quality of learning materials can affect students' use of e-learning. User education on e-learning is therefore necessary to increase awareness and promote efficient uptake.

Participation in e-learning was theorized and quantitatively validated by Garavan et al., (2010). In accordance with their hypothesis, motivation to learn, general human traits (like age and social class), and features of e-learning instructional design (like content quality and learner assistance, feedback, and recognition) all influence participation in online courses. According to research by Fleming et al., (2017), technical support for e-learning, e-learning skills and knowledge, and low perceived complexity of the e-learning system are all indicators of future use and general perception of using e-learning. As a result, when creating the content for online courses, it is important to take users' needs into account.

Alqahtani et al., (2022) looked into how users perceived online learning in a classroom setting. The research revealed that system quality, service quality, and quality of life all had a positive correlation with and influence on perceived utility and usability in learning. Perceived utility and perceived simplicity of use had a beneficial impact on users' opinions of e-learning. Therefore, it would be wise to look into how perceived usefulness and usability affect how people view online learning.

Perceptions of E-learning

Personal opinions on e-learning can affect attitudes and a user's intention to utilize it in the future, according to Sun et al., (2008). The helpfulness of the service, information quality, and system quality are all various facets of e-learning quality that might affect user decisions, according to Uppal et al., (2018). Perera & Abeysekera (2022) argued that service quality had a big impact on students' "intention to use" e-learning as a way to further their education. Therefore, it is crucial to comprehensively take into consideration a number of criteria in research on students' perspectives of the adoption of e-learning.

In a similar vein, Selim (2007) claimed that a number of crucial traits play a significant effect in how students perceive online learning. The factors include instructor attitudes toward e-learning as a tool to support student learning, student motivation, technical aptitude, and technical skill. The quality of the e-course content, the kinds of technology, and the supportive atmosphere, among other factors, have an impact on students' perceptions of e-learning, according to Nikou et al. (2022). The important elements influencing learner perception, according to Anthony et al. (2020), were learner computer anxiety, e-learning course flexibility, e-learning course quality, perceived usefulness, perceived ease of use, and assessment diversity. According to Dyerek (2022), the quality of the content and materials, the restrictions on direct interaction with the lecturer, the Internet connection, and home circumstances were the most often reported drawbacks of e-learning. For instance, Dyerek (2022) contended that a few pupils had to buy or upgrade computer equipment. As a result, students' perceptions of e-learning cover a wide range of topics, including cross-cutting problems that necessitate in-depth research as well as technology, environment, user skills, and knowledge.

Theoretical Framework and Hypotheses

A theory is described in the context of a credible or scientifically appropriate set of general principles which are offered to explain phenomena (Mergel, 1998). These principles must have been noted over time and cannot be disputed by the corpus of information already in existence. Theories are immensely useful and have been used in many studies to achieve a certain set of objectives. For example, in this study, the researchers planned and carried out this study to test theories'

predictions and to develop and execute behaviors that have been promoted and supported by theories. The following theories therefore form the basis of the investigation.

System service quality (SSQ): Despite the many benefits of e-learning, some aspects including the time commitment, server or network slowness, and accessibility issues may deter students. According to DeLone & McLean (2003), students' judgments of how to use an IS are always influenced by the quality of the services that the organization offers. If the e-learning services are of poor quality, students may become unsatisfied. If a student finds the offered system to be challenging to utilize, they can be reluctant to embrace it. For instance, Perera and Abeysekera (2022) found that service quality affects students' opinions of utilizing an IS.

H1. System service quality (SSQ) has a significant effect on learners' perception to use e-learning.

Quality of learning material (QLM) is one of the elements that has an impact on how students view any IS (DeLone & McLean, 2003). For instance, it is asserted that in e-learning, the variable of quality of learning material (QLM) directly affects the perception of "perceived usage" and "real use of the system" (Nawaz & Mohamed, 2020). High-quality e-content must be created in order to inspire and encourage students to fully engage in using e-learning for education.

H2. Quality of learning material (QLM) has a significant effect on learners' perception to use e-l earning.

LMS user awareness (UA) is one of the key elements of user perception in adopting e-learning for effective uptake and efficient utilization. According to the diffusion of innovation theory (DOI) (Rogers, 2003), the entire process, including user training, should get careful consideration in the educational setting. Users must be instructed on the features and relative advantages of the available e-learning platforms and services in order to raise awareness. As a result, relative advantage, simplicity of use, and self-efficacy are evaluated as three categories of uptake that reflect user awareness. The institution would waste money, do inferior work, and fail without rigorous planning; it is further claimed (Kisanjara, 2020; Nikou & Maslov, 2021).

Similar to other cutting-edge e-learning situations, this one calls for a sizable upfront analysis, development time, and financial investment. To increase user awareness for successful e-learning uptake, additional technological infrastructure is needed, such as the usability of e-learning facilities, Internet access, and technical assistance (Gichayo & Tarus 2015). In this instance, it is advised that users have prior experience with e-learning in order for them to adopt a positive outlook and produce successful results following use. In addition, it has been found that the impression of e-learning is influenced by the availability of electronic devices that facilitate its adoption after deployment (Njenga, 2011). Two views, electronic and learning, which stress the use of electronic equipment to facilitate learning, are used to define e-learning. Electronic devices are not present, is an indication that e-learning is not being used. This assertion states that in order for colleges to adopt e-learning, they must first purchase a sufficient number of electronic equipment. On the basis of user education, Internet accessibility, and the availability of electronic devices, it is hypothesized that:

H3. User training (UT) on e-learning has significant effect on the e-learning uptake
H4. Internet connectivity (IC) has significant effect on the e-learning uptake
H5. Technical support of Users (TS) has significant influence on the e-learning uptake
H6. Availability of electronic (AoE) devices has significant influence on the e-learning uptake

E-learning platforms have some benefits, one of which is that they can make students' assessments more productive and efficient. Technology's impersonality will guarantee that pupils will adopt e-learning successfully. Additionally, the e-learning facilities and platforms should be capable of providing students with the necessary knowledge quickly and efficiently. As long as they have Internet access, students who have access to e-learning platforms can now readily interact with educational resources in a number of formats (text, graphics, sound, video on demand, etc.) from any location at any time.

They can connect with teachers and students both separately and simultaneously thanks to the availability of message boards, instant messaging, and video conferencing. They can participate in self-paced learning if the e-learning platforms and facilities are easy to use, giving them control over both the method and the subject matter of their education (Nikou & Maslov, 2021; Yacob et al., 2012). Therefore, perceived relative advantage (usefulness) and perceived ease of use both positively and significantly influence students' intention to use e-learning platforms, according to TAM theory (Davis, 1989) and Al-Okaily et al., (2020). As a result, the following is hypothesized:

H7. Perceived relative advantage (PEU) has a significant effect on learners' perception to use e-learning
H8. Ease of use of e-learning (EoU) has a significant effect on e-earning uptake

The learner or student is a crucial participant in education. Students who utilize e-learning anticipate engaging in independent study, which calls for a thorough understanding of and proficiency with the use of e-learning tools and resources (Kisanjara, 2020). Self-efficacy has been cited in a number of studies as a factor in determining readiness and awareness for e-learning adoption (Rogers, 2003). In order to promote e-learning uptake for success, the questions were created to assess students' self-efficacy, which also included their views toward using e-learning resources. Additionally, according to the UTAUT theory, a person's impression of a system's usability is described as their anticipation that utilizing it will be simple and effortless, and it significantly influences the adoption of e-learning applications (Venkatesh et al., 2003) and TAM (Davis, 1989) and it is therefore hypothesized that:

H9. Self-efficacy (SE) has a significant effect on e-learning uptake
H10. Usability of e-learning (UE) has a significant effect on learners' perception to use e-learning.
H11. Less effort (LE) in using e-learning has a significant effect on learners' perception to use e-learning
H12 Awareness (AW) of e-learning among users has significant effect on learners' perception to use e-learning.

Conceptual Framework

In order to develop the conceptual framework in Figure 1 below, concepts and variables from theories (including TAM, DOI, IS Success mode and UTAUT), empirical studies, and practice were operationalized. The conceptual framework is made up of independent variables related to e-learning perception and dependent variables related to e-learning uptake.

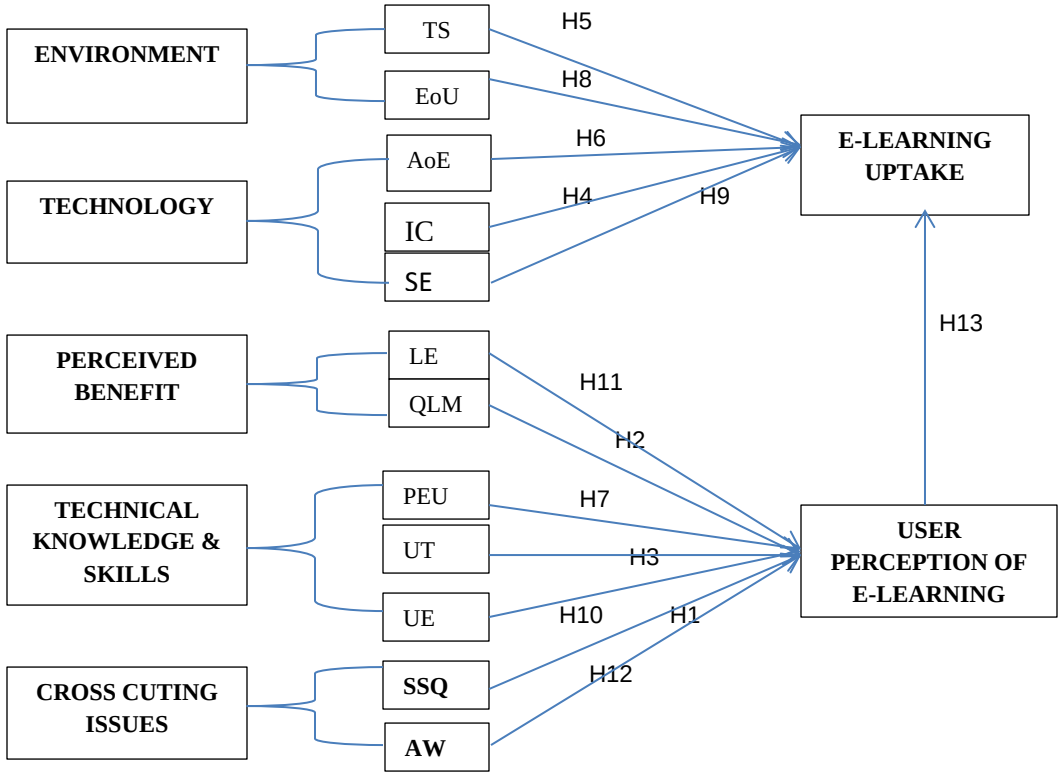

Figure 1: A conceptual Framework (Source: Literature Review)

Operationalization of Variables

The particular question types used in the data collection tools were the result of operationalizing observed variables from manifest or non-measurable variables that describe and specify how the research variables can be measured. In order to ensure the theoretical and statistical validity of the study's findings, operationalization was also carried out. Table 1 displays the operationalized variables.

Table 1: *Operationalization of Variables*

Concepts	Measured Variables	Explanations and Sources
Environmental	Technical support	Is used to describe the soft skills and knowledge that ICT specialists supply to e-learning users when they are unable to use the facilities and platforms for e-learning. (Tarus & Gichayo, 2015; Kisanjara, 2020)
	Usability of LMS	According to Venkatesh et al. (2003) and Davis (1989), a person's impression of a system's usability is defined as their anticipation that using it will be painless. This perception is important for the adoption of cutting-edge technical applications.
Technological	Availability of electronic devices	Refers to the availability of hardware, such as tablets, smartphones, laptops, and other tools, that supports and

		facilitates student learning (Perera & Abeysekera, 2022).
	Internet connectivity	An Internet Service Provider (ISP) connection is one that enables one or more computers or other pieces of hardware to communicate with one another via the vast Internet. Njenga (2011) and Chirwa (2019)
	Functionality of computer labs and related electronic devices (computer efficacy)	(Sife, 2007; Njenga, 2011; Tarus & Gichayo, 2015) Makes reference to computer labs and other electronic gadgets that are operating successfully and efficiently and those students can use to enhance learning.
Perceived Benefits	Simplify learning	Refers to the use of e-learning, which minimizes the direct interaction between teachers and students, to allow users to study whenever, wherever, and at a cheap cost. Nikou & Maslov in 2021; Wu et al., in 2012
	Quality of learning materials	According to Sun et al. (2008), Pharm et al. (2019), Nikou & Maslov (2021), it is a measure of how a technology provides its learning materials compared to the resources offered by traditional learning methods.
Knowledge & Skills of Users	Ease of use of platforms and facilities	A person's expectation that utilizing a system will be painless is known as perceived ease of use, and it is a key driver in the adoption of ground-breaking technical applications. Alqahtan et al., (2022) and (Venkatesh et al., 2003), Baji et al., (2022), Davis (1989),
	Training of users	refers to any hard and soft skills and information given to users, including students, on how to utilize the facilities and e-learning platforms provided during the learning process (Kisanjara, 2020; Njenga, 2011);
	Ability of user to use LMS	refers to users' and students' ability to use e-learning tools like LMS and other learning resources (Liao et al., 2022; Kisanjara, 2020).
Cross Cutting Issues	Quality of Services offered by e-learning	According to DeLone and McLean (1992), Perera and Abeysekera (2022), Alqahtan et al., (2022) and others, it is a measurement of how well a technology meets the needs of its users.
	User awareness of e-learning	refers to the process of educating users on the critical issues surrounding e-learning before it is implemented, such as its utility, self-efficacy, and simplicity of use (Kisanjara, 2020; Nikou & Maslov, 2021; Yacob et al., 2012).

METHODOLOGY

For this study, a questionnaire was developed to target the specified population. The questionnaire was created by three professionals, who also assessed each of its questions. Mzumbe University, the study's subject, provided consent prior to the start of data collection. Students from both undergraduate and graduate programs took part in the study. The quantitative method has been applied. In this inquiry, theoretical models were examined and the suggested hypotheses were tested using a quantitative analytical survey. To aid in the study's ability to generalize its findings, a qualitative technique was applied in addition to the quantitative one.

Sample Size and Sampling Technique

A total of 300 students from Mzumbe University were included in the study, including 150 undergraduates from ICT-related programs and 150 from business-related degrees. A response rate of 80.33% was achieved since 241 respondents actually gave data. The selection of such a sample size is justified by the fact that earlier research with a comparable design utilized samples of 100 to 500 students. As a result, this study used a sample size of 300 to establish research validity (Glenn, 1992; Sigh & Masuku, 2014).

The recommended reliable sample size should be more than 100 because the data analysis method uses structural equation modeling (Hair et al. 2014). Additionally, in order to increase generalizability and reduce bias, this study employed heterogeneity sampling techniques (such as simple random and purposive sampling). The use of non-probability sampling approaches in addition to probability sampling techniques, according to Teddlies & Yu (2007), is excellent since it captures all study-related aspects and, when utilized appropriately, results in a representative sample.

Data Collection and Analysis Techniques

SPSS was used to analyze the data collected via questionnaires. Additionally, PLS-SEM was utilized to analyze the data and assess the derived hypotheses. Construct validity analysis, convergent validity analysis, discriminant validity analysis, and structural modeling, in particular the CFA, were utilized to establish the validity and reliability of the measurement models (Hair et al., 2017). The PLS-SEM was chosen and employed in this study because, using weighted composites of indicator variables facilitates accounting for measurement error, thus making PLS-SEM superior when compared to other multivariate analysis technique like multiple regression, which is using sum scores, where each indicator is weighted (Hair et al., 2014). Further, PLS relaxes the strong assumption of common factor–based SEM (CB-SEM) that all of the co-variation between the sets of indicators is explained by a common factor (Henseler et al., 2021)

RESULTS

Perceptions of Students Towards E-learning Uptake at Mzumbe University

This subsection presents and interprets the results of the first specific objective of this study. It includes the status of the technology available for supporting the uptake of e-learning, quality of technical support, and learning material and the benefits of LMS at the university. Finally, the subsection presents the results on technical knowledge to use the e-learning system effectively.

Status of the Technology Available for Supporting the Uptake of E-learning

Results for the e-learning supporting environment (possession of electronic devices, Internet speed, availability of Internet services, and usability of the e-learning system) are shown in Table 2. As it can be seen in the results, all respondents were found to own at least one electronic device (mobile phone, tablet or personal computer) that can be used to access the e-learning system with nearly a third of respondents (28.6%) possessing more than one device. When it comes to Internet speed, the majority of respondents (77.6%) said that the Internet speed at the university is effective for accessing the e-learning system. Regarding availability of Internet services, over three quarters of respondents (75.9%) said that Internet services were not always available when they wanted to access the service. Finally, the majority of respondents (88%) said that the e-learning system used at the university is user friendly. With these results, therefore, students at Mzumbe University perceived negatively the use of e-learning due to unavailability of Internet which is the main factor significantly influencing the e-learning uptake level.

Table 2: *Perception on the status of supporting the uptake of e-learning*

Variable Measured	Frequency (N)	Percentage
Possession of Types of Electronic Devices		
One device	172	71.4
Two devices	64	26.6
Three devices	5	2.0
Total	241	100.0
Internet Speed		
Very ineffective	19	7.9
Ineffective	35	14.5
Somehow effective	139	57.7
Effective	42	17.4
Very effective	6	2.5
Total	241	100.00
Availability of Internet		
Yes	58	24.1
No	183	75.9
Total	241	100.00
Usability of LMS		
Very user friendly	3	1.2
Not user friendly	26	10.8
Average	139	57.7
User friendly	59	24.5
Very user friendly	14	5.8
Total	241	100.00

Quality of Technical Support, Learning Material and the Benefits of LMS at the University

Results for quality of technical support, accessibility of the e-learning system, benefits of the system as well as quality of learning materials in the system are shown in Table 3. Regarding technical support in using the system it was found that the majority of respondents (over 80%) were satisfied with the technical support provided. Regarding accessibility of the system, only about one third of respondents (29.5%) said they were able access the system whenever they wanted to while over

two thirds of the respondents (70.5%) said they could rarely or never access the system when they wanted to. As far as benefits of the e-learning system are concerned, the majority of respondents (82.92%) said they are aware of the potential benefits of using the e-learning system. Finally, nearly half (47.3%) of respondents were not satisfied with the quality of materials in the e-learning system. Therefore, generally the results imply that students have negative perceptions on e-learning due to low quality of LMS materials, and inaccessibility of the LMS despite being satisfied with the technical support and they are aware of the benefit of e-learning in their learning context.

Table 3: *Quality of technical support, Learning material and benefits of LMS at the University*

Variable Measured	Frequency (N)	Percentage
Technical support in using LMS		
Very unsatisfied	2	.8
Not satisfied	43	17.8
Average	119	49.4
Satisfied	69	28.6
Very satisfied	8	3.3
Total	241	100.0
Accessibility of LMS		
Never	136	56.4
Rarely	34	14.1
Average	47	19.5
Most of the time	18	7.5
Every time	6	2.5
Total	241	100.0
Benefits of LMS		
Yes	41	82.92
No	100	17.08
Total	241	100.00
Quality of learning materials (LMS resources)		
Very unsatisfied	16	6.6
Not satisfied	98	40.7
Average	86	35.7
Satisfied	39	16.2
Vary satisfied	2	0.8
Total	241	100.0

Technical Knowledge to Use the E-learning System Effectively

Results for technical knowledge to use the e-learning system effectively are shown in Table 4. Looking at these results, it is evident that that the majority of students (73%) cannot use the e-learning system effectively, whereas only 14.1% of students can use the system effectively. As far as training on the use of the e-learning system is concerned, results show that more than half of the respondents (57.7%) had not received any formal training on the use of the e-learning system. However, in the case of awareness of benefit of the learning management system (LMS), the results show that 95.83% agree that they are aware of the benefits of the LMS at Mzumbe

University. Thus the results in Table 4, generally imply that students perceive negatively as the majority did not have enough knowledge and skills to use e-learning effectively, despite being aware of its benefits.

Table 4: *Technical knowledge to Use the E-learning System Effectively*

Variable Measured	Frequency (N)	Percentage
Ability in using LMS		
Not very effectively	75	31.1
Not effectively	101	41.9
Average	29	12.0
Effectively	7	2.1
Very effectively	29	12.0
Total	241	100.0
Training on the use of LMS		
Yes	102	42.3
No	139	57.7
Total	241	100.00
Awareness of Benefits of LMS		
Yes	10	95.83
No	231	4.17
Total	241	100.00

Reasons/Factors for Low Uptake of E-learning

This subsection presents and interprets the results of the second specific research objective of this study. We used partial least square structural equation modeling (PLS-SEM) to analyse the data and present the findings for the factors/reasons that affect the low uptake of e-learning. The results of the two main analyses, which included measurement and structural analysis, are shown in the following subsections.

Measurement Results

This subsection presents the analysis of findings regarding the measurement model, including the assessment of the measure's validity and reliability. The indicator loadings, internal consistency reliability, convergent validity, and discriminant validity were determined prior to structural assessment in compliance with the SEM requirement (Hair et al., 2017).

Internal reliability and factor loadings were revealed through PLS-SEM for each indicator. The outcomes in Table 5 show the specific factor loadings. Regarding Table 6, all item loadings were accepted in accordance with the standard factor loading value of >0.70 as advised by Hair et al. (2014), with the exception of one indicator, SE, which has a moderately lower factor loading. Therefore, for the following stage of the PLS-SEM analysis, all indicators were kept. The Composite Reliability (CR) and Cronbach's alpha were used to report the internal consistency reliability. Table 5 further demonstrates that all values were above the suggested value of 0.70 (Hair et al., 2014) indicating acceptable internal consistency.

Table 5: *Internal consistency reliability, reflective indicator loadings, and AVE*

Construct	Items (Indicators)	Factor Loadings	Mean	Std	α	CR	AVE
Environment	TS	0.84	3.65	2.02	0.92	0.97	0.89
	EoU	0.97	3.85	2.04			
Technology	AoE	0.91	4.59	2.03	0.95	0.93	0.77
	IC	0.89	4.35	2.04			
	SE	0.63	3.91	6.03			
Perceived Benefits	LE	0.98	3.85	2.04	0.89	0.91	0.85
	QLM	0.93	3.91	2.03			
Technical Knowledge & skills	PEU	0.90	4.49	2.04	0.91	0.89	0.90
	UT	0.95	2.03	1.62			
	UE	0.91	5.53	1.94			
Cross cutting issues	SSQ	0.87	3.81	2.02	0.89	0.87	0.90
	Aw	0.94	3.81	2.04			

NB: α is Cronbach's alpha; CR is Composite reliability; AVE is Average explained variance

Convergent and discriminant validity: the construct validity was assessed using convergent and discriminant validity, which means that assessments of the same or related constructs should be positively associated. Table 5 above displays the average variance extracted (AVE) values that must be submitted in respect to the convergent validity. The results demonstrate that all average variance explained (AVE) values were higher than the recommended threshold value of 0.50. The discriminant validity test also looks at how distinct a construct is from other constructs (Hair et al., 2014). To report the values, the Fornell Larcker criterion will be used, and a construct's VE scores must be lower than the shared variance for all model constructs. The Fornell and Larcker criterion was applied to establish the discriminant validity because all AVE scores satisfied this requirement, as indicated in Table 6 (Fornell & Larcker, 1981).

The degree to which a construct differs from other constructs is also examined by the discriminant validity test (Hair et al., 2014). To report the values, the Fornell Larcker criterion will be used, and a construct's VE scores must be lower than the shared variance for all model constructs. The Fornell and Larcker criterion was applied to establish the discriminant validity because all AVE scores satisfied this requirement, as indicated in Table 6 (Fornell & Larcker, 1981)

Table 6: *Discriminant Validity*

CONSTRUCT	ENV.	TEC	PEU	TNSK	CRS
Environment	**0.890**				
Technology	0.309	**0.770**			
Perceived Benefits (PEU)	0.120	-0.328	**0.850**		
Technical knowledge and skills	0.053	0.538	-0.387	**0.90**	
Cross cutting issues	0.225	0.697	-0.353	0.242	**0.90**

Structural Model Results

Following the statistical principles of structural modeling equation (SEM), the model with hypotheses was assessed based on Hair et al. (2014). The evaluation was carried out so as to determine the path coefficient in the independent as well as dependent variables. According to the results, the structural model has a goodness of fit of 0.065. The results in Table 7 show that nine

(9) of the thirteen hypotheses tested were supported as it influences perceptions and uptake of e-learning.

Table 7: *Hypotheses tested results*

Hypotheses	β	t-statistics	Sig.	Status
H1. Service Quality of e-learning → perception on e-learning	0.291	3.210	0.002	accepted
H2. Quality of e-learning materials→ perception on e-learning	0.353	2.748	0.003	accepted
H3. User training → perception on e-learning	0.081	0.487	0.150	rejected
H4. Internet connectivity → e-learning uptake	0.186	0.346	0.130	rejected
H5. Technical support → e-learning uptake	0.360	4.599	0.005	accepted
H6. Availability of e-learning→ e-learning uptake	0.246	3.167	0.340	rejected
H7. Perceived usefulness → perception e-learning use	0.022	0.389	0.000	accepted
H8. Ease of use →e-learning uptake	0.112	1.267	0.005	accepted
H9. Self-efficacy → e-learning uptake	0.235	2.365	0.005	accepted
H10. Usable e-learning → perception on e-learning use	0.110	1.780	0.001	accepted
H11. Less effort → perception on e-learning	0.623	9.225	0.001	accepted
H12. User awareness → perception on e-learning	0.235	0.389	0.210	rejected
H13. Perception of e-learning →e-learning uptake	0.484	6.220	0.000	accepted

The uptake of e-learning, the phenomena variable of this investigation, was explained by a variance of 76%. Additionally, the variance of 26% accounted for the idea that e-learning was a middle variable. Additionally, the variance of 26% explained how useful and simple the system was evaluated to be. The SEM results in Table 7 show that service quality of e-learning is statistically significant (p-value = 0.002) and has a significant influence on students' perception of e-learning. As a result, the structural model backs up H1. The SEM results also revealed that the quality of e-learning materials and e-content is statistically significant (p-value = 0.003) and has a significant influence on students' perception of e-learning. As a result, the structural model in Figure 2 supports hypothesis H2.

Furthermore, the results in Table 7 show that perceived usefulness of e-learning, usable e-learning and less effort when using e-learning were all statistically significant, with p-values less or equal to the 0.05 recommended values. These variables had a significant impact on people's perceptions of e-learning. As a result, we determined that the structural model supported hypotheses H7, H10, and H11. Furthermore, ease of use, self-efficacy, and the moderating variable (perception of e-learning) were statistically significant influences on e-learning uptake at Mzumbe University, with p-values less than the recommended 0.05. Thus, the structural model in Figure 2 supported hypotheses H8, H9, and H13

However, user training, user awareness, and e-learning availability were statistically insignificant, with p-values greater than the recommended p-value of 0.05. The variables had no effect on students' perceptions of e-learning. Also, Internet connectivity was statistically insignificant because its p-value was 0.130 higher than the maximum recommended values for significance, indicating that the variable had no effect on student e-learning uptake. As a result, the structural model in Figure 2 rejected hypotheses H3, H4, H6, and H12.

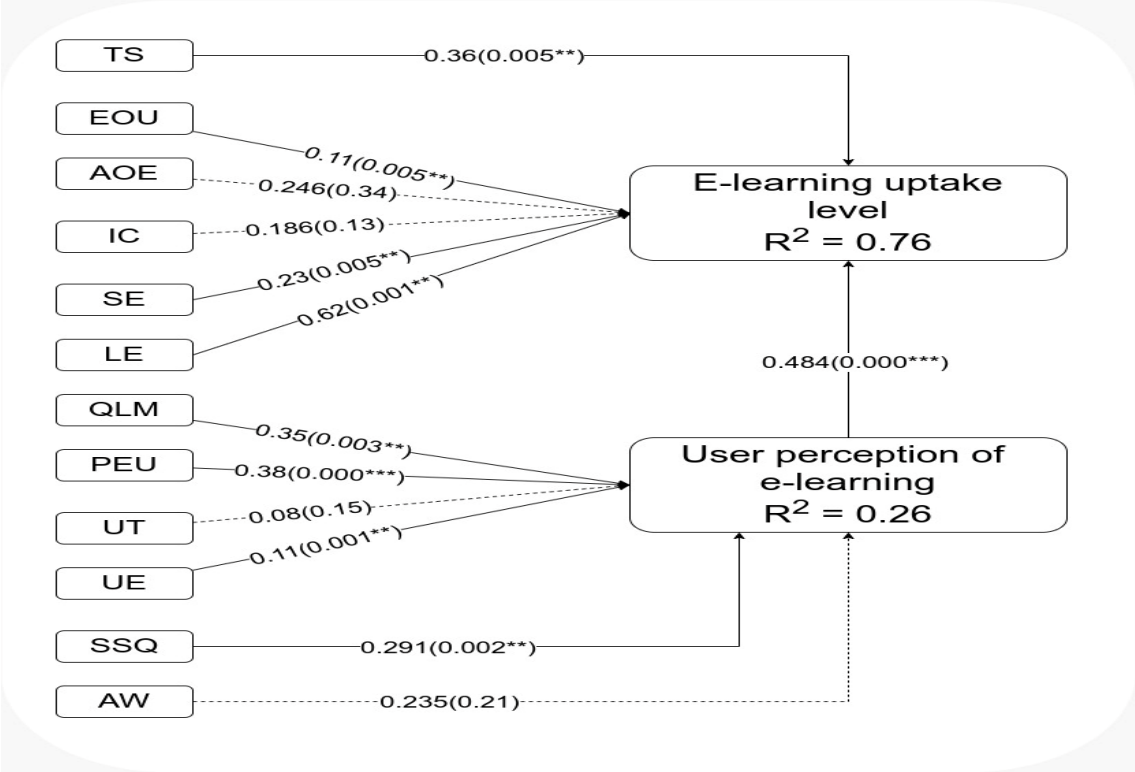

Figure 2: Results of the structural model
Key: TS-technical support, EOU-ease of use, AOE-availability of e-learning, IC-Internet connectivity, SE-self efficacy, LE, less effort, QLM- quality of learning materials, PEU- perceived usefulness, UT-user training, UE-usable e-learning, SSQ-service quality, AW-awareness

DISCUSSION

Perceptions of Students Towards E-learning Uptake at Mzumbe University

One of the objectives of this study was to study the perceptions of students towards e-learning uptake at Mzumbe University. To this end, we assessed students' perceptions on e-learning uptake enabling factors namely technology, technical support, and students' ability to use the LMS.

Status of the Technology Available for Supporting the Uptake of E-learning

Technology plays a pivotal role in facilitating uptake of e-learning. This includes the ability to access learning resources on an LMS which requires learners to have access to Internet services. One of the findings of this study is that all respondents possessed a device that enables them to access the Internet (and hence the LMS). Although this was the case, the study further found that most of the respondents were positive about the speed of the Internet at the university but had a negative perception about the availability of same, that is, the service was not always available when they wanted to use it. Another aspect of e-leaning that can affect students' perceptions is usability of an LMS (Mtebe & Raisamo, 2014; Eraslan & Kutlu, 2019). As it was reported in similar studies, technological challenges like this contribute to negative perceptions and low motivation of students towards uptake of e-learning (Elshami et al., 2021; Wei & Chou, 2020).

Quality of Technical Support, Learning Material the Benefits of LMS at the University

Other factors that have an impact on perceptions of students towards e-learning uptake are technical support, awareness and quality of learning resources found on an LMS (Asamoah, 2019; Ghasia & Machumu, 2020). While it was found that most respondents are happy with the quality of the technical support they receive at Mzumbe University, the study further found that a significant majority of respondents are aware of the benefits of e-learning. This finding can partly be explained by another finding of this study which shows about half of respondents are not satisfied with the quality of learning resources available on the LMS. In contrast, Ghasia & Machumu (2020) found that awareness of e-learning at Mzumbe University to be increasing. This contradiction can be attributed to the fact that the findings of this study were based on system access (based on LMS log files) rather than user opinions (Ghasia & Machumu, 2020). Since students may sometimes be compelled to login to an LMS to access assignments and lecture notes, extent of system usage may indicate improved awareness but not necessarily a positive perception towards e-learning.

If learners are not satisfied with the quality of learning resources available on the LMS they will consequently have negative perceptions about e-learning in general. This finding is further explained with the findings of a similar study by Almasi, Machumu & Zhu (2021) which found that although most instructors at Mzumbe University are enthusiastic about the use of e-learning in teaching, most of them possess average competence in designing electronic learning resources. Therefore, the university should make enough effort to ensure that the Internet connectivity is available as well as the quality of materials from LMS need to increase for positive perception towards improving the e-learning uptake level.

Technical Knowledge to Use the E-learning System Effectively

Ability to use an LMS effectively is another factor that influences students' perceptions towards e-learning uptake (Wei & Chou, 2020). It was found that most of the respondents (over 70%) cannot use the LMS effectively. This finding can be attributed to the fact that over half the respondents said they did not receive any training on the use of the LMS. Despite this fact, the majority of the respondents (95.83%) are aware of the existence an LMS at the university and the benefits of using e-learning in general. For the past few years, the university has invested heavily on training and raising awareness about e-learning but the emphasis has been on instructors only. The only exposure students get to the LMS is during the orientation period which lasts for only a few hours. Therefore, emphasis should also be placed on students for positive perceptions in order to increase the level of e-learning uptake.

Reasons/Factors that Influence the Low Uptake of E-learning at Mzumbe University

PLS-SEM was used to evaluate the hypotheses in regard to e-learning uptake in order to discover the factors that influence e-learning uptake at Mzumbe University, which was the second specific research objective of this study. The study's findings demonstrated that technical assistance, ease of use, self-efficacy, and less effort in adopting e-learning have a statistically significant direct influence on e-learning uptake at Mzumbe University. This could be owing to the nature of the phenomenon being examined, which is dependent on characteristics relating to specific e-learning stakeholders. The findings of this study are comparable to those of Perera & Abeysekera (2022) and Nikou (2022), which indicated a need to adopt e-learning that is easy to use and requires less work in order for students to experience it and have the intention to utilize it in the long run. Furthermore, according to the findings of this study, technological assistance as a perceived university's preparedness appears to strongly affect the intention to engage in e-learning, which leads to high uptake, as indicated by the study of Raza et al., (2020). The results of this study imply that universities should be ready to hire e-learning specialists who can give technical support as well as self-efficacy and motivational aspects for students to use the e-learning system.

Furthermore, the outcomes of this study demonstrated that the availability of e-learning and Internet access had a negligible direct influence on e-learning uptake. Kisanjara et al. (2020) discovered that Internet connectivity and the availability of e-learning platforms and facilities have a substantial influence on e-learning acceptance in educational settings. The contradictory character of these findings is due to the different nature of the environments in which these research studies were conducted. For example, there are insufficient e-learning platforms, and Internet connectivity is poor, making it difficult for students to use e-learning services at Mzumbe University. Thus, the findings of this study may also show that universities have not been adequately prepared nor have a favorable environment to fully deploy and utilize the capabilities of e-learning systems (e.g. usefulness) promoting students' learning.

The findings of this study demonstrated that the quality of e-learning materials and perceived benefits of e-learning had a statistically significant influence on e-learning perceptions at Mzumbe University. This has had a tremendous effect on e-learning adoption. Similarly, Nikou & Maslov (2022) and Anthony et al., (2020) established that e-learning course quality and perceived usefulness were key elements impacting positively on learner perception. Thus, if students see the value of e-learning and are proud of the quality of e-learning materials or e-contents, their perception of e-learning usage will immediately improve by increasing e-learning uptake level.

Furthermore, the findings of this study demonstrated that other elements such as user training and awareness had little impact on students' perception of e-learning. In contrast to the findings of this study, Nikou & Maslov (2022) stated that students' perceptions of e-learning are greatly influenced by their awareness and training on e-learning systems. As revealed by the findings of this study, the inconsistency in the findings is due to insufficient intensive training among students, particularly first-year students who join the institution for the first time at Mzumbe University. This implies that improving student awareness of what e-learning is, its benefits, and how to use it in learning could be the most essential component in increasing perceptions and subsequent high uptake levels. The study's findings revealed that perception has a substantial influence on the e-learning uptake level. As a result, perception of e-learning is the first derivative of e-learning adoption; as students become aware of and understand the benefits of e-learning and how to use it through intense training, e-learning is more likely to be used to its full potential.

CONCLUSION

The purpose of this study was to examine how e-learning is perceived and to pinpoint the causes of Tanzania's Mzumbe University's low e-learning uptake. A total of 241 undergraduate students who were majoring in both science and business were included in this study. As indicated in Tables 2, 3, and 4, the findings demonstrate that the majority of students have a negative opinion of the factors (in terms of the availability of e-learning, the caliber of technical support, the caliber of e-learning learning materials, and the advantages of the LMS utilized at MU). However, the main cause of the low uptake is students' unfavorable perceptions of e-learning at Mzumbe University, despite the fact that the impact of perception of e-learning on e-learning uptake was statistically significant as determined by SEM (see Figure 2).

As seen in Table 7 and Figure 2, there is a low uptake of e-learning in Mzumbe University for a variety of reasons/factors, including inadequate e-learning platforms, low quality of materials in the LMS, unavailability of Internet connection, and inadequate e-learning training. This is due to the fact that when students first enroll in college, they are not properly prepared. Low bandwidth and unavailability of Internet connectivity prevent students from using existing e-learning platforms like Moodle when they try to access the Internet via electronic resources like PCs. The results also demonstrate how the use of e-learning as a teaching and learning tool has a significant effect on university performance in terms of teaching, learning, and management.

In order to enhance the e-learning uptake level for long-term usage, e-learning as a new technology needs the following: less effort to use, convenience of use, quality learning materials and services, availability of e-learning at any time, perceived usefulness, self-efficacy, and technical assistance. Due to high-quality material from LMS and e-content, students are also expected to use e-learning effectively and efficiently. In order to outline the proper implementation of e-learning, Mzumbe University should redesign its ICT policy. This includes increasing awareness, carrying out intensive training, and putting in place all necessary ICT infrastructure, including sustainable Internet connectivity, bandwidth, and electricity, among other things.

IMPLICATION, LIMITATION AND FUTURE RESEARCH

Implication and Limitations of the Study

By taking into account the primary factors and views highlighted in connection with improving e-learning uptake at Mzumbe University, the study's results practically provide a platform for where to start. The study's conclusions emphasize the significance of reformulating ICT policy to comply with new guidelines or procedures in order to successfully implement e-learning as a cutting-edge technological innovation for services linked to student teaching, learning, and administration. These findings are anticipated to serve as a basis for improving the performance of Mzumbe University and other educational institutions, enabling them to continue to be competitive and attract more students from inside and outside of Tanzania. As a result, society will profit from low-cost, time- and location-independent learning and teaching services.

According to the researchers, theoretically, one of the study's shortcomings is that the sample size was too small compared to the number of students at Mzumbe University to allow for extrapolation of the results to other Tanzanian universities with comparable characteristics. Additionally, a consistent sample of students was used in the research. To gather the in-depth information from a wider perspective, it would be necessary to involve students and academic staff as well as e-learning professionals and key stakeholders. This study made an effort to overcome that limitation and ensure the generalizability of its findings across Tanzanian universities by employing a diverse sample technique. Finally, this study has added to the body of knowledge concerning the reasons for and perceptions of e-learning in Tanzanian institutions and other universities in underdeveloped countries where e-learning adoption is still in its infancy.

Future Research

Future study should use diverse sampling procedures and samples to enable easier generalization. Because this study provided many insights into the various components and perspectives of e-learning at Mzumbe University, future research may apply the structural model developed in this study and try to apply the analysis in other universities, both private and public.

REFERENCES

Adedoyin, O.B., & Soykan, E. (2020). 'Covid-19 pandemic and online learning: the challenges and opportunities', *Interactive Learning Environments*, pp. 1–13. doi:0.1080/10494820.2020.1813180.

Almasi, M., Machumu, H., & Zhu, C. (2021). 'Instructors' perspectives, motivational factors and competence in the use of an e-learning system in a Tanzanian University', *International Journal of Education and Development using Information and Communication Technology*, vol. 17, no. 2, pp. 76–95.

Al-Okaily, M., Alqudah, H., Matar, A., Lutfi, A. and Taamneh, A. (2020), 'Dataset on the Acceptance of e-learning System among university students' under the COVID-19 pandemic conditions', *Data in Brief*, vol. 32, 106176.

Alqahtani,. M.A., Alamri, M.M., Sayaf, A.M. and Al-Rahmi, W.M. (2022). 'Investigating Students' Perceptions of Online Learning Use as a Digital Tool for Educational Sustainability During the COVID-19 Pandemic. doi: 10.3389/fpsyg.2022.886272. Pp. 1-16

Alqurashi, E. (2019). 'Predicting student satisfaction and perceived learning within online learning environments', *Distance Education*, vol. 40, no. 1, pp. 133–148. doi: 0.1080/01587919.2018.1553562

Anthony Jnr, B., Kamaludin, A., Romli, A., Mat Raffei, A.F., A_L Eh Phon, D.N. (2020). ICT officials' opinion on deploying open source learning management system for teaching and learning in universities in a developing society. E-Learning and Digital Media, vol.18, no. 1, pp. 18–38. doi: 10.1177/2042753020946280

Asamoah, M.K. (2019). 'Learner support services for postgraduate students: A qualitative approach', *E-Learning and Digital Media*, vol. 16, no. 5, pp. 367–392. doi: 10.1177/2042753019860613

Asamoah, M.K. (2021). 'ICT officials' opinion on deploying open source learning management system for teaching and learning in universities in a developing society', *E-Learning and Digital Media*, vol. 18, no. 1, pp.18–38. doi: 10.1177/2042753020946280

Baji, F., Azadeh, F., Sabaghinejad, Z., & Zalpour, A. (2022). 'Determinants of e-learning acceptance amongst Iranian postgraduate students'. *Journal of Global Education and* Research, vol. 6, no. 2, pp. 181-191. https://www.doi.org/10.5038/2577-509X.6.2.1089

Beaudoin, M.F. (2002). 'Distance education leadership: An essential role for the new century', *Journal of Leadership Studies*, vol. 8, no. 3, pp.131–144. doi: 10.1177/107179190200800311

Benigno, V. and Trentin, G. (2000), 'The evaluation of online courses', *Journal of Computer Assisted Learning*, vol. 16, no. 3, pp. 259--270.

Chang, S-C., & Tung, F-C. (2008). 'An empirical investigation of students' behavioural intentions to use the online learning course websites', *British Journal of Educational Technology*, vol 39, no. 1, pp 71–83. doi: https://doi.org/10.1111/j.1467-8535.2007.00742.x

Chirwa, M,. (2018). 'Access and use of internet in teaching and learning at two selected teachers' colleges in Tanzania' *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, vol. 14, no. 2, pp. 4-16

Davis, F. (1989), 'Perceived usefulness, perceived ease of use and user acceptance of Information technology', *MIS Quarterly*, vol. 13, no. 3, pp. 319--340.

DeLone, W.H. and McLene, E.R. (2003). 'The DeLone and McLean Model of Information Systems Success: A Ten-Year Update' *Journal of Management Information Systems / Spring*, vol. 19, no. 4, pp. 9–30

Dyrek, N., Wikarek, A., Niemiec, M., Owczarek, A.J., Olszanecka-Glinianowicz, M., and Kocełak, P. (2022). The perception of e-learning during the SARS-CoV-2 pandemic by students of medical universities in Poland–a survey-based study. https://doi.org/10.1186/s12909-022-03600-7. Pp. 1-9

El-Seoud, S., Taj-Eddin, I., Seddiek, N., Mohamed, M., & Nosseir, A. (2014). 'E- learning and students' motivation: A research study on the effect of e-learning on higher education', *International Journal of Emerging Technologies in Learning* (iJET), vol. 9, pp. 20–26. doi: 10.3991/ijet.v9i4.3465

Elshami, W., Taha, M.H., Abuzaid, M., Saravanan, C., Kawas, S.A., & Abdalla, M.E. (2021). 'Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges', *Medical Education Online*, vol. 26, no. 1, 1920090. doi: 10.1080/10872981.2021.1920090

Elshareif, E., and Mohamed, E.A. (2021). 'The effects of e-learning on students' motivation to learn in higher education', *Online Learning*, vol. 25, no. 3, pp. 128–143. doi:10.24059/olj.v25i3.2336.

Eraslan Yalcin, M., & Kutlu, B. (2019). 'Examination of students' acceptance of and intention to use learning management systems using extended TAM', *British Journal of Educational Technology*, vol. 50, no. 5, pp. 2414–2432. doi: https://doi.org/10.1111/bjet.12798

Fleming, J., Becker, K., & Newton, C. (2017). Factors for successful e-learning: Does age matter? *Education & Training*, vol. 59, no. 1, pp. 76–89. https://doi.org/10.1108/ET-07-2015-0057.

Fornell, C., and Larcker, D.F. (1981). 'Evaluating Structural Equation Models with Unobservable Variables and Measurement Error' *Journal of Marketing Research,* vol. 18, no. 1 (Feb., 1981), pp. 39-50 (12 pages).

Garavan, T.N., Carbery, R., O'Malley, G. and O'Donnell, D. (2010). 'Understanding eLearning? An empirical investigation of the critical factors influencing learner satisfaction', *Computers and Education*, vol. 50, no. 4, pp. 1183–1202.

Ghasia, M., & Machumu, H. (2020). 'Reflection on e-learning system of the Mzumbe University in Tanzania: Successes, challenges and way forward', *International Journal of Education and Development using Information and Communication Technology*, vol. 16, no. 2, pp. 109–121.

Glenn D. (1992). Sampling the Evidence of Extension Program Impact. Program Evaluation and Organizational Development, IFAS, University of Florida.

Guppy, N., Verpoorten, D., Boud, D., Lin, L., Tai, J., & Bartolic, S. (2022). 'The post-covid-19 future of digital learning in higher education: Views from educators, students, and other professionals in six countries', *British Journal of Educational Technology*, vol. 53, no. 6, pp. 1750–1765. doi: https://doi.org/10.1111/bjet.13212

Handal, B., Groenlund, C., & Gerzina, T. (2010). 'Dentistry students' perceptions of learning management systems', *European Journal of Dental Education*, vol. 14, no. 1, pp. 50--54. doi: https://doi.org/10.1111/j.1600-0579.2009.00591.x

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2014). 'Multivariate Data Analysis': New Jersey: Prentice Hall (7th Ed.). Upper Saddle River, *NJ*: Pearson *Prentice Hall. Pp.1-739*

Hair, J.F., Babin, B.J., and Krey, N. (2017). 'Covariance-based structural equation modeling' Multivariate *Data Analysis*: New Jersey: Prentice Hall. (7th Ed.). Upper Saddle River, *NJ*: Pearson *Prentice Hall.*

Henseler, J. (2021). Composite-based structural equation modeling: Analyzing latent and emergent variables. New York, NY: Guilford Press

Innocent, W.A., & Masue, O.S. (2020). 'Applicability of e-learning in higher learning institutions in Tanzania', *International Journal of Education and Development using Information and Communication Technology*, vol. 16, no. 2, pp. 242–249

Jones, D.T (2011). An Information Systems Design Theory for E-learning. A thesis submitted for the degree of Doctor of Philosophy of The Australian National University. pp. 17- 431.

Kisanjara, S.B. (2020**)** Modeling E-learning Implementation in Tanzanian Universities*.* A thesis Submitted in the fulfillment of the award of the degree of philosophy of the Mzumbe University.

Leong, M.G., Shukor, A.N., Nordin, S.M., and Baba, S. (2020*), '*Predictors of blended learning deployment in institutions of higher learning*:* theory of planned behavior perspective', *International Journal of Information and Learning Technology*, vol. 37, no. 4, pp. 179-196.

Li, Y., Duan, Y., Fu, Z., & Alford, P. (2012). 'An empirical study on behavioural intention to reuse e-learning systems in rural china', *British Journal of Educational Technology*, vol. 43, no. 6, pp. 933–948. doi: https://doi.org/10.1111/j.1467-8535.2011.01261.x

Mergel, B. (1998). '*Instructional design & learning theory'*. Available online at: *http://etad.usask.ca/802papers/mergel/brenda.htm*.

Morgan, H. (2020). 'Best practices for implementing remote learning during a pandemic', *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, vol. 93, no. 3, pp.135–141. doi: 10.1080/00098655.2020.1751480

Mtebe, J.S., & Raisamo, R. (2014). 'A model for assessing learning management system success in higher education in Sub-Saharan countries', *The Electronic Journal of Information Systems in Developing Countries* , vol. 61, no. 1, pp. 1–17. doi: https://doi.org/10.1002/j.1681-4835.2014.tb00436.x

Mutisya, D.N., & Makokha, G.L. (2016). 'Challenges affecting adoption of e-learning in public universities in Kenya', *E-Learning and Digital Media*, vol. 13, no. 3-4, pp. 140–157. doi:10.1177/2042753016672902

Mwalumbwe, I., & Mtebe, J. S. (2017). 'Using learning analytics to predict students' performance in moodle learning management system: A case of Mbeya University of Science and Technology', *The Electronic Journal of Information Systems in Developing Countries*, vol. 79, no. 1, pp. 1–13. doi: https://doi.org/10.1002/j.1681-4835.2017.tb00577.x

Nawaz, S.S., and Mohamed, R. (2020), 'Acceptance of mobile learning by higher educational institutions in Sri Lanka: an UTAUT2 approach', *Journal of Critical Reviews*, vol. 7, no. 12, pp. 1036-1049, doi: 10.31838/jcr.07.12.183.

Ndibalema, P. (2022). 'Constraints of transition to online distance learning in higher education institutions during covid-19 in developing countries: A systematic review', *E-Learning and Digital Media*, vol. 19, no. 6, pp. 595–618. doi: 10.1177/20427530221107510

Ni, A.Y. (2013). 'Comparing the effectiveness of classroom and online learning: Teaching research methods', *Journal of Public Affairs Education*, vol. 19, no. 2, pp. 199–215. doi: 10.1080/15236803.2013.12001730

Nikou, S., & Maslov, I. (2022). An analysis of students' perspectives on e-learning participation the case of COVID-19 pandemic. *A*vailable on Emerald Insight at: https://www.emerald.com/insight/2056-4880.htm.Pp. 1-17

Njenga, J.K., & Fourie, L.C.H. (2010). 'The myths about e-learning in higher education', *British Journal of Educational Technology*, vol. 41, no. 2, pp. 199–212. doi: 10.1111/j.1467-8535.2008.00910.x

Njenga, J. K, (2011). 'E-learning adoption in Eastern and Southern African higher education institutions: A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in the Department of Information Systems, *University of the Western Cape:* pp. 1-269.

Noesgaard, S., & Orngreen, R. (2015). 'The effectiveness of e-learning: An explorative and integrative review of the definitions, methodologies and factors that promote e-learning effectiveness', *Electronic Journal of e-Learning*, vol. 13, pp. 278–290.

Ozoemena, A.S. (2014). 'Assessment of the Use of E-learning Facilities by Home Economics Teachers in Delta State, Nigeria'*, Assessment,* vol. 5, no. 5(16), pp. 207--212

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). 'Online education: Worldwide status, challenges, trends, and implications', *Journal of Global Information Technology Management*, vol. 21, no. 4, pp. 233–241. doi: 10 .1080/1097198X.2018.1542262

Pei, L., & Wu, H. (2019). 'Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis', *Medical Education Online*, vol. 24, no. 1, 1666538. doi: 10.1080/10872981.2019.1666538

Perera, R.H.A.T, & Abeysekera, N., (2022). 'Factors affecting learners' perception of e-learning during the COVID-19 pandemic', *Asian Association of Open Universities Journal,* vol. 17 no. 1, 2022 pp. 84-100. DOI 10.1108/AAOUJ-10-2021-0124

Ros, S., Hernádez, R., Caminero, A., Robles, A., Barbero, I., Maciá, A., & Holgado, F. P. (2015). 'On the use of extended tam to assess students' acceptance and intent to use third-generation learning management systems' *British Journal of Educational Technology*, vol. 46, no. 6, pp. 1250–1271. doi: https://doi.org/10.1111/bjet.12199

Raza, S. A., Yousufi, S. Q., Rafi, S. M. T., & Javaid, S. T. (2020). 'Impact of Smart-phone Addiction on Students' Academic Achievement in Higher Education Institute of Pakistan', *Journal of Education & Social Sciences,* vol. 8, no. 1, 1-14.DOI: https://doi.org/10.20547/jess0812008101

Rogers, E. M. (2003). '*Diffusion of innovations,* 5th ed.' New York, NY: *Free Press*: pp.2-260.

Selim, H. (2007). 'Critical success factors for e-learning acceptance: Confirmatory factor models'. *Computers & Education,* vol. 49, no. 2, pp. 396-413.

Sfenrianto, S., Tantrisna, E., Akbar, H., and Wahyudi, M. (2018). 'E-learning effectiveness analysis in developing countries: East nusa tenggara, indonesia', *Bulletin of Electrical Engineering and Informatics*, vol. 7, no. 3, pp. 417–424. doi: 10.11591/eei.v7i3.849

Sharpe, R., & Benfield, G. (2005). 'The student experience of e-learning in higher edu-cation: A review of the literature', *Brookes eJournal of Learning and Teaching*, vol. 1, pp.1–9.

Sife, A. *et al*. (2007). 'New technologies for teaching and learning: Challenges for higher learning institutions in developing countries'. *International Journal of Education and Development using ICT (IJEDICT)*, vol.3, no. 2, pp.57-67.

Sigh, A.S., and Masuku, M.B., (2014). 'Sampling Techniques & Determination of Sample Size in Applied statistics Research: An Overview', *International Journal of Economics, Commerce and Management United Kingdom*, vol. II, no. 11, pp. 1-22.

Sun, P.C., Tsai, R.J., Finger, G., Chen, Y.Y. and Yeh, D. (2008), 'What drives a successful? *Tanzanian Universities'***,** A thesis submitted for the degree of Doctor of Philosophy of the Mzumbe University. Pp. 1-233

Tarus, J. K. and Gichoya, D. (2015). 'E-Learning in Kenyan Universities: Preconditions for Successful Implementation'. *The Electronic Journal of Information Systems in Developing Countries:* pp.1-14.

Teddlies, C., and Yu, F. (2007). Mixed Methods Sampling: A Typology With Example*:* https://www.researchgate.net/publication/249831052_Mixed_Methods_Sampling_A_Typology_With_Examples.

Tham, C. M., & Werner, J. M. (2005). 'Designing and evaluating e-learning in higher education: A review and recommendations', *Journal of Leadership & Organizational Studies*, vol. 11, no. 2, pp. 15–25. doi: 10.1177/107179190501100203.

Uppal, M. A., Ali, S., & Gulliver, S. R. (2018). 'Factors determining e-learning service Quality'. *British Journal of Educational Technology,* vol. 49, no. 3, pp. 412–426. https://doi.org/10.1111/bjet.12552

Venkatesh, V.**,** Morris, M.G., Davis, G.B., and Davis, F.D. (2003). 'User Acceptance of Information Technology: Toward a Unified View'. *MIS Quarterly*, vol. 27, no. 3, pp. 425-478.

Wei, H-C., & Chou, C. (2020). 'Online learning performance and satisfaction: do perceptions and readiness matter?', *Distance Education*, vol. 41, no. 1, pp. 48–69. doi: 10.1080/01587919.2020.1724768

Yacob, A., Aini Zuriyati Abdul Kadir, Zainudin, O., and Zurairah, A. (2012). 'Student awareness towards e-learning in Educatio': *Procedia - Social and Behavioral Sciences*. Universiti Teknologi MARA, Malaysia pp. 93-101. doi: 10.1016/j.sbspro.2012.11.310.

Yahiaoui, F., Aichouche, R., Chergui, K., Brika, S. K. M., Almezher, M., Musa, A. A., & Lamari, I.A. (2022). 'The impact of e-learning systems on motivating students and enhancing their outcomes during covid-19: A mixed-method approach', *Frontiers in psychology*, vol. 13 (874181). doi: 10.3389/fpsyg.2022.874181

Zarei, S., & Mohammadi, S. (2022). 'Challenges of higher education related to e-learning in developing countries during covid-19 spread: a review of the perspectives of students, instructors, policymakers, and ict experts', *Bulletin of Electrical Engineering and Informatics*, vol. 29, no. 57, 85562-85568. doi: 10.1007/s11356-021-146.
