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# Using the Pandemic to Accelerate 21<sup>st</sup>-Century Learning at a Rural University in Zimbabwe

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### Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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## ABSTRACT

This study responds to the disruptive environment in which educational institutions globally find themselves in the COVID-19 lockdown, where remote-based teaching was adapted to ensure continuous learning. Globally, over 90% of learners are affected by the closure of learning institutions. The study evaluates the digital transformation necessitated by the COVID-19 lockdown through the perception of faculty. Despite the rapid technological developments and high adoption of technology-mediated tools in most developed countries, developing countries lag. E-learning adoption has remained low in most developing countries, and this study aims to investigate the acceptance of Moodle at a rural university in Zimbabwe. This quantitative study utilised the Unified Theory of Acceptance and Use of Technology (UTAUT) model to explore how the institution used the COVID-19 pandemic as a springboard to accelerate the adoption of virtual learning systems. Very few studies have been conducted to evaluate Moodle acceptance in a developing country context using the UTAUT model during a pandemic such as the COVID-19. An online questionnaire was distributed to 200 faculty members. The results revealed that performance and effort expectancy and the facilitating conditions positively influenced the behavioural intention to use Moodle. However, in contrast, social influence did not positively influence the actual usage of Moodle. Educationists and technologists can use the results of the study to improve e-learning

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deployment in developing countries. The study also builds on ongoing research on e-learning implementation and evaluation using the UTAUT model. Future studies should be conducted across several institutions and involve students to come up with more generalisable results.

*Keywords: COVID-19; E-learning; UTAUT; behavioural intention; Moodle; rural environment; Zimbabwe.*

## 1. INTRODUCTION AND BACKGROUND

The coronavirus pandemic, commonly known as COVID-19, is ravaging, causing unprecedented human, economic and social crises [1]. As of 10 July 2020, the world had over 12,5 million COVID-19 infections, over 7 million recovered patients, and over 500 000 deaths [2]. In response to the COVID-19 outbreak, countries around the globe placed measures to contain its spread, such as limiting public gatherings and enforcing social distancing [3]. A report by UNESCO reveals that over 1.5 billion learners representing about 90% of enrolled learners in about 200 countries, were affected by school closures [4]. The closure of schools necessitated the transformation of the traditional education system, resulting in various digital divides. Nevertheless, the COVID-19 pandemic provides an opportunity for Higher Education Institutions in developing countries to transform and adopt technology-based learning for the pedagogical support of learners [5].

Governments around the world implemented strategies to contain the spread of the disease. Thus, the Government of Zimbabwe announced a total shutdown on 24 March 2020 by banning public gatherings in a move to curb widespread infections [6]. Face-to-face teaching was banned, and educational institutions responded in various ways to ensure that teaching and learning continued during the lockdown.

Information and Communication Technologies (ICTs) affect every facet of human life, including education, with a promise to enhance access for communities that were once excluded. ICT improves the quality of education and offers convenience to both instructors and learners. The explosion of the internet and the supporting applications are shaping the future of education in response to 21<sup>st</sup>-century skills. Like all other sectors, ICTs have transformed education leading to the rise of electronic learning (e-learning), with most universities adopting it. Coates et al. [7] concluded that the past decades had witnessed an unprecedented transformation of university education through Learning

Management Systems (LMS). The proliferation of ICT devices capable of supporting remote learning in most developing countries has not resulted in meaningful adoption rates [8].

The traditional lecture delivery method, where the lecturer delivers content to students who listen and take notes with minimum engagement, is one of the most dominant teaching methods in developing countries such as Zimbabwe [9,5]. Graham [10] concluded that the traditional face-to-face approach would soon be replaced by blended learning, which marries the advantages of face-to-face and e-learning. If adequately implemented, e-learning can replace traditional face-to-face learning; an investigation by Al-Qahtani and Higgins [11] revealed no performance differences between students taught through an e-learning system and those taught through face-to-face teaching. The COVID-19 pandemic redefines learning and calls for developing countries to transform and adopt online learning as face-to-face interaction becomes impossible.

University X has increased its student enrollment numbers while its infrastructural development has remained stagnant, resulting in acute space shortages and timetabling headaches. Limited infrastructure has slowed down the institution's growth and denied potential students admission as the number of enrolled students is linked to physical facilities such as accommodation and classrooms. For a rural university like University X, these challenges are real as its surrounding communities cannot provide adequate accommodation to students and staff. Less than 10% of University X's infrastructure has been erected, and the prevailing economic environment has halted construction. The suspension of construction work has been caused by economic decline, reduced government funding, hyperinflation, and a large public debt [12].

Embracing virtual learning systems allows the institution to increase student enrollment without worrying about space limitations and effectively using available lecturers. Graham [10] and

Bourzgui et al. [13] noted that cost-effectiveness, reduced need for physical infrastructure, and improved timetabling led to several institutions offering online courses. Sudweeks et al. [14] concurred that HEIs were implementing e-learning to address challenges related to inadequate physical facilities. During this COVID-19 pandemic, virtual learning systems present the only possible way for continued learning. Thomas et al. [15] noted that improving the attitude of the lecturers was crucial in improving their behavioural intention towards LMS usage. After training its staff, University X declared that most of its teaching and learning would be online through Moodle under the COVID-19 social distancing guidelines.

When technology-based training tools were first introduced, concerns from educationists were that the tools would fail to support the everyday learning needs of the learner. LMSs evolved from simple channels for placing content online to incredible tools that support the pedagogical needs of the learner. Most LMSs offer learning tools such as course content management, a course calendar, discussion board, auto-marked quizzes and exams, grading, student progress tracking, announcement, and reviews. The tools offered by most LMSs immensely benefit the student through collaborative and interactive learning, which results in improved satisfaction and enthusiasm [16]. LMSs are advancing 21<sup>st</sup>-century learning skills, and the outbreak of the COVID-19 pandemic may help developing countries leapfrog and transform into the digital space. Despite the popularity of e-learning in developed countries, its adoption in developing countries such as Zimbabwe remains low. The study evaluates how the COVID-19 lockdown could accelerate 21<sup>st</sup>-century learning adoption at a rural university in Zimbabwe.

After providing an introduction, the paper presents the following sections: the literature review, problem statement, the justification for adopting Moodle by University X, and the motivation to conduct the study. The following sections delve into the methodology, sampling, data analysis, and discussion. The last part of the paper presents the recommendations and conclusions.

## **2. LITERATURE REVIEW**

The global COVID-19 scourge transformed society affecting social activities, work, and learning, among others. The closure of

educational institutions affected over 1.5 billion learners, plunging the education system into a crisis requiring some digital revolution where learning, examination, and interaction can only be online [17]. Migrating into the online environment will result in the emergency of various digital divides and widen access barriers, requiring urgent attention from educators and policymakers. Marinoni, van't Land, & Jensen [4] established that after the closure of schools due to the COVID-19 outbreak, over two-thirds of HEIs in Africa did not migrate into the online environment and suspended teaching, leaving learners stranded. Kapasia et al. [17] noted that marginalised and poor communities are often discriminated against when learning migrates to the online environment. This new teaching and learning order during the COVID-19 has magnified the digital divide after the emergence of home-based learning through various digital tools [18]. Ayebi-Arthur et al. [19] noted that crises like earthquakes stimulated universities in New Zealand to rapidly adopt remote learning to ensure that teaching was not interrupted.

Over 85% of HEIs in developed countries migrated to the online learning environment, and only 29% of HEIs in Africa successfully migrated [4]. Sezgin [20] concurred that countries and institutions that invested in digital technologies easily adapted to the new order. Over a third of HEIs in Africa indicated that they did not have adequate infrastructure to communicate and engage with students during the COVID-19 lockdown compared to an average of about 3% across the other regions [4]. This means that students from many African countries lost learning or contact time with their institutions during the current lockdown, whose end is not yet known. Ayebi-Arthur et al. [19] reiterated that communication was critical for institutions in New Zealand that shut down due to seismic earthquakes. Communication enabled the students to be more prepared, understand the risks and maximise cooperation. Iivari et al. [18] noted that institutions dived into the sudden, unexpected digital arena to ensure continued learning without any preparation.

Mpofu et al. [21] concluded that the low number of African scholars who could traverse comfortably in an online learning environment shows that e-learning adoption is low in the continent. The adoption of LMS has been slow in developing countries such as Zimbabwe as it was viewed as optional, and this influenced institutional support, lecturer, and student's

attitude, but the advent of the COVID-19 is demanding institutions to transform or perish. Since the President of Zimbabwe declared the national lockdown on 24 March 2020 [6], no face-to-face lecture delivery was conducted.

LMS's have emerged as practical tools to support web-based learning by offering a wide range of facilities that provide an effective learning environment [7, 22]. E-learning offers personalised and individual learning, which the traditional face-to-face teaching sometimes fails due to mass teaching and limited resources. After the COVID-19 pandemic, online learning is being pursued by higher education institutions more than how distance education was sought. Maina and Nzuki [23] concluded that e-learning offer students access to learning resources anywhere and at any time, crucial during the COVID-19 lockdown. Serdyukov [24] noted that e-learning expanded access to education, catering for communities that experienced the educational divide due to geographical location or other forms of disabilities. E-learning facilitates content distribution between the instructor and the students beyond space and time limitations [25]. Abdullah and Toygan [26] noted that the purpose of e-learning was to improve efficiency in teaching and enhance learning by developing and distributing learning content. One significant advantage of adopting e-learning is that it augments the students' digital skills by equipping them with skills needed for current and future jobs [27].

E-learning supports 21<sup>st</sup>-century learning attributes such as self-paced, collaborative, and learner-centred learning [28]. Furthermore, e-learning fits the requirements of today's learners, and therefore learners are comfortable, engaged, and find it easy and fun to use [23]. Through e-learning, learners can create new content and knowledge, learn through collaborations, and engage in critical thinking [29]. E-learning systems are embedded with collaborative tools which stimulate learner-instructor interaction and learner-learner interaction, thus promoting a sense of community [30]. Additionally, e-learning encourages learners to take control of their learning, learn in a collaborative and interactive environment [13].

In most emerging economies, the mobile phone is often the only available ICT by which learners can access LMSs. Mobile phone penetration in Zimbabwe was 100.5% of the population, while computer ownership was 24% [31].

Unfortunately, Zimbabwe has the highest data costs globally, with 1GB costing USD75.20, while Sudan has the cheapest at USD0.68 per 1GB [32]. The country's low computer ownership rates mean that most students access content from LMSs using mobile devices. The mobile phone's small screen size is sometimes a challenge when reading large amounts of text. Thomas et al. [15] concurred that mobile devices had extended access to LMSs, allowing lecturers and students to learn from any time and anywhere. Mobile learning offers flexibility and enhanced learning. Pullen et al. [33] noted that students manage their idle time while on the road by using mobile devices to complete their work.

Serdyukov [24] opined that barriers to e-learning adoption are technological (limited access to ICT, prohibitive cost of internet, lack of digital skills, inadequate technical support) and pedagogical (improper curriculum design and rigid teaching styles). Iivari, Sharma, & Ventä-Olkkonen [18] noted that learning institutions faced challenges in embracing the new digital order due to a lack of resources, skills, and competencies. A study by Dahlstrom et al. [8] revealed that LMSs were viewed as tools for enhancing teaching, and most of the advanced features have not yet been used. Lack of institutional support, inadequate training, limited technical support, and unavailability of ICT devices are significant barriers to LMS adoption [34]. Moakofhi et al. [35] noted that lack of access to the internet, limited institutional support, and limited infrastructure were significant barriers to LMS acceptance in Botswana. In a study on Kenyan universities, Mutisya and Makokha [36] found out that 55% of the lecturers cited lack of training as a hindrance to e-learning adoption and professed incompetence in handling online courses.

The unified theory of acceptance and use of technology (UTAUT) has been used to assess the acceptance of LMSs in institutions of higher learning in developing countries such as Tanzania, Kenya, Malaysia, Botswana, and South Africa [37, 38, 35, 29]. In a Malaysian study, Wong et al. [38] concluded that it was crucial to train lecturers to use an LMS to increase Moodle usage. Lack of ICT support was viewed as a major determinant of LMS adoption in a study conducted at HEIs in Botswana [35]. In a similar study in Kenya, Tarus et al. [39] contended that lack of digital skills by academic staff negatively affected Moodle adoption. User satisfaction and system quality were UTAUT's determinants in adopting an online forum in a

study in Indonesia [40]. Alrawashdeh et al. [41] also concluded that system enjoyment and interactivity were UTAUT's major predictors of a web training system. The UTAUT was also applied to determine the acceptance of an LMS at a study in Kenya, and the scholars revealed that institutional policies and training determined acceptance [23]. Another study conducted using UTAUT in Malaysia by Pullen et al. [33] indicated that the teachers' performance expectancy, social influence, and effort expectancy significantly influenced m-learning system adoption. In a similar study across Kenya and Uganda, Mtebe and Raisamo [37] concluded that all the independent variable constructs of the UTAUT had a significant positive effect on the behavioural intention to use m-learning. In another study in Guyana, Thomas et al. [15] found that two of UTAUT's constructs, attitude and facilitating conditions, were major determinants of the behavioural intention to use m-learning.

## **2.1 Problem Statement**

This study evaluates how the COVID-19 pandemic is accelerating 21<sup>st</sup>-century learning at a rural university in Zimbabwe. Earlier studies show that e-learning uptake was still low in most developing countries such as Zimbabwe. This study is being undertaken when face-to-face learning is restricted during the COVID-19 lockdown and faculty has to migrate to remote content delivery.

## **2.2 Why Moodle at University X?**

The last two decades have seen many educational institutions adopting LMSs such as Moodle, Blackboard, WebCT, among others, to complement face-to-face teaching and meet diverse learner needs and expectations [42]. Moodle is open-source, easy to implement, and has no licencing fees [43]. This has made Moodle one of the most popular LMSs in most developing countries. Moodle offers tools such as course content management through content uploading and course calendars, communication through announcements and electronic mail, and assessment through auto-marked quizzes and exams [43]. Moodle facilitates student progress tracking and collaborative learning through online discussion boards, reviews, and Wikis and administration to monitor student work and access control.

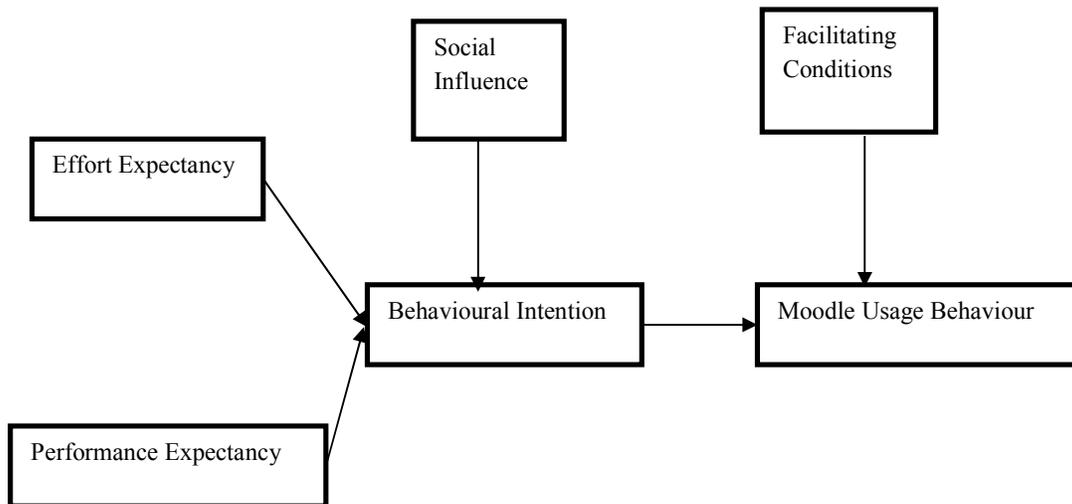
Less than 10% of University X's infrastructure has been erected, and therefore offering more courses online can assist the institution in meeting space and timetabling constraints. Moodle was installed for free on several servers, and updates are available at no cost. University X is offering conventional and block release courses, which have been affected by the current lockdown. Ali Reduced government funding and acute foreign currency shortages make it impossible for University X to use proprietary LMSs like Blackboard and WebCT, which offer better customisability and flexibility [12]. Proprietary LMSs are robust and offer more functionality but require hefty licence fees [44]. Moodle can support blended learning or deliver 100% online teaching during the COVID-19 lockdown enabling geographically dispersed students to gather in a virtual environment and access classroom resources. Gambari et al. [9] described blended learning as a combination of face-to-face and online teaching, taking the best of both worlds, motivating students to learn when they are in the mood for it. A small population of University X students owns laptops and computers, with the majority owning mobile phones. A Moodle mobile app has been configured to enable the majority of the students and lecturers to access the platform remotely.

## **2.3 Motivation**

The proliferation of ICT devices capable of supporting remote learning in most developing countries has not resulted in meaningful adoption rates and practical usage [8]. Ali, Kate, and Xiaohui [42] noted a need to conduct more research on LMS adoption in developing countries to provide empirical knowledge on the effects of technology, social and attitudinal contexts on adoption. The study also contributes literature on UTAUT adoption by evaluating how the COVID-19 pandemic accelerated 21<sup>st</sup>-century learning at a rural university in Zimbabwe.

## **3. THEORETICAL FRAMEWORK**

Scholars report that many technology prediction and acceptance theories have been amalgamated into the UTAUT [45, 37]. The UTAUT has four constructs that influence an individual's acceptance of new technology; performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), as shown in Fig. 1. The UTAUT also acknowledges four important moderating



**Fig. 1. UTAUT adapted from Venkatesh et al. [45]**

variables which predict the user's acceptance of new technology; age, gender, experience, and voluntariness.

- i. Performance Expectancy evaluates the extent to which individuals believe that using the technology will increase their performance, also referred to as perceived usefulness in earlier models.
- ii. Effort Expectancy: This is the degree of easiness perceived by the individual when using the technology.
- iii. Social Factors: The degree to which an individual perceives how others will influence them to use the technology.
- iv. Facilitating Conditions: The perceived degree of institutional and technical support during the use of the technology.

The UTAUT model is one of the widely used models as Venkatesh et al. [45] established that it could explain about 70% of the variance in the user's intention to adopt a system compared to TAM, which can only account for 40% variance [46]. Ibrahim and Jaafar [47] found that the UTAUT model provided a valuable tool for managers to predict the acceptance of a new system.

#### 4. METHODS

Quantitative data was collected from faculty at University X through an online questionnaire designed using the UTAUT. The survey link was sent to the faculty via email. The questionnaire consists of 24 questions that utilise a 5-point Likert scale to evaluate Moodle acceptance. The

first part of the instrument asked demographic questions, while the remaining sections focused on the four constructs of the UTAUT, as shown in Table 1.

Two senior faculty members who are experts in educational technology validated the questionnaire and concluded that the instrument addressed the study's objectives. This is in line with recommendations by Kline [48], who advised that domain experts can determine the instrument's validity. The study used Cronbach's alpha to measure the instrument's reliability and obtained values ranging from 0.725 to 0.934, as shown in Table 2. The values are greater than the 0.7 threshold recommended by Hair et al. [49]. Thus all the constructs had a good level of internal consistency and were suitable for use in the study.

The survey targeted 200 full-time and part-time faculty; 113 questionnaires were completed, giving a response rate of 56.5%. The nature of the study did not warrant authorisation from the university's ethics committee. Participants were informed that partaking in the study was voluntary and that their responses were confidential. All the participants' identification was kept anonymous, and they signed a consent form informing them of their right to withdraw from the survey. The demographics reflect that 32% of participants were female (n=37), and 68% were male (n=77). In terms of years of service at the institution, 50.8% had over five years, 8.8% had 3-5 years, 26.3% had 1-3 years, and 14% had less than one year.

**Table 1. Items measuring the UTAUT constructs**

Construct	Item Number	Items
Performance expectancy	1	Moodle would assist me in improving my academic performance.
	2	Using Moodle would allow me to do more work in less time.
	3	Moodle will be useful in my academic career.
	4	Using Moodle will help me achieve my teaching goals
Effort expectancy	1	I find it easy to use Moodle without much assistance.
	2	I would become skillful at using Moodle.
	3	Interaction with Moodle is clear and understandable
Social influence	1	I use Moodle because everyone seems to be using it
	2	Not using Moodle may make learning difficult for my students
	3	Management has been helpful
Facilitating Conditions	1	The training has provided me with enough knowledge to use Moodle
	2	I think University X is ready to support me in using Moodle
	3	I have adequate internet at work to support my use of Moodle

**Table 2. Cronbach’s alpha reliability results**

Construct	Item Number	Cronbach’s Alpha
Performance expectancy	4	0.841
Effort expectancy	3	0.798
Social influence	3	0.725
Facilitating Conditions	3	0.934

**5. RESULTS AND DISCUSSION**

Descriptive and inferential statistics were used to interpret the collected data and draw inferences on the construct’s variables. The survey results revealed that all the four constructs, performance expectancy, effort expectancy, social influence, and the facilitating condition, positively influenced Moodle adoption by faculty at University X.

Participants agreed that using Moodle allowed them to do more work in less time (M=4.13). The survey results also show that most participants (M=4.52) agreed that Moodle improved their academic performance. The remaining performance expectancy attributes were high; Moodle will help me achieve my teaching goals (M=3.89), and Moodle will be useful in my academic career (M=4.6). Regarding effort expectancy, most of the participants (M=4.32) found Moodle easy to use. Most of the faculty found Moodle easy to interact with (M=4.25). Hasan [44] found out that teachers perceived that using Moodle was easy and fun.

Faculty felt that they would be skillful in using Moodle with more exposure and training

(M=4.71). This is in line with Dahlstrom et al. [8], who established that users believed that they needed more skills to use an LMS effectively. Albidewi and Tulb [50] concur that staff should be adequately prepared through training for the effective implementation of an LMS. Related to training, these findings are in line with Ash [51], who noted that potential users required practical demonstrations to improve LMS usage. The respondents did not agree that they used Moodle because everyone seemed to be using it (M=2.28) but agreed that not using Moodle would make learning for their students difficult (M=4.11). Lack of influence from peers found in this study is similar to that found in Kenya by Maina and Nzuki [23], who concluded that peers did not influence faculty in adopting an LMS. This means that teachers agreed that online teaching was the new order. The faculty felt that management had been helpful during their Moodle usage (M=4.71).

Regarding internet access to support the use of Moodle, the respondents agreed that there was inadequate internet access to support Moodle (M=4.69) effectively. This is consistent with findings by Maina and Nzuki [23] and Obisat et al. [52], who considered poor internet

**Table 3. Cronbach's Alpha, Means, and standard deviation**

<b>Construct</b>	<b>Cronbach's Alpha</b>	<b>Mean</b>	<b>Standard deviation</b>
Performance expectancy	0.788	4.32	0.79
Effort expectancy	0.682	4.21	0.82
Social influence	0.711	3.59	0.69
Facilitating Conditions	0.895	4.53	0.85

infrastructure as a major barrier to LMS implementation. The respondents rated the level of ICT support highly (M=4.69). This is in line with Abdullah and Toycan [26], who concluded that management support was critical for successful e-learning implementation. Respondents agreed that they had enough knowledge through training extended by the institution (M=4.19). The findings related to training resonate with those of a study conducted at an HEI in Botswana by Moakofhi et al. [35], who identified ICT support as a major determinant of LMS adoption.

The study provides a glimpse at the state of e-learning at a typical public university in Zimbabwe and enunciates the contributions of various factors to the adoption of Moodle at University X. The results show the potential of Moodle being used as a tool for continued learning in response to COVID-19 lockdown. The study revealed that performance expectancy and effort expectancy positively influenced faculty's behavioural intention to use Moodle. Overall, social influence did not have a significant impact on the behavioural intention of faculty. The aggregated mean for performance expectancy was 4.32, the standard deviation was 0.79, while the Cronbach's alpha was 0.88, as shown in Table 3. Effort expectancy had a Cronbach's alpha of 0.682, a mean of 4.21, and the standard deviation was 0.82. The facilitating conditions had a standard deviation of 0.85, Cronbach's alpha of 0.895, and a mean of 4.53. These three constructs positively influenced the behavioural intention to adopt Moodle. The mean for social influence was 3.32, the standard deviation was 0.69, while Cronbach's alpha was 0.711.

This implies that the provision of the internet, training of faculty, and technological devices have a strong bearing on the successful adoption of Moodle at University X. The results revealed that performance expectancy, effort expectancy, and facilitating conditions were major determinants of Moodle adoption at University X. It was clear that faculty would adopt Moodle if it was easy to use and believed that they could accomplish more by adopting it. The faculty

agreed that training and ICT support were crucial in influencing Moodle usage. Erratic internet and lack of access to technology have a significant influence on Moodle adoption. The social influence did not positively influence adoption. The findings are similar to work by Maina & Nzuki, [23, 15, 35,50, 26].

## 6. RECOMMENDATIONS

LMS usage at a HEIs can be improved by integrating management, technical and human factors. Management should invest more in infrastructure, faculty training and undertake periodic reviews to understand issues that hinder LMS uptake. The university curriculum should be revised to reflect the inclusion of online teaching and encourage adoption. The study was conducted at one public institution, and the researcher recommends a comparative study that will include both public and private institutions for more generalisation. Future studies could also involve students to come up with more generalisable results.

## 7. CONCLUSIONS

Results show that faculty are ready to adopt online learning and require constant training to improve their competencies. The university should revise its curriculum to offer more remote learning possibilities and invest in supporting technology. All the UTAUT constructs influenced the adoption of the LMS. Related to performance expectancy, faculty revealed that Moodle would improve their academic performance and enable them to do more work in less time. Its ease of use influences higher adoption rates, positively influencing effort expectancy. The results revealed that social influence did not strongly determine the usage of Moodle by faculty. In the wake of the COVID-19 lockdown, faculty felt that Moodle provided a platform for sustainable learning under restricted face-to-face teaching. The facilitating conditions strongly influenced Moodle adoption, and faculty indicated that university management had organised training to equip staff during the lockdown, enabling faculty

to gain more skills and use the LMS confidently. The participants felt that inadequate internet negatively affected the faculty's usage of Moodle. The results are similar to Maina and Nzuki (2015)'s findings, who observed that limited ICT infrastructure affected LMS adoption.

This research provides an overview of LMS acceptance factors faced by faculty at a rural institution in a developing country and identifies benefits for its implementation during the COVID-19 pandemic when face-to-face training is not possible. Other universities can use the results of this study with a similar socio-economic environment who are considering implementing an LMS to address related challenges. This study provides insight to educators and policymakers on the state of online learning and how they could craft policies to improve adoption.

## CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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