



Using Moodle for Curriculum Delivery in Higher Institutions during the Covid-19 Pandemic

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This study presents a discursive review on the use of Moodle as an online tool to salvage education during the COVID-19 pandemic, most especially in developing countries across the globe. The author explores and discusses various studies to establish what is known and unknown about the use of Moodle by academics to deliver the curriculum in higher institutions. Learning Management System (LMS), with the most popular - Moodle known among students in South African higher institutions, is not a new concept. It has globally been used in most developed countries for many decades to significantly impact the education system across the globe. Its use has been a huge success in the educational system as it makes learning experiences to be available to students at their convenience. Thus, the declaration of COVID-19 as a pandemic by the World Health Organisation (WHO), did not affect curriculum delivery in the developed countries. However, with the lockdown procedures in many developing countries, educational institutions including higher institutions of learning (HEIs) in Africa ceased all teaching and learning activities for several months. However, South African higher institutions reviewed curriculum delivery and resulted in full use of Moodle for teaching and learning activities to salvage the 2020 academic year.

Keywords: *Academics, HEIs, Coronavirus, Pandemic, Moodle, curriculum delivery*

INTRODUCTION

The use of Moodle, one of the most used Learning Management System (LMS) as an e-learning tool has become a critical teaching and learning tool all over the world and its impact on curriculum delivery cannot be over-emphasised. In recent times, Ulker and Yilmaz (2016) assert that the traditional face to face teaching method approach is gradually being replaced with online teaching and learning approaches, to make learning experiences available to students at their convenience, and also to make teaching and learning more effective. Mlitwa

and Belle (2011) in their study, reports that there is a need for more South African academics to fully adopt Moodle for effective curriculum delivery. Seemingly, the Council on Higher Education (CHE) declares in Webstock and Fisher (2016) that LMS' usage is underutilised by some South African academics. Furthermore, Steyn et al. (2018) posit that the adoption rate of learning technologies is lower in previously disadvantaged South African universities compared to previously white-dominated universities in South Africa.

This implies that the adoption of Moodle by academics from universities in developed countries differ from those in developing countries (Naresh & Reddy, 2015). Their inability to maximise Moodle in developing South African universities by the academic staff might deny students the benefits of learning and this limits curriculum delivery. Extant literature indicates the commitment of the South African government to provide effective and better education to the citizenry, particularly in the area of ICT in which LMS is included (Cloete, 2017). Coleman and Mtshazi (2017) avow that there is a need for academics to embrace Moodle for effective curriculum delivery. Sackstein, Coleman and Ndobe (2019) opine that the perception of academic staff affects the usage of the learning management system in most historically disadvantaged Universities in South Africa. In the views of Evans and Mutula (2015), the adoption of LMS, especially Moodle for curriculum delivery among academic staff in South African universities is capable of enhancing teaching and learning activities.

THEORETICAL FRAMEWORK

A theory provides a framework for analysis for the efficient development of a study. The rationale for the theoretical framework in this study is to provide a further in-depth understanding of the study. Despite the global acceptance of learning technologies for efficiency and productivity in the education system, there is a noticeable resistance among some academic users. Technology acceptance theories have been adopted into this study to understand the reasons for the acceptance and use of learning technologies. Various studies have been conducted to investigate the best possible ways to promote the use of technology and explore reasons for hindrances in its acceptance and use (Mutsvunguma, 2019).

There are several theories to understand technology acceptance among users. These include Technology Acceptance Model (TAM), Theory of Planned Behaviour, Theory of Reasoned Action, Diffusion of Innovation Theory, Combination of Technology Acceptance Model (TAM) and Theory of Planned Behaviour (TPB) Model (C-TPB-TAM), Motivational Model (TM), Model of PC Utilisation (MPCU), Social Cognitive Theory and Unified Theory of Acceptance and Use of Technology (UTAUT). Several studies have used the listed theories to underpin users' behaviours towards technologies' acceptance from local and global perspectives. The Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation Theory (DOI) have been adopted as the underpinning theories to understand academics' use of Moodle for curriculum delivery. The rationale for the theories is

to provide not only a clear understanding but in-depth and conceptual models to strengthen the study.

Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT is a technology adoption model developed in 2003 by Venkatesh, Morris, Michael, and Davis. UTAUT as a theory provides the concepts that promote the use of technology among the users. According to Bhatiasevi (2016), UTAUT promotes a clear and in-depth understanding of technology acceptance and its use. The richness and high descriptive capability of the UTAUT model, compared to other similar theories of technology acceptance, have made it appropriate for this study. In the words of Venkatesh *et al.* (2003), various previous technology acceptance models have described an intention to use technology at 40 per cent among the users while UTAUT describes the intention to use technology among the users at 70 per cent. The strength of the UTAUT model lies in the combination of eight different theories to make UTAUT the most comprehensive and appropriate set of theories that explain the adoption and use of technology by users (Quigfei, Shaobo & Gang 2008). The UTAUT model explains the adoption and use of technology for any purpose regardless of existing variables like gender, ICT skills, cultural differences, varied technologies; thus making UTAUT rich and reliable to use in any study (Bhatiasevi, 2016). The model has four constructs that have been adapted to explain different factors influencing the behavioural intention of academics to use Moodle in this study. These constructs are performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating condition (FC).

Evans (2013), in his longitudinal study, opines that UTAUT's constructs moderates the gender, age, experience of the users in technology acceptance. Venkatesh *et al.*, (2003) describe the constructs as performance expectancy (PE) as a user believes that using technology to perform a job function will promote his performance, effort expectancy (EE) and refers to the level of ease at which a user uses technology to perform a function. Furthermore, social influence (SI) explains the perception of a user to use a technology based on how important the technology is to him to use the technology to perform a function, while the facilitating condition (FC) refers to the degree at which a user believes that organisational facilities enhance the use and adoption of such technology. Several studies affirm the appropriateness, richness, suitability and reliability of UTAUT as the theoretical framework for technology adoption and use to promote integration and effective use of technology in curriculum delivery using different contexts (Holtz & Krein 2011; Jeng & Tzeng 2012). Other scholars, who have also theorised UTAUT in various studies, prove its explanation on the acceptance of technology to be appropriately designed (Evans, 2013; Owolabi, 2016; Quadri & Garaba, 2019).

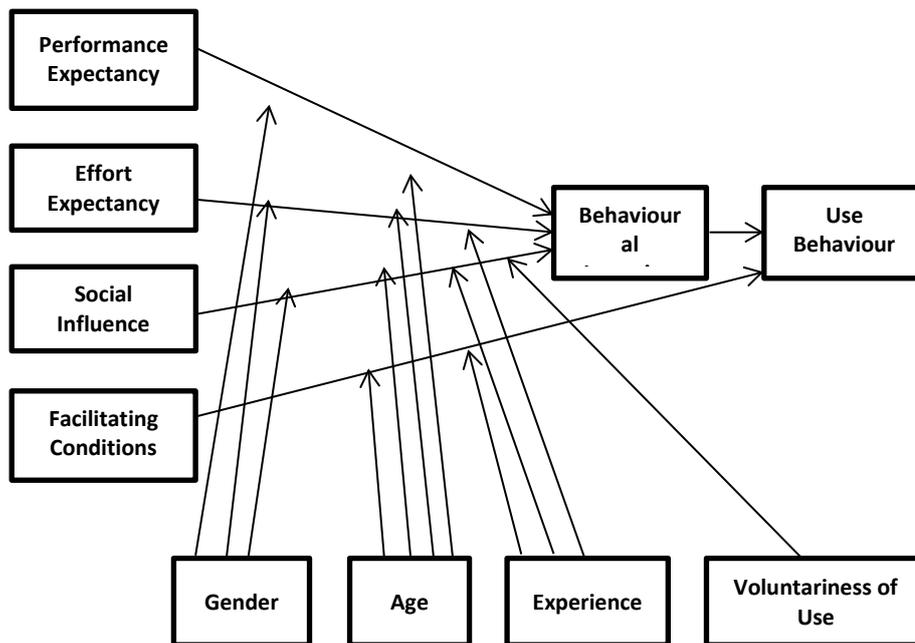


Fig.1: UTAUT Model (Venkatesh et al. 2003).

Extant literature affirms the suitability of UTAUT establishing various factors that influence behavioural intention to use technology for curriculum delivery by academics. The UTAUT's constructs are summarised as follows (Venkatesh et al. 2003:428):

1. **Performance Expectancy:** “the degree at which an academic staff believes that the use of Moodle LMS will promote curriculum delivery”.
2. **Effort Expectancy:** “the degree at which any academic staff believes that Moodle LMS will be easy to deliver curriculum”.
3. **Social Influence:** “an academic staff’s perception that every other academic staff should use Moodle LMS for curriculum delivery”.
4. **Facilitating Condition:** “the degree at which academic staff believes that organisational and technical facilities are available to use Moodle LMS for teaching and learning”.

Diffusion of Innovation (DOI) Theory

Another theory underpinning technology acceptance among academic staff is the theory of Diffusion of Innovation. Everret Rogers (1962) developed the Diffusion of Innovations (DOI) theory as a general diffusion model. The theory describes how an idea or innovation is accepted by a group of people. Rogers (1962) admits and uses technology and innovation interchangeably as most of the studies on diffusion involve technological innovations. Seemingly, Gikenye (2012) posits that innovation can be a technological technique or an idea that can be adopted by a group of people in any social system. Hence, the theory explains how a new idea or a newly developed product can gain momentum or acceptance and spread quickly

among a given population. The endpoint of the diffusion theory is the acceptance of that idea by a person as a new behaviour. Thus, when a user performs an activity with the new idea, differently from the way it used to be performed, this behaviour is described as adoption. The person must perceive the idea or product as an innovation before adoption.

Rogers (2003) asserts that every innovative idea is characterised by five key characters for it to be adopted for diffusion. These characteristics are relative advantage, compatibility, observability, trialability and complexity. Accordingly, Rogers (1962) posits that the fast adoption of an innovation significantly hangs on the benefits and the ease of adoption. This implies that a user adopts a new idea if he finds it suitable, and rejects it if it is difficult to use; thereby limiting its spread among others. An adopted idea influences the user's approach or makes him function differently from others who do not adopt such an idea. This indicates why curriculum delivery of a module or course by an academic who adopts Moodle is enhanced by providing learning materials to his students on the Moodle to access. Thus, to influence the adoption of technology among academics, it is necessary to clearly understand the target population. Conversely, Rogers (1995) and Surry (1997) reiterate four critical factors which include the innovation itself as the influencing factors to diffusion theory. The detailed information about the innovation must be communicated to the users, as well as time and the nature of the social system must be considered when the innovation is being introduced.

Also, Roger's Diffusion of Innovation theory categorises the adopters of innovation into five. They are the innovators, early adopters, early majority, late majority and laggards.

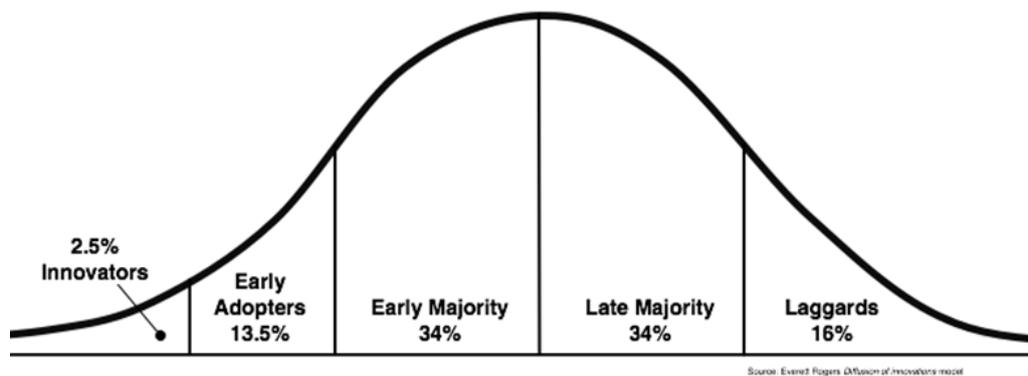


Fig.2. Source: <http://blog.leanmonitor.com/early-adopters-allies-launching-product/>

From the figure above, the majority of the adopters of technology fall into the middle category. However, it is imperative to understand that during the promotion of innovation, different strategies are necessary to be employed in order to appeal to the different adopter. The decision to adopt an innovation can be made individually or collectively, as a group or authority-based.

This study adopts this theory for its rationale to identify individual factors and organisational factors that can promote or hinder the use of Moodle by the academic staff. Its provision for basic analysis is on the basic components of technological innovations, the adoption, diffusion

and communication (Mkhize, Mtsweni & Buthelezi, 2016). Furthermore, the theory has been used in various similar studies to indicate its appropriateness in different contexts for the acceptance of ICT innovations (Harris, 2002). The theory also recognises that the pace of technology diffusion can be slow in some contexts. This explains why innovation with great potential benefits may be quickly adopted.

Moodle as a Learning Management System

The use of Moodle as a functional LMS has been globally embraced in most HEIs in the developed countries. The present digital age of 4IR has driven various electronic learning systems into the education sector as key revolutionary tools for transformation. It serves as an important technological tool that promotes an effective teaching and learning (TAL) process. E-learning is the main enabler that promotes curriculum delivery and provides a variety of learning materials to students outside the traditional classroom settings. Extant literature asserts that e-learning refers to the use of various electronic tools/platforms to present, acquire, generate or disseminate knowledge as a teaching and learning process. Al-Busaidi (2013) and Kibinkiri (2014) posit that e-learning is the usage of different computer technologies to facilitate teaching and learning either as offline and online modes or both, known as internet and intranet. Kent, Laslo and Rafaeli (2016) agree that e-learning is a computer-assisted learning approach that can enhance pedagogical approaches and provides an effective learning experience between both the teachers and students. Thus, with the integration of technology such as electronic learning technologies into the educational space, it is an innovative idea that is now being adopted at various institutions of higher learning (Ohei & Brin, 2019). The influx of e-learning into teaching and learning in different countries has enhanced effective curriculum delivery.

Seemingly, Zhou, Chen and Chen (2019) and Ratheeswari, (2018) report that e-learning has improved teaching processes at various institutions of higher learning. The benefits include ease of content creation, borderless classrooms, removal of location barrier, effective online delivery of lectures, enhanced student's engagement, self-paced learning, an online discussion platform, and instant feedback. It also can support academics on the dissemination of course materials to students, update them on students' activities and also engage them with students. This implies that the adoption of e-learning promotes time flexibility for both the academics and the students. Location is not in any way a barrier to curriculum delivery with the adoption of e-learning by academics (Islam & Azad, 2015). Naresh and Reddy (2015) affirm that with the adoption of Moodle by some countries' academics, students' intakes, as well as courses offered, have been on the increase in developed countries. Thus, the advent of technological tools has increased access to education (Martins & Nunes, 2016).

With the declaration of national lockdown by the South African government, the full adoption of Moodle for curriculum delivery became the best option for South African academics. Teaching and learning activities continue with the use of Moodle (Mhlanga & Molo, 2020).

Though, several studies affirm that Moodle has been used alongside traditional classroom teaching in some South African HEIs for years before now (van de Heyde & Siebrits, 2019; Letseka, Letseka & Pitsoe, 2018; Schutte et al., 2017; Bagarukayo & Kalema, 2015). However, the outbreak of the COVID-19 pandemic forced all learning institutions into full adoption of Moodle for curriculum delivery in education nationwide.

Accordingly, Poon (2013) avows that online learning and traditional physical classroom can be mixed as blended learning. This is a type of learning that is delivered with different ICT tools. Seemingly, Ma, Li and Liang (2019) concur with Atef and Medhatl (2015) that blended learning is very effective in curriculum delivery for new knowledge, skills and also allow the academics to develop a new willingness to learning attitudes in their students, better than the commonly used teacher-driven methods. The introduction of learning technologies such as Moodle into education has impacted students in the motivation to learn new things and this has improved teaching and learning activities in higher institutions (Han & Shin, 2016). Moodle is a software that is developed to ease curriculum delivery.

Furthermore, effective utilisation of Moodle by academics has the potentials of providing adequate access to learning materials to the students without any location barrier, thus, improving the quality of curriculum delivery in the education system (Linna, 2013). This implies why Moodle is adopted into various higher institutions as innovation for blended learning. Macfadyen and Dawson (2010) assert that the use of Moodle enables academics to easily track and monitor their students' academic activities on the LMS. Also, Alghamdi and Bayaga (2016) aver with the use of Moodle; it is easy for academics to plan, organise and deliver curriculum contents for interactive engagement with students, thereby providing instant feedback. The use of Moodle as an applied tool for curriculum delivery does not necessarily promote physical contacts between the academics and their students (Murshitha & Wickramarachchi, 2016). This indicates why Moodle is a classroom without borders where all teaching and learning activities are online (UNESCO, 2020).

However, the adoption of Moodle into education depends on the availability and accessibility of necessary technological resources that can provide adequate technical support, and also there is a need for continuous training of the academics on the effective use of Moodle. Mtebe and Raisamo (2014) report that the adoption of Moodle in African universities is increasing to enhance curriculum delivery. Emelyanova and Voronina (2014) opine that the increase in the adoption of Moodle in higher institutions is significantly influenced by the perception of the academics on the usefulness of the Moodle. The perceived usefulness, perceived ease of use, attitude towards and job relevance are other factors that influence the adoption of Moodle among academics (Alharbi & Drew, 2014). Goh (2013) posits that academics play a significant role in promoting and enhancing Moodle among their students as an electronic learning system. This implies that academics have a huge role in the acceptance and use of Moodle for effective curriculum delivery in higher education institutions.

The use of Moodle is a significant step in today's institutions of higher learning and has become a global trend to deliver quality, enhanced TAL process for academics, supported by necessary training and support for effective use (Rhode et al. 2017; Lin, Wang, Wu & Chen, 2019). However, Lansari et al., (2010) opine that the adoption of various technologies in education does not only improve teaching and learning, it is also a tool for competitive advantage. Though Duygu and Sevgi (2013) in Maina and Nzuki (2015) report that some African institutions are yet to embrace Moodle for curriculum delivery, and this is a serious concern. Webstock and Fisher (2016) opine that various learning technologies have not been maximised by some South African institutions to enhance TAL. Many South African Universities make efforts to use various LMS tools to transform and promote education (Heyde & Siebrits, 2019). Thus, the present pandemic era calls for the full adoption of Moodle by academics to deliver learning materials for teaching and learning activities. This explains why academics should be encouraged, supported and trained to adopt Moodle for curriculum delivery in the system.

Webstock and Fisher (2016) assert that Moodle's successful adoption in many developed countries is based on effective curriculum delivery for any program or course unlike many developing countries, where several challenges have limited its effectiveness. In the words of Bhalalusesa et al. (2013), many of the African universities are still struggling to use Moodle effectively in curriculum delivery, despite its adoption among academics. This is why there is low acceptance of Moodle for full curriculum delivery in African universities such as Kenya, Nigeria, South Africa, Ghana, and Zimbabwe among others (Webstock & Fisher, 2016). Furthermore, Masiello, Ramberg and Kirsti (2005) declare that several factors influence technology adoption in these developing countries; which include lack of basic technical skills among the academics, poor implementation approach and inadequate technological infrastructures. Similarly, Eynon (2005) identifies poor ICT for self-efficacy, technophobia, low level of computer education, age, and gender among other things that affect the adoption of Moodle in Africa.

Bervell and Umar (2017) avow that Moodle is significantly effective in curriculum delivery as reported in most developed countries, although Nair and Patil (2012) observe that the implementation approach in African universities determines its adoption, use and non-use among academic staff. Their level of acceptance and use of Moodle can be influenced by their student's behavioural intention to use Moodle for learning. The students can access Moodle with various tools such as computers, mobile phones, tablets to access learning content online, in group discussions, forums and interaction. The rate of use among academics needs to be encouraged, which explains the rationale for this study among South African universities.

The Use of Moodle for curriculum delivery in higher institutions

The use of Moodle in different higher institutions of learning has become a tool for promoting e-learning activities (Embi et al, 2011). The Moodle is a web-based technology application that is used to design, organise and present course contents, online learning curriculums, virtual

classrooms, conducting assessment and generate learning outcomes (Alenezi, 2018). The Moodle is also significant for the advancement of teaching and learning activities as it provides a more convenient means for students to access learning activities (Kasim & Khalid, 2016). The use of Moodle for curriculum delivery presents academics with new teaching and learning environments via the internet and intranet to promote a blended learning teaching approach at various institutions, thus allowing student engagements, sharing of instructional materials and information (Zaharias & Mehlenbacher, 2012).

Blended learning instruction with the use of Moodle combines traditional face-to-face interactions simultaneously with virtual learning activities. It provides students with diverse opportunities to participate, interact and engage in learning activities at their own pace and location, suitable to them (Govender & Mkhize, 2015). Therefore, the use of Moodle is beneficial to the enhancement of TAL activities as well as curriculum delivery. Its adoption calls for support with all technological infrastructures and adequate computer literacy skills among academics. Although, there are different types of LMS being used at various Universities, some of which include WebCT, Moodle, MyGuru2, iLearn System, PutraLMS, and MyLMS, Blackboard (Kasim & Khalid, 2016). The LMS systems are very important to solve curriculum delivery challenges facing the educational system in the present COVID-19 pandemic globally.

Studies indicate that higher institutions of higher learning in developed countries adopt LMS to provide online teaching and learning activities in the education system (Edutechnica, 2015). Also, a sizeable number of universities in Sub-Saharan Africa are found using LMS for curriculum delivery (Sakai, Atuto, Kewl & Blackboard, 2011). Accordingly, Machado and Tao (2007) say that various classifications of LMS are based on availability, stability, usability, scalability and interoperability. Ulker and Yilmaz (2016) are of opinion that successful implementation of LMS is driven by its usefulness, cost and its suitability to the academics in any university. Availability of the motivational factors for the LMS enhances the way the systems are effectively used for teaching and learning. Open Source (OS) as a form of LMS is free to use, easy to modify to suit the need of the users. Dobre (2015) classifies LMS into open-source, proprietary and cloud-based. According to him, open-source refers to all LMS software applications that are with open source codes (computer codes), available for easy modifications and further improvement or modification, and can be tailored to meet the academic needs of the curriculum delivery. The software provides efficient and alternative ways to promote academic learning at a relatively low cost as well as unrestricted access to academics to design their curriculum content delivery on the LMS (Feller & Fitzgerald, 2000). An example of an open-source LMS commonly used is Moodle LMS.

Moodle is a free Open Source software package developed specifically in 2002 by Martin Dougiamas in Australia to provide support on curriculum delivery, online materials, online teaching and learning materials. Common pedagogical principles have been applied in its creation to create effective online platforms for TAL activities (Subramanian, Zainuddin &

Alatawi, 2014). The software is freely used under the public license but copyrighted access still exists to use, recodify and customise completely. The Moodle is accessed on any internet-connected devices such as a computer, tablet and mobile phones. It allows different activities for both academics and students to be conducted such as assignment management, forums, blogs, quizzes, tracking of student's attendance. The significance of Moodle includes the creation of collaborative learning platforms to deliver learning contents, and tracking of students' learning understanding through various assessments. Moodle also enables self-enrollment opportunities for students to enrol for modules or courses to enable them to access all learning materials for the program, and also interact with other users, and join forums to communicate with a built-in message system (Sumak, Polancic & Hericko, 2010).

The use of different types of LMS across institutions of higher learning in developed countries points out the growth rate of LMS use in higher education (Mkhize et al, 2016; Gasaymeh, 2017; Mtebe & Raphael, 2018). According to Edutechnica (2016), more than 90% of universities in Australia, Canada are actively using LMS for curriculum delivery. Similarly, Zawaidy (2014) reports that many academics in Saudi Arabia explore LMS effectively for curriculum delivery. The use of LMS for curriculum delivery is gradually being embraced on a large scale in most African countries. Munguatosha et al. (2011) report that 80% of the institutions in Tanzania are using different LMS for teaching and learning activities. However, studies indicate that international organisations facilitated the adoption of LMS in some Sub-Saharan Africa to encourage curriculum delivery; organisations such as the World Bank (WB), the African Development Bank Group (AfDB), and the United Nations Development Program (UNDP) provided training and support on LMS (Trucano, Farrell & Isaacs, 2007).

The United States in 2012 through the African Development Bank released a \$15.6million grant to the African Virtual University (AVU) to strengthen e-learning for teaching and learning for all the universities in Africa (Adkins, 2013). Accordingly, the Department of Higher Education and Training, DHET (2013), reports that many South African institutions are embracing several e-learning tools for curriculum delivery. Similarly, Bhalalusesa et al (2013), concur with Elmubark et al. (2013) that the adoption of LMS is gaining momentum in Africa. Related studies affirm the integration of LMS systems into teaching and learning in only four institutions in Zimbabwe (Mtebe & Raisamo, 2014). While Unwin et al. (2010) in their longitudinal study of 358 participants from 25 African countries report the use of LMS in 49% of African universities (Mtebe & Raisamo 2014). In Nigeria, several e-learning systems are being used at the National Open University of Nigerian (NOUN) to promote distance education (Ajadi et al, 2008; Suleiman 2011). Adoption and use of LMS systems are influenced by many factors (Sanchez & Hueros, 2010; Sumak, Hericko, Pusnik, & Polancic, 2011; Kumar & Samalia, 2015; Suradi & Yusoff, 2018) are among the academics as identified earlier. Kunene (2020) summarises the factors as perceived ease of use, system trust and user satisfaction

among academics. Thus, the use of Moodle among academics can be influenced by many of these factors as established by various studies.

CHALLENGES OF MOODLE'S USE BY ACADEMICS IN DEVELOPING COUNTRIES

Many studies have been conducted to establish factors that affect online teaching and learning activities during COVID-19, with particular references to students in higher institutions. Authors indicate various problems militating against curriculum delivery during the pandemic. Gratz and Looney (2020) in their study conducted in the United States of America, report inadequate skills of online teaching, lack of adequate time to prepare online learning materials or contents, as some of the challenges against academics in the use of Moodle for curriculum delivery. Similarly, Arora and Srinivasan (2020) opine that the issues of the network, inadequate computer training, inadequate awareness, a lack of interest, fewer students' attendance, lack of personal experience with the students and lack of students' interaction with one another are limitations faced by teachers in the online teaching-learning process. Moreover, Kaup et al. (2020) highlight challenges of using Moodle among academics to include inadequate knowledge of technology, inadequate training for academics and students' engagement during the COVID-19 pandemic.

This implies that academics may not have equal and adequate access to sufficient infrastructure which include configured laptops, internet facilities and a conducive environment to effectively impart knowledge. Some academics may be faced with connectivity issues, system failure, bandwidth issues, etc. during online teaching, and their lack of technical knowledge may frustrate their ability to resolve such problems. Verma et al. (2020) reflect that some higher institutions do not have well-trained academics that are capable of working remotely online to deliver curriculum contents through online platforms only. During the COVID-19 pandemic, academics are expected to facilitate online teaching and learning from the comfort of their homes, thereby creating a technological challenge for some old aged academics who do not possess technical expertise for online teaching (Sharma, 2020). The academics are also confronted with students who many at times may be undisciplined or not serious, some of whom may be playing music, making noise, during online classrooms or posting negative comments (Punit & Qz.com, 2020).

Teaching from the comfort of academics' home environment settings may be challenging to prepare, design and deliver curriculum contents and maybe exhausting and demotivating. Buabeng-Andoh (2012) posits that academic-level, institution -level and system-level barriers influence academics' use of technology for teaching and learning. In the words of Lloyd et al. (2012), institutional barriers, interpersonal barriers, inadequate facilities, and technological know-how barriers have been identified as barriers to online teaching and learning in some south-Eastern higher institutions in the United States of America. Haber and Mills (2008)



further affirm lack of training, the size of the higher institutions and the complexity of the curriculum as some hindrances to the effective use of online teaching in Florida.

While Al-Senaidi et al. (2009) aver lack of necessary equipment, lack of adequate institutional support, users' perceptions on the benefits of Information and Communications Technology (ICT), lack of subject confidence and inadequate time are some of the barriers against online teaching and learning in Oman. Additionally, Berge and Mrozowski (1999) classify barriers to curriculum delivery through online teaching and learning as technical, student support, fiscal, geographic, legal, governance, labour management, academic and cultural. Some academics may resist curriculum delivery through online platforms due to a negative attitude, lack of time, lack of ICT competence, computer self-efficacy, and lack of technological support (Peralta & Costata, 2007; Keengwe et al., 2008; Yuen & Ma, 2008; Chen, 2010; Prottas et al., 2016; Mthethwa-Kunene, & Maphosa, 2020). It is also noted that some institutions may not support their academics with adequate resources to enhance them to develop quality online learning materials (Taylor, 2002).

CONCLUSIONS

The challenges of using Moodle by lecturers differ from developed to developing countries. It is mandatory to use Moodle for curriculum delivery in this present era of the COVID-19 pandemic, where physical contacts have been limited for social distancing. Academic activities must continue despite the pandemic, to salvage the academic calendar. Hence, Moodle is an effective approach to deliver curriculum to students in their different locations. This study reaffirms the significance of academics' use of different Moodle platforms to deliver the curriculum in South African universities. The study ascertains that the Moodle LMS platform has many benefits in designing and presenting curriculum contents, as well as assessments of students by the academics. The study concludes that Moodle as the LMS platform has various challenges that should be addressed by the universities for academics to effectively use the platforms for teaching and learning.

RECOMMENDATIONS

However, to ensure the maximum benefits of LMS platforms in South African higher institutions, the study recommends based on findings from several longitudinal studies (Elmahadi & Osman 2013; Mtebe & Raisamo 2014) to improve the low rate of Moodle use among the lecturers in South Africa (Tagoe, 2012; Bhalalusesa et al, 2013; Chioma et al, 2018). The usage of Moodle systems among some academics needs to be encouraged to enhance effective curriculum delivery during the pandemic era. To achieve this, the following recommendations have been suggested:

- Higher education institutions' planning: South African education sector should place more importance on the use of learning technologies and provides diverse measures for

technology-driven teaching and learning, and assessments in higher institutions. The HEI should revise existing teaching and learning policy frameworks to accommodate new strategies and technical structures that can support academics for e-learning. This review will advocate and promote the full use of technology-driven platforms in future crises/pandemics. The technology-driven platforms will allow students' attendance, content delivery, submission of assignments, online examinations through the use of electronic devices, software, internet connectivity and power back-up for significant evaluations and results.

- Academics: self-development of academics is necessary for adequate use of technology in education. The global trend of the partnership between education and technology is a product of the Fourth Industrial Revolution (4IR) that every nation must align with. Regular and adequate professional development of academics will enable them to be prepared for quality online teaching and to address the challenges of conducting online classes and assessments. According to Ajani (2019), regular professional development enables academics to be empowered for online teaching and assessments. South African HEIs should support their academics adequately with regular training on technology-driven education to enhance online teaching perspectives.
- Technological infrastructures: Inadequate availability of technical infrastructures and irregular interrupted internet connectivity are the biggest infrastructural challenge confronting the HEIs and academics in South Africa. Government, network providers, technology companies and higher education institutions can partner to solve various problems of technical infrastructures. Public-private investment in institutional-supported technologies can be explored by the HEIs through Government financial support to reduce the financial burden on the institutions, and to enhance technological infrastructures for online teaching and assessments.
- Promotion of sustainable development into HEIs to prepare curriculum delivery for both conventional teaching and online teaching will aid the integration of learning technologies into teaching and learning. The development of curriculum contents for online teaching and assessment plans will be strategic to online teaching, learning and assessments in the classroom. Furthermore, the use of online teaching and assessment will discourage the use of paper and promote a sustainable environment; it will also encourage digital literacy among academics and their students. Thus, giving them exposure to the digital world – which makes them employable for social sustainability. These are geared towards economic sustainability.



REFERENCES

- Ajadi, T., Salawu, O. & Adeoye, F., (2008). E-learning and Distant Education in Nigeria, *Turkish Online Journal of Educational Technology*, 7(4), 61-70.
- Ajani, O.A. (2019). Understanding Teachers as Adult Learners in Professional Development Activities for Enhanced Classroom Practices, *AFFRIKA Journal of Politics, Economics and Society*, 9 (2), 195-208.
- Al-Busaidi, K. A. (2013). An empirical investigation linking learners' adoption of blended learning to their intention of full e-learning. *Behaviour & Information Technology*, 32(11), 1168-1176.
- Alenezi, A., (2018). Barriers to Participation in Learning Management Systems in Saudi Arabian Universities. *Education Research International*, 2018. <https://doi.org/10.1155/2018/9085914>.
- Alghamdi, S.R. & Bayaga, A., (2016). Use and attitude towards Learning Management Systems (LMS) in Saudi Arabian universities. *Eurasia Journal of Mathematics, Science & Technology Education*, 12(9), 2309-2330.
- Alharbi, S. & Drew, S., (2014). Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. *International Journal of Advanced Computer Science and Applications*, 5(1), 143-155.
- Al-Senaidi, S., Lin, L. & Poirot, J. (2009). Barriers to adopting technology for teaching and learning in Oman, *Computers and Education*, 53 (3), 575-590.
- Arora, A.K. & Srinivasan, R. (2020). Impact of pandemic COVID-19 on the teaching-learning process: a study of higher education teachers, *Prabandhan: Indian Journal of Management*, 13 (4), 43-56.
- Atef, H. & Medhat, M., (2015). Blended learning possibilities in enhancing education, training and development in developing countries: A case study in graphic design courses. *TEM Journal*, 4(4), 358-365.
- Berge, Z.L. and Mrozowski, S.E. (1999), Barriers to Online Teaching in Elementary, Secondary, and Teacher Education, *Canadian Journal of Educational Communication*, 27(2): 59–72.
- Bervell, B., & Umar, I. N. (2017). A decade of LMS acceptance and adoption research in Sub-Saharan African higher education: A systematic review of models, methodologies, milestones and main challenges. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(11), 7269-7286.
- Bhalalusesa, R., Lukwaro, E. E., & Clemence, M. (2013). Challenges of using E-learning Management Systems Faced by the Academic Staff in Distance Based Institutions from Developing Countries: A Case Study of the Open University of Tanzania. *Huria: Journal of the Open University of Tanzania*, 14, 89–110.



- Bhatiasevi, V. (2016). An extended UTAUT model to explain the adoption of mobile banking. *Information Development*, 32(4), 799-814.
- Buabeng-Andoh, C. (2012). Factors influencing teachers adoption and integration of information and communication technology into teaching: a review of the literature, *International Journal of Education and Development Using ICT*, 8, 136-155.
- Chen, R.J. (2010). Investigating models for pre-service teachers' use of technology to support student-centred learning, *Computers and Education*, 55 (1), 32-42.
- Cloete, A. L. (2017). Technology and education: Challenges and opportunities. *HTS Theological Studies*, 73(4), 1-7.
- Coleman, E. & Mtshazi, S., (2017). Factors affecting the use and non-use of Learning Management Systems (LMS) by academic staff. *South African Computer Journal*, 29(3), pp.31-63
- Coleman, E., & Mtshazi, S. (2017). Factors affecting the use and non-use of Learning Management Systems (LMS) by academic staff. *South African Computer Journal*, 29(3), 31-63.
- DHET, (2013). White Paper for Post-School Education and Training: Building an expanded, effective and integrated post-school system. *Department of Higher Education and Training, Pretoria, South Africa*.
- Dobre, I. (2015). Learning Management Systems for a higher education-an overview of available options for Higher Education Organizations. *Procedia-social and behavioural sciences*, 180, 313-320.
- Edutechnica: LMS Data – Spring 2015 Updates.
(2015). <http://edutechnica.com/2015/03/08/lms-data-spring-2015-updates>.
- Elmubark, A. Y., Cronje, J. C., & Osman, I. M. (2013, May). A framework for investigating universities readiness for on-line learning: With particular reference to Sudanese universities. In *2013 IST-Africa Conference & Exhibition* (pp. 1-13). IEEE.
- Embi, M. A., Abdul Wahab, Z., Sulaiman, A. H., Atan, H., Ismail, M., & Mohd Nordin, N. (2011). E-learning in Malaysian higher education institutions: Status, trends, & challenges. *Department of Higher Education Ministry of Higher Education*.
- Emelyanova, N., & Voronina, E. (2014). Introducing a learning management system at a Russian university: Students' and teachers' perceptions. *International Review of Research in Open and Distributed Learning*, 15(1), 272-289.
- Evans, N. D. (2013). *Predicting user acceptance of electronic learning at the University of Zululand* (Doctoral dissertation, University of Zululand).
- Evans, N., & Mutula, S. (2015). Predicting the acceptance of electronic learning by academic staff at the University of Zululand, South Africa. *Mousaion*, 33(4), 1-22.



- Eynon, R. (2005). The use of the internet in higher education: Academics' experiences of using ICTs for teaching and learning. *Aslib Proceedings*, 57 (2), 168-180.
- Feller, J., & Fitzgerald, B. (2000). A framework analysis of the open-source software development paradigm. In *ICIS 2000 proceedings of the twenty-first international conference on information systems*. Association for Information Systems, Atlanta, GA, 58-69.
- Gasaymeh, A.M.M. (2017). University Students Use of WhatsApp and their Perceptions Regarding its Possible Integration into their Education. *Global Journal of Computer Science and Technology*, 17 (1), 1-10.
- Gikenye, W. (2012). The diffusion of mobile phones for Business and Information Management in Kenya. *Journal of Gender, Information and Development in Africa (JGIDA)*, 1(1), 43-56.
- Goh, T. T. (2013). *A framework for multiplatform e-learning systems* (Doctoral dissertation, Tese de Doutorado. Massey University. New Zealand. 2007. Disponível em :< <http://mro.massey.ac.nz/handle/10179/1576>>. Acesso em: 10 set).
- Govender, D. (2018). Postgraduate Supervisory Relationship: Experiences at an Open Distance Learning Institution. *International Journal of Education and Science*, 20(1-3), 9-17.
- Govender, I., & Mkhize, M. (2015). E-Learning in Place of Face-to-face Lectures: An Exploratory Study of Students' Perceptions. *Alternation Journal*, 22(1), 183-203.
- Gratz, E. & Looney, L. (2020). Faculty resistance to change: an examination of motivators and barriers to teaching online in higher education, *International Journal of Online Pedagogy and Course Design*, 10 (1), 1-14.
- Haber, J. & Mills, M. (2008). Perceptions of barriers concerning effective online teaching and policies: Florida community college faculty, *Community College Journal of Research and Practice*, 32 (4-6), 266-283.
- Han, I. & Shin, W.S. (2016). The use of a mobile learning management system and the academic achievement of online students. *Computers & Education*, 102, 79-89.
- Holtz, B., & Krein, S. (2011). Understanding nurse perceptions of a newly implemented electronic medical record system. *Journal of Technology in Human Services*, 29(4), 247-262.
- Islam, A.N. & Azad, N. (2015). Satisfaction and continuance with a learning management system: Comparing perceptions of educators and students. *The International Journal of Information and Learning Technology*, 32(2), 109-123.
- Kasim, N.N.M. & Khalid, F. (2016). Choosing the right learning management system (LMS) for the higher education institution context: a systematic review. *International Journal of Emerging Technologies in Learning (IJET)*, 11(06), 55-61.



- Kaup, S., Jain, R., Shivalli, S., Pandey, S. & Kaup, S. (2020). Sustaining academics during COVID-19 pandemic: the role of remote teaching-learning, *Indian Journal of Ophthalmology*, 68 (6), 1220-1221.
- Keengwe, J., Onchwari, G. & Wachira, P. (2008). The use of computer tools to support meaningful learning, *AACE Journal*, 16 (1), 77-92.
- Kent, C., Laslo, E., & Rafaeli, S. (2016). Interactivity in online discussions and learning outcomes. *Computers & Education*, 97, 116-128
- Kibinkiri, E. L. (2014). *The Role of E-learning on the Professional Development of Student-teachers in Cameroon* (Doctoral dissertation, University of South Africa).
- Kumar, D., & Samalia, H. V. (2015). Learning management system adoption in universities-perception about moodle as a pedagogical tool in a private university in India. *Editorial Advisory Board*, 6, 169.
- Lansari, A., Tubaisat, A. & Al-Rawi, A. (2010). Using a learning management system to foster independent learning in an outcome-based university: A gulf perspective. *Proceedings of Issues in Informing Science and Information Technology*, 73-87.
- Lin, Y., Wang, S., Wu, Q. and Chen, L. (2019). Key Technologies and Solutions of Remote Distributed Virtual Laboratory for E-Learning and E-Education. *Mobile Networks and Applications*, 24(1), 18-24.
- Linna, P. (2013). Experiences of designing an e-learning training program collaboratively. *IST-Africa 2013*, 1-10.
- Lloyd, S. A., Byrne, M. M., & McCoy, T. S. (2012). Faculty-perceived barriers of online education. *MERLOT Journal of Online Learning and Teaching*, 8(1), 1–12.
- Macfadyen, L.P. & Dawson, S. (2010). Mining LMS data to develop an “early warning system” for educators: A proof of concept. *Computers & Education*, 54(2), 588-599.
- Machado, M., & Tao, E. (2007). Blackboard vs. Moodle: Comparing user experience of learning management systems. In *2007 37th annual frontiers in education conference-global engineering: Knowledge without borders, opportunities without passports* (pp. S4J-7-S4J-14). IEEE.
- Maina, M. K., & Nzuki, D. M. (2015). Adoption determinants of e-learning management system in institutions of higher learning in Kenya: A Case of selected universities in Nairobi Metropolitan. *International Journal of Business and Social Science*, 6(2), 233-248.
- Martins, J., & Baptista Nunes, M. (2016). The temporal properties of e-learning: an exploratory study of academics ‘conceptions, *International Journal of Educational Management*, 30 (1), 2-19.
- Masiello, I., Ramberg, R., & Lonka, K. (2005). Attitudes to the application of a Web-based learning system in a microbiology course. *Computers & Education*, 45(2), 71–185.



- Mkhize, P., Mtsweni, E. S., & Buthelezi, P. (2016). Diffusion of innovations approach to the evaluation of learning management system usage in an open distance learning institution. *International Review of Research in Open and Distributed Learning*, 17(3), 295-312.
- Mtebe, J. S., & Raisamo, R. (2014). Investigating perceived barriers to the use of open educational resources in higher education in Tanzania. *International Review of Research in Open and Distance Learning*, 15(2), 43–65.
- Mtebe, J.S. & Raphael, C. (2018). Key factors in learners' satisfaction with the e-learning system at the University of Dar es Salaam, Tanzania. *Australasian Journal of Educational Technology*, 34(4), 107-122.
- Mthethwa-Kunene, K. E., & Maphosa, C. (2020). An Analysis of Factors Affecting Utilisation of the Moodle Learning Management System by Open and Distance Learning Students at the University of Eswatini. *Humanities*, 5 (1), 17-32.
- Murshitha, S. M., & Wickramarachchi, A. P. (2016). An LMS usage assessment among students in a blended learning environment. *Journal of Information Systems & Information Technology (JISIT)*, 1 (2), 1-7.
- Mutsvunguma, G. (2019). *Institutional repositories as platforms for open access in South African universities: the case of the University of KwaZulu-Natal* (Doctoral dissertation).
- Nair, S.C. & Patil, R. (2012). A study on the impact of learning management systems on students of a university college in Sultanate of Oman. *International Journal of Computer Science Issues (IJCSI)*, 9(2), p.379.
- Naresh, B., & Reddy, B.S. (2015). Challenges and Opportunity of ELearning in Developed and Developing Countries-A Review. *International Journal of Emerging Research in Management & Technology*, 4 (6), 259 -262.
- Ohei, K.N. & Brink, R. (2019). A framework development for the adoption of information and communication technology web technologies in higher education systems, *South African Journal of Information Management* 21(1), a1030. <https://doi.org/10.4102/sajim.v21i1.1030>
- Owolabi, K. A. (2017). *Access and use of clinical informatics among medical doctors in selected teaching hospitals in Nigeria and South Africa*. A PhD dissertation, University of Zululand.
- Peralta, H., & Costa, F.A. (2007). Teachers' competence and confidence regarding the use of ICT. *Educational Sciences Journal*, 3, 75-84.
- Poon, J., (2013). Blended learning: An institutional approach for enhancing students' learning experiences. *Journal of online learning and teaching*, 9(2), 271-288.
- Prottas, D.J., Cleaver, C.M. & Cooperstein, D. (2016), Assessing faculty attitudes towards online instruction: a motivational approach, *Online Journal of Distance Learning Administration*, 19(4).

- https://www.westga.edu/~distance/ojdla/winter194/prottas_clever_cooperstein194.html.
- Punit, I.S. & qz.com (2020). *For many of India's teachers, online classes amid lockdown have been an awful experience*, Scroll. in, available at <https://scroll.in/article/961738/for-many-of-indias-teachers-online-classes-amid-lockdown-have-been-an-awful-experience> (accessed 23 August 2020).
- Quadri, G., & Garaba, F. (2019). Perceived Effects of ICT on Knowledge Sharing among Librarian in South-West Nigeria: A UTAUT Theoretical Approach. *Journal of Balkan Libraries Union*, 6(1), 38-46
- Ratheeswari, K. (2018). Information Communication Technology in Education, *Journal of Applied and Advanced Research*. 3 (1), 45-47. <https://doi.org/10.21839/jaar.2018.v3i1.169>.
- Rhode, J., Richter, S., Gowen, P., Miller, T. & Wills, C., 2017. Understanding Faculty Use of the Learning Management System. *Online Learning*, 21(3), 68-86.
- Rogers, E.M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
- Rogers, E.M. 1995. *Diffusion of Innovations*, Fourth Edition. New York: Free Press.
- Sackstein, S., Coleman, E., & Ndobe, T. V. (2019). Lecturers' Perceptions of Learning Management Systems within a Previously Disadvantaged University. In *Opening up Education for Inclusivity across Digital Economies and Societies* (pp. 1-28). IGI Global.
- Sharma, A.K. (2020). *COVID-19: creating a paradigm shift in India's education system*, Economic Times Blog, available at <https://economictimes.indiatimes.com/blogs/et-commentary/covid-19-creating-a-paradigm-shift-in-India's-education-system/>. Accessed on 31 July 2020.
- Subramanian, P., Zainuddin, N., Alatawi, S., Javabdeh, T., & Hussin, A. R. C. (2014). A study of comparison between Moodle and Blackboard based on case studies for better LMS. *Journal of Information Systems Research and Innovation*, 6, 26-33.
- Suleiman, A. A., (2011). Essentialities for e-learning: the Nigerian tertiary institutions in question. *Academic Research International Journal*. 1 (2), 2011.
- Sumak, B., Heričko, M., Pušnik, M., & Polančič, G. (2011). Factors affecting acceptance and use of Moodle: An empirical study based on TAM. *Informatica*, 35(1), 91-100.
- Sumak, B., Polancic, G., & Hericko, M. (2010, February). An empirical study of virtual learning environment adoption using UTAUT. Paper presented at the *2010 Second international conference on mobile, hybrid, and on-line learning* (pp. 17-22). IEEE.
- Surry, D. W. (1997). *Diffusion Theory and Instructional Technology*, [Online]. Retrieved, from <http://www.gsu.edu/~wwwitr/docs/diffusion/>.
- Taylor, C.R. (2002). "E-learning: the second wave", *T and D*, 56 (10), 24-31.
- Trucano, M., Farrell, G., & Isaacs, S. (2007). *Survey of ICT and education in Africa: A summary report based on 53 country surveys*. Washington DC: World Bank.



- Tzeng, J. Y., & Chen, S. H. (2012). College students' intentions to use e-portfolios: From the perspectives of career-commitment status and weblog-publication behaviours. *British Journal of Educational Technology*, 43(1), 163-176.
- Ulker, D., & Yilmaz, Y. (2016). Learning management systems and comparison of open-source learning management systems and proprietary learning management systems. *Journal of systems integration*, 7(2), 18-24.
- UNESCO, (2020), COVID-19 Educational Disruption and Response, UNESCO, available at <https://en.unesco.org/covid19/educationresponse> (accessed 16 June 2020).
- Van de Heyde, V., & Siebrits, A. (2019). The Ecosystem of e-learning Model for Higher Education. *South African Journal of Science*, 115 (5/6), 1-6. doi.org/10.17159/sajs.2019/5808.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27 (3), 425-478.
- Webbstock, D., & Fisher, G. (2016). *South African higher education reviewed: Two decades of democracy*. Pretoria: Council on Higher Education.
- Yuen, A.H. & Ma, W.W. (2008), "Exploring teacher acceptance of e-learning technology", *Asia-Pacific Journal of Teacher Education*, 36 (3), 229-243.
- Zaharias, P., & Mehlenbacher, B. (2012). Exploring User Experience (UX) in virtual learning environments. *International Journal Hum.-Computer Studies*, 70, 475-477.