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Open Distance E-Learning System in the Institutions of Higher Learning in South Africa

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ABSTRACT

The purpose of the study was to investigate the application of open-distance e-learning systems in the institutions of higher learning to encounter pandemic and student population increase in South Africa. The in-class contact teaching and learning system can have very serious negative effects on students when it comes to a limitation of intake to universities and lockdowns in relation to outbreaks like Covid-19. This study applies the literature to develop a framework for using the open-distance electronic learning system (Open Distance e-learning – ODeL). The study discovered that institutions of higher learning, especially contact institutions, could face risks and disruptions that may result in the suspension of academic programmes. The study provides a framework for the possible adoption of the Open Distance e-learning (ODeL) system by institutions of higher learning. The results of this study will provide alert and guidance to institutions of higher learning about the adoption of open-distance e-learning to accommodate all interested students and ensure continuity of learning during a pandemic like COVID-19. The framework provided will assist institutions of higher learning with the how-to in terms of implementation of Open Distance e-learning in case they decide to adopt it. Learners will be able to get admitted and enjoy learning in any institution of their choice without any limitation due to space shortage and institutions may ensure continuity in teaching and learning for their educational business even during the pandemic.

KEYWORDS: ODeL, open distance education, electronic learning, e-learning system, COVID-19, higher learning institutions

INTRODUCTION

Institutions of higher learning are affected by various anomalies every year when it comes to teaching and learning, especially universities that render only class contact lessons in South Africa, including but not limited to the high influx of students' applications for admission and the recent COVID-19 virus, that have recently brought the world to a standstill under lockdown, with governments instructing citizens to remain within their households. The application of virtual or online learning technologies has grown tremendously in the past three decades to transform the modus operandi in the institutions of higher learning based on many reasons including e-pedagogy (Bharuthram & Kies, 2013). "Shifts in technology-enhanced pedagogical practices and in discourses around information and communication technologies (ICTs) have had varying degrees of influence in higher education" (Ng'ambi, Brown, Bozalek, Gachago, & Wood, 2016). Research suggests that online learning has been shown to increase retention of information, take less time, is flexible and adaptable to disruptions and changes such as those imposed by the

coronavirus which might be here to stay (World economic forum, 2020). Zongozzi (2020) also support the statement attesting that "ODeL has gained popularity in the South African higher education sector in recent times". Recently, like it happened across different countries in the universe "South African universities have been forced to transit from face-to-face to online learning (e-learning) as a result of the coronavirus pandemic (COVID-19). However, various challenges hinder disadvantaged students from realising the full potential of e-learning" (Mpungose, 2020).

Seemingly Covid-19 (Coronavirus) has come to change the modus operandi in institutions of higher learning for good. Across the universe more than 1.2 billion students are closed out of their learning institutions at different levels from primary to tertiary levels due to Covid-19, which requires more innovative strategies for continuity in teaching and learning (Krönke, 2020; UNESCO, 2020). The situation became worse to the African countries due to poor infrastructure, lack of technological operational skills and lack of fundamental resources (Krönke, 2020; Krönke and Olan'g, 2020; United Nations, 2019; UNESCO Institute of Statistics, 2016). According to OECD policy responses to coronavirus (2020), as a result of the pandemic, training that were planned to be conducted in the classrooms are now shifted to take place online with people encouraged to learn at their own homes or environments. World economic forum (2020) attests that "the Covid-19 has changed education forever". This pandemic called Covid-19 has forced schools to shutdown worldwide and as a results more than 1.2 billion children had to stay at home (World economic forum 2020). World economic forum (2020) further state that as a result of covid-19 "education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms". Since the pandemic outbreak requires the application of social distance and lockdown at some stages for citizens, electronic learning (e-learning) may be a way to deal with the situation and may also be used as a solution for other teaching and learning anomalies. World economic forum (2020) state that due to the corona virus pandemic some companies started offering free online learning platform. One may wonder whether this global sudden change from classroom lesson to online platform lessons will bring about a paradigm shift forever in the education system worldwide (World economic forum, 2020), as a permanent solution to several anomalies burdening the educational system since times in memorial. "Although it is too soon for a full assessment, early data and anecdotal evidence suggest a sizeable increase in online learning" (OECD policy responses to coronavirus, 2020).

The concept "anomalies" is defined by Business dictionary (2020) as "a deviation from the norm; something unusual". Merriam- Webster learner dictionary (2020) defines it as something that is not usual or not expected. It is also defined as "something that is unusual enough to be noticeable or seem strange. A person or thing that is different from what is usual, or not in agreement with something else and therefore not satisfactory" (Cambridge dictionary 2020). For instance, in South Africa every learner who is qualified for tertiary education admission is expected to be afforded opportunity for admission to any institution of higher learning of their choice and that is impossible due to high population growth and limited number of tertiary institutions, which result in some students remaining at home or study what is out of their dreams at the institution not preferred by students. On the other side, with or without the coronavirus outbreak students are supposed

to be proceeding with their learning process at different academic institutions of higher learning. This is especially because learners already paid fees for the current academic year of study and repeating their studies to the following year may pose a serious progress delay as their age is going up. This is unlike with the application of e-Learning system to which unlimited number of students may be admitted from different areas annually and the lessons proceedings even during the corona virus pandemic.

Generally, "the use of the term e-Learning is rapidly changing … the content and approaches to e-learning" (Hussin, Bunyarit & Hussein 2009; Queiros and de Villiers 2016). The concept eLearning was explained in the TechLearn Conference held in November 1999 by Elliott Masie as "the use of network technology to design, deliver, select, administer, and extend learning" (ISpring 2019). The introduction of smartphones, tablets and other mobile devices in the beginning of the year 2000, promoted the adoption or application of eLearning since people were able to use such devices for watching videos, e-books reading and even playing several educational games online. Nowadays, mobile devices are popularly used for eLearning, education and running business. eLearning system is always convenient because is always available for the learners with availability of their mobile devices (ISpring 2019). ELearning takes place electronically online with students acquiring knowledge or attending to their lessons using internet and electronic materials and devices (Tamm, 2019).

There are lot of benefits from eLearning, which include convenience, wider coverage, single knowledge base, faster development, easy progress tracing, flexibility, easy to adapt to learners. eLearning may take the shape of many different applications tools such as webinars, video courses, screencast, talking-head video, eBook and articles, conversation simulation, VR simulation, Podcast, Mailing list (ISpring 2019). The other benefit is that with eLearning, students are able to use their own pace and environment in learning, learning is cost effective and efficient (Tamm 2019).

The term was preceded by the use of terms such as "open distance learning, web-based training (WBT), computer-based training (CBT), technology-based learning and online learning" (Hussin, Bunyarit and Hussein 2009). E-Learning has gained extensive popularity in institutions of higher learning, mostly because of high student intakes and annual enrolment which bring about high demand for resources (Jaiyeoba & Iloanya 2019; Liaw 2008; Mutula 2002). The terms "e-Learning" and "online learning" are often used interchangeably in the field. In this regard Eke (2010) points out that they differ in that e-learning may refer to learning through technology and online learning is learning through the web. He further states that, although the two terms are similar because they are both used to refer to distance learning, the differences between them are significant. E-Learning includes many applications such as computer-based learning, web-based learning, virtual classrooms, and digital collaboration (Burac, Fernandez, Cruz & Cruz 2019; Eke 2010). The learning is delivered through different electronic media such as the Internet, intranets, extranets, satellite broadcasts, audio/video tape, the telephone, interactive television and CD-ROM (Hussin, Bunyarit & Hussein 2009; Eke 2010). By contrast, online learning is rendered through a single mode of technology which effects learning by means of only the "internet, intranet, and extranet" (Eke 2010). It entails learning courses that consist of text and graphics and also include exercises and tests which are marked and scored with recordkeeping online. Advanced

online learning may also cover the application of "animations, simulations, audio and video sequences, peer and expert discussion groups, online mentoring, links to material on a corporate intranet or the web, and communications with the corporate education records" (Eke 2010; Van de Heyde & Siebrits 2019). However, there are many other terms that are used as if they mean the same in e-Learning. In this regard, Hussin, Bunyarit, and Hussein (2009) state the following:

> *The terms distance education and distance learning are often used interchangeably. The definitions for distance learning vary from a term used to describe a more student-centered approach to distance education to a synonym for distance education. Distance education is an instruction that takes place in different locations; that is, the professor and students are separated by distance and time and communicate via media. In distance education courses, the instruction is prepared and packed days, weeks, months, or a year before the act of learning by the student. This time difference creates an environment quite distinct from the typical face-to-face instruction of the college classroom where the teaching and learning take place in the same time frame and with the professor and student in the same room.*

Furthermore, e-Learning can be adopted in two different ways, known as synchronous and asynchronous (Cantoni 2004; Eke 2010). In synchronous e-learning, internet technology is used to conduct class live in order to lecture or interact with students. On this learning platform many things happen as if in a normal physical contact classroom, such as "lessons, assignments, chats, instant messaging, blogging, and forums" (Eke 2010; Hadullo, Oboko & Omwenga 2017), and students are able to ask questions and get a response from the lecturer. The challenge may be an interruption in power supply, loss of network access, or slow system response (Eke 2010), which may result in students frequently lost from class. Teaching and learning in asynchronous e-Learning is totally based on the web or computer, with lecturer and students interacting exclusively on the computer or the web in different times, using either CD-ROM or local area network (Takalani 2008; Eke 2010). The study by Queiros and de Villiers (2016) discovered that eLearning requires the following connections which are fundamentally essential to succeed.

- Strong social presence such as timely feedback, interaction with facilitators, peer-to-peer contact, discussion forums, and collaborative activities).
- Technological aspects such as technology access, online learning self-efficacy, and computer self-efficacy and
- Tools such as websites, video clips, and many more.

"In Africa, e-learning is at its infant stage, but it has some benefits which it offers as a means of increasing access to and improving the quality of education in Africa" (Eke 2010). Hadullo, Oboko, and Omwenga (2017) also attest to that as they underscore that adoption of ICT for educational system enhancement is still left far behind in developing countries. This is due to poor infrastructure relating to electricity supply, computer hardware, and network facilities for an internet connection. Africa is supposed to be dominant in e-Learning since students in countries on the continent are mostly from

marginalized backgrounds and isolated geographical areas of settlement or underprivileged citizens that are also difficult to reach (Jaiyeoba & Iloanya 2019; Teo 2011; Oladokun 2002; Mutula 2002; Queiros & de Villiers 2016; Bharuthram & Kies 2013). "Online learning is a means of reaching marginalized and disadvantaged students within South Africa" (Queiros & de Villiers 2016). Coetzer and Mapulanga (2020) stress that "information and communication technology has changed the face of higher education by facilitating e-learning". This implies that the open distance electronic learning (ODeL) system brings about solutions to many academic challenges faced by institutions of higher learning. Despite the evolution of technologies, many universities in South Africa are still not able to accommodate a large number of students because of limitations in physical space. Yet, information and communication technology (ICT) has created vast opportunities in the way learners and educators acquire and deliver information and knowledge (Eke 2010). The situation forces academic institutions to adopt the current technology to face modern challenges with ease. However, Queiros and de Villiers (2016), underscore that students' situations and perceptions need more attention in developing countries in case institutions of higher learning want to move their learning modus operandi to be rendered through online systems. The institutions should also divine some means to accommodate all students including those that are underprivileged and lacking technological skills without education and learning quality sacrifice.

Technology can assist academic institutions in mitigating the impact of health-threatening pandemic outbreaks like Coronavirus disease (COVID-19). Technology will afford institutions the flexibility to offer academic services even when the country is locked down because of an unprecedented COVID-19 outbreak. Unfortunately, COVID-19 revealed the glaring inequality in the South African higher education sector because most historically advantaged institutions (HAIs) had the capability to offer alternative online teaching platforms. On the other hand, the historically disadvantaged institutions (HDIs) with their limited resources and capabilities found it difficult to implement alternative teaching strategies. However, the sudden and unprecedented changes affected staff and students attached to both HAIs and HDIs because there was considerable uncertainty and concern over issues such as skills for virtual learning, connectivity, infrastructure, appropriate devices, and unfavorable study environments for some students.

A synopsis of the higher education sector in South Africa

Currently South Africa has 26 public universities, with the majority rendering in-class contact education. Though some render distance or virtual education partially for selected qualifications, the University of South Africa (UNISA) is the only university in the country that renders full distance learning and teaching, although it also partially provides in-class contact learning and teaching through tutorship. This regularly results in anomalies in admission aimed at accommodating all students and furthering teaching and learning during pandemic outbreaks. This is because with the e-learning system, the university may admit an unlimited number of students without turning any students away, since the limitation is not related to physical space in class, unlike in the case of its in-class contact university counterparts. With e-learning, social distance is always maintained, and this may cater to pandemic outbreaks like COVID-19 when they happen. The universities in South Africa are listed below, in no particular order:

1. University of Fort Hare
2. University of Stellenbosch
3. University of Johannesburg
4. North-West University
5. Rhodes University
6. Nelson Mandela University
7. University of Pretoria
8. Mpumalanga University
9. University of South Africa
10. University of KwaZulu-Natal
11. University of the Witwatersrand
12. University of Venda
13. University of Limpopo
14. Sol Plaatje University
15. Walter Sisulu University
16. University of Cape Town
17. Sefako Makgatho Health Sciences
18. University of Zululand
19. University of the Free State
20. University of the Western Cape
21. Durban University of Technology
22. Cape Peninsula University of Technology
23. Central University of Technology
24. Mangosuthu University of Technology
25. Tshwane University of Technology
26. Vaal University of Technology

THEORETICAL FRAMEWORK

The study is guided by E-learning theory by Aparicio, Bacao and Oliveira (2016). The theory presents three major categories of system for e-learning, namely "people, technologies and services", see figure 1. The theory elaborates further to say that during teaching and learning there is a possibility of interaction between people and the e-learning system. Different people and groups of learners and teachers can interact with each other directly and/or indirectly through the e-learning system. It is through technology that learning and teaching is made possible through integration or interconnection of teaching and learning content, communication inability and collaborative tools. During e-learning all teaching and learning activities are connected to models of pedagogy and instructional strategies. The E-learning system is expected to provide service through activities as per specifications (Aparicio, Bacao and Oliveira 2016).

The theory presents people as e-learning stakeholders. The people include customers as students and employees; suppliers as teachers, content providers, accreditation bodies, education institutions, and technology providers; professional associations; SIGs as students commission; board and shareholders as education ministry and industry. The theory also presents technologies as e-learning technologies comprising of content, communication and collaboration functionalities. Content focus on documents, digital audio, and video, authoring tools, vitualisation tools, knowledge repositories, search engines, learner online journal/newsletter, learner web post area, web link manager, audio and video capturing, edutainment content, glossary, and assessment. Communication is about content discussion area, forum, chat, social network,

VOIP, synchronous communication and e-mail. Finally, collaboration is about multi-user dialog, sharing tools, ask an expert area, problem/solution area, one on one mentoring. On the other hand, Services is about e-learning activities, which include pedagogical models, and instructional strategies. Pedagogical models include open learning, distributed learning, learning communities, communities of practice, and knowledge-building communities. Instructional strategies entail contextualizing instruction, presenting and cueing content, activating learning processes, activating and assessing learner outcomes, synthesizing and sequencing processes into instructional lessons, promoting or supporting authentic learning activities, facilitating problem-solving, promoting collaboration, supporting role-playing, supporting multiple perspectives, modeling and explaining, scaffolding (Aparicio, Bacao and Oliveira 2016). Figure 1 illustrates the e-learning system theory as per the discussion

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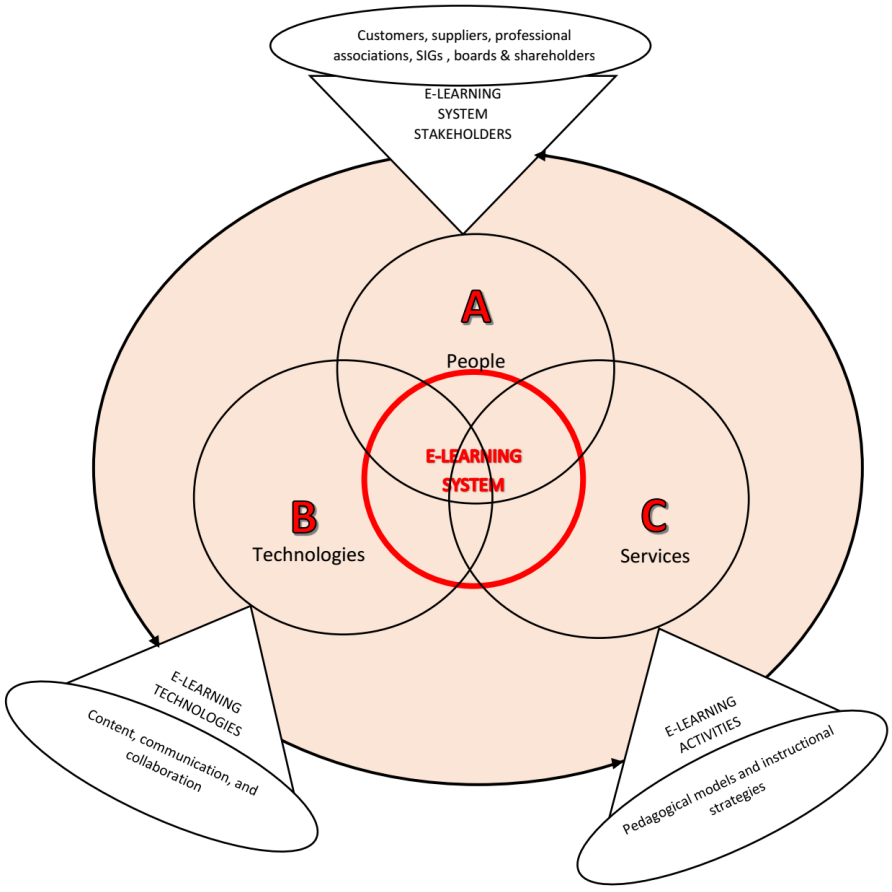

Figure 1: E-learning system theory (author 2023)

STATEMENT OF THE PROBLEM

This study was triggered by anomalies faced by institutions of higher learning in South Africa that disabled the rendering of teaching and learning since they use in-class face-to-face teaching and learning modus operandi. These anomalies include among others, institutions not being

able to admit all qualified people interested in studying or following a particular career in their institution and the Covid-19 pandemic outbreak that prevented institutions of higher learning to proceed with their teaching and learning activities, especially those using in-class contact mode of teaching and learning. When the president of South Africa announced a lockdown during the current Covid-19 pandemic outbreak in early 2020, all universities were shut down, except those that offer online tuition, like UNISA. The only known academic activity that UNISA was still rendering in contact situations was the writing of examinations. In response to the restrictions that came as part of the state of emergency, most universities frantically attempted to identify and apply online teaching and learning systems to continue their business. UNISA also introduced virtual summative assessment technology as a matter of urgency following the covid-19 pandemic outbreak that were followed by international lockdown to citizen in respective countries across the universe (UNISA 2020b)

RESEARCH PURPOSE, QUESTION AND OBJECTIVE

The purpose of this conceptual paper is to investigate a framework for the use of the Open distance e-learning system in the institutions of higher learning during the pandemic and student population increase in South Africa. To achieve this purpose, the authors seek to answer the following research question: Which framework for the Open Distance e-Learning (ODeL) system can help to encounter pandemic and student population increase in institutions of higher learning in South Africa? The objective of the study is to propose a framework for the application of the Open distance e-learning system in the institutions of higher learning to encounter pandemic and students' population increase in South Africa.

RESEARCH METHODOLOGY

This qualitative study applied the literature review to develop a framework for using the open distance electronic learning system (Open Distance e-learning – ODeL) as a central tool in facing anomalies in higher education institutions in South Africa. Literature relating to eLearning was consulted to learn how eLearning may be applied to support institutions of higher learning with the framework to implement full online teaching and learning lessons and assessments in both summative and formative form. In searching for appropriate sources online, researchers used the keywords from the title and purpose of the study to conduct literature searches using google search engine and institutionally subscribed databases. The search has yielded extremely high number of sources related to the study. The most suitable sources were selected since citing all the sources was always impossible. This is because some sources share same or related information and to avoid repetition of same information as well as exceeding required number of words for the journal. The study finally came up with a framework proposed for the application of Open Distance e-Learning system to address anomalies emanated from covid-19 pandemic and limited admission space for students' admission for in-class contact teaching and learning in the institutions of higher learning in South Africa.

LITERATURE REVIEW

The leading institution rendering open distance education in South Africa

The only institution of higher learning with fully fletched distance education in South Africa is the University of South Africa (UNISA). UNISA has a long history of using distance education. "With over 300,000 students, the University of South

Africa (Unisa) is Africa's largest open distance learning (ODL) institution" (Queiros & de Villiers 2016). This statement was also underscored by Letseka, Letseka and Pitsoe (2018). They further elaborate that "UNISA has been described as a mega university, and the only dedicated distance education provider in the African continent" (Letseka, Letseka & Pitsoe 2018). In the early years, the university used what it called correspondence distance study, later it moved to open distance learning (ODL), and currently teaching and learning are rendered through open distance electronic learning (ODeL). In correspondence distance study, the predominant mode of educational service delivery was through postal and courier services. In these, printed study material and teaching recordings were sent to students in cassette and compact disc containers. Students, in turn, submitted work for assessment by using similar services or by hand delivery at the branch. Lecturers were available to students for walk-in visits or by telephone, to discuss and clarify study-related issues. This means that teaching was rendered by means of print material and assignments submitted in similar formats. There were no recurring physical classroom sessions, and this was convenient for students who were scattered apart geographically. Radio and television were also used to enhance teaching and learning. Discussion forums were organised from time to time at university centres across the country to enable students to share their learning experiences (Shillinglaw 1992). The university subsequently moved to ODL, in which some of the materials were delivered online using the myUnisa website. Assignments were uploaded to the university's electronic system or sent by post for marking. During this period institutions of higher learning depended much on virtual learning collaboration over time through ODL (Jaiyeoba & Iloanya, 2019; Khor 2015). Recently the university progressed to what it calls ODeL. According to Hadullo, Oboko and Omwenga (2017), nowadays higher education institutions in the developing countries see an increase in the adoption of "Learning Management System (LMS) assisted e-learning".

According to UNISA (2020a), "ODeL is a different way of learning ... there is a physical distance between you and your university". This means that you do not have to visit the university to access learning and teaching lessons; instead, everything is covered on the online platform. Open distance e-learning (ODeL) requires students to be able to develop their own study plan and manage their time independently, since no in-class lectures are offered. Besides, students are provided with several support programmes to enable them to succeed in their studies, such as tutorship, library service and resources, the myUnisa portal, the myLife e-mail account, social media, UNISA radio, Digital Access Centres (DACs), counselling, and the Dean of Students and Student Affairs (DoSSA). Counselling support is provided in different ways to students, such as online, telephonically, by post, or even through office visits for career, academic and personal issues. The library provides information services to students in different ways, including reading space, physical internet access, and online and physical materials. The DoSSA provides support pertaining to student social and leadership development and student governance and attends to the needs of students with disabilities. The DACs are responsible for the provision of access to the Internet and computer facilities, especially in the rural areas, with administrators who attend to students' online needs. UNISA Radio provides platforms for talk shows and university-created social media platforms, such as Facebook, Linkedin, YouTube and Twitter, where students get an opportunity to

interact with each other about study-related and subject-related matters. The university also has several branches that render administration and library services globally. This means that students interact digitally with university staff online using the Internet (Teo 2011; UNISA 2020a). Study materials include prescribed and recommended books that students are expected to purchase, and study guides provided online or posted physically by the university. This means that students will need to create their own study environment wherever they are located, with appropriate information communication technology (ICT) and networks to connect to their university to access the lessons (UNISA 2020a).

> *Many assume that today's students are willing and able to design their own study programs based on their interests, talents and inclinations, and control their own study process. Some even argue that students should be at the center of university decision-making, including curriculum design and pedagogy, and should also be viewed as creators of knowledge (Guri-Rosenblit 2018).*

Open distance electronic learning system

The "Internet-based e-learning revolutionarily changed the training and education industry for its uninterrupted online service for 24/7 access anywhere" (Huang, Webster, Wood and Ishaya 2006). The fact is that "the rapid growth of Information and Communication Technology (ICT) has brought about significant changes in the practice of e-learning globally" (Hadullo, Oboko & Omwenga 2017). Tyilo (2017) underscore that frequent improvement in technology result in frequent improvements in the way education is rendered in the institutions of higher learning, which emanate from digitization across the universe. In a way, government play a leading role in ensuring the adoption of technology to move the higher education institutions with eager to enhance their mode of teaching through modern technologies such as eLearning systems "The widespread adoption of learning technologies within higher education institutions (HEIs) globally has made it evident that e-learning serves is a critical need, especially in developing-world contexts in which HEIs have limited resources" (Van de Heyde & Siebrits 2019). E-Learning has been applied as a means of transformation from the olden day's manual mode to the modern mode of teaching and learning instructions in the institutions of higher learning due to innovative technology and globalization. It is a new trend in educational technology which brought a new way of delivering educational instruction (Burac, Fernandez, Cruz & Cruz 2019). The study by Sibanda & Donnelly (2014) discovered that eLearning has brought an improvement in the way of teaching, learning, and assessment as well as the students' pass rate.

> *Higher education is being rapidly transformed by the growth in online learning, with an increasing number of universities worldwide offering degree programs in online, distance modes of study. Australian education has a long history of 'distance education', primarily offered by regional universities. With the digital communication advances of the 21st century, traditional 'correspondence' study has transformed into online learning, with many more universities, both metropolitan and regional, offering undergraduate degree programs that can be completed entirely online. While this can provide a significant opportunity for further widening of participation in higher education,*

> *Australian and international research indicates that much needs to be done to improve the higher attrition rates currently associated with online learning* (Stone 2019).

According to Coetzer and Mapulanga (2020), "increased internet access has also caused e-Learning programmes to become an integral part of higher education". Technology has brought a new paradigm shift to learning and teaching in institutions of higher learning. These may now be able to reach their students online through their different kinds of technologies for different learning activities, including access to library information resources following simple steps (Rodrigues, Almeida, Figuiredo and Lopes, 2019; Hess, Greer, Lombardo & Lim 2015; Coetzer & Mapulanga 2020). Electronic learning brings about an opportunity for many citizens who are not focused on studying only or who may not have time to focus on studying only, mostly for reasons such as full-time employment or responsibility to support family while being willing to further their studies. Electronic learning is very flexible since it allows students to engage in their study activities when they are free from other responsibilities, with study materials accessible at any time through the university library website (Arkorful & Abaidoo 2015). However, they must always be required to meet assessment deadlines such as assignment submissions and preparation for and writing of examinations. Unlike the situation in contact, in-class universities, where students are guided with examples and motivated to study in class, distance learning requires students to be self-motivated and plan their time for study to avoid negative results at the end of their studies. In e-Learning, students are expected to be adult enough to know, understand and plan what to do when and how in their studies, with the lecturer becoming just one of the learning resources (Shillinglaw 1992).

This kind of learning (e-learning) system is also cost-effective to students and institutions in terms of money and time (Chawinga & Zozie 2016). It is time-bound with regard to both learning and teaching, including feedback between students and lecturers due to the nature of technology (Li & Irby 2008; Coetzer & Mapulanga 2020). It may also be of great advantage to the previously disadvantaged who are geographically isolated in different areas far apart from each other and their preferred institutions of higher learning (Chiero, Beare, Marshall & Torgerson 2015). This is because students will be able to learn together at the same institution and discuss their study-related issues using university technology online. They will, however, always need to be connected to the network to be able to reach each other and the university's online platform.

Students' connectivity is another issue that may be taken care of either by students or the institution. For instance, issues relating to bandwidth coverage to areas where students and institutions are located, as well as data, software, and hardware for students to be able to connect, maybe highlighted as some of the key challenges for this kind of learning technique (Pitsoe & Baloyi 2015; Queiros & de Villiers 2016). The university may also need to provide online training for students with regard to developing their skills and competency to use online resources, including access to library services and resources. This is because the challenges may include adapting to the system as students could find it difficult to understand the use of several applications from the start of their studies. Online training may also help to eliminate frustration and technophobia for students who have just been initiated to

tertiary education (Mawere & Kundai 2018; Delaney and Bates, 2018; Huwiler, 2015). Universities will need to prioritize supporting students to ensure the smooth operation of their online teaching and learning (Hess, Greer, Lombardo & Lim 2015). Appana (2008); Pitsoe and Baloyi (2015); Coetzer and Mapulanga (2020) agree that technical and socially related support is required to mitigate students' challenges relating to their readiness for the new technology, study funding and time, and university staff preparation for the new way of service delivery. However, some students may still need basic computer literacy to be able to adapt to and take part in this kind of educational learning stream (Eke 2010). Data in South Africa is also not that affordable or cost-effective compared to other African countries such as Egypt, Nigeria and Kenya, although this country has more internet users than any other country on the continent (Coetzer & Mapulanga 2020).

> *The growth of e-learning, where education is delivered through the internet, has presented new challenges for library services. Traditional library services need to shift to online service delivery to meet the needs of all university users, whether they are on campus or based on other satellite centers of the university* (Coetzer &Mapulanga 2020).

ODeL requires instructional design elements, which include teaching and learning content, interaction, feedback, interface design and student involvement (Hussin, Bunyarit and Hussein, 2009). Shifting from the dated ancient educational systems to ICT-driven modern educational systems enhances the learning process, especially if the system is applied effectively, even though it also comes with several challenges including lack of working resources, poor or slow network connection, poor support, and lecturers' capacity (Tyilo, 2017). The "use of e-learning systems shows a positive influence on student learning. Most instructors utilized e-learning systems as presentation and preparation tools in teaching and learning" (Burac, Fernandez, Cruz & Cruz 2019). ODeL may bring about many benefits and advantages for students through e-learning, such as receiving teaching while at work or at home at their own convenience and in their own time. It can also be of great advantage to women who choose to continue their household activities while studying, or matriculants who may not afford or gain admission to full-time university study. African citizens may benefit from studying at universities in developed countries abroad without having to deal with the stress of travel and accommodation costs involved in physically studying at an institution abroad (Eke 2010; Larocque & Latham 2003).

> *Despite the perceived benefits attached to e-learning, several studies concur that there are still many challenges facing e-learning. These include but are not limited to: course development, assessment, learner support, institutional factors, user characteristics and overall performance. The overall implication is that developing countries still lag behind in adopting ICTs in their education systems* (Hadullo, Oboko & Omwenga, 2017).

More importantly, there will be a need for a flexible framework that can guide institutions in the implementation of eLearning systems. "Although eLearning is the use of technology for teaching, learning, and assessment, there is no common approach to it across South African Higher Education Institutions" (Bagarukayo & Kalema 2015). Andriotis (n.d) introduced what they named the "flexible eLearning

framework". They further underscore that the eLearning framework need to be flexible by satisfying all facets of the learning environment. This may be achieved with appointment of a team of experts for curriculum, designing instructions, educational technology, programmer, though it all depends on the requirements for the courses for eLearning (Andriotis, n.d). There are eight dimensions that need to be considered in the framework, namely andragogy or pedagogy for the teaching and learning, technological for educational technology infrastructure, interface design for eLearning template designs, evaluation for effectiveness, management for learning environment, resources for supporting the programme, ethical for social and political influence, cultural diversity, bias, geographical diversity, learner diversity, information accessibility, etiquette, and the legal issues; and institutional for administrative and academic affairs; and learner services (Andriotis, n.d; Ramakrisnan, Yahya, Hasrol & Aziz 2012). Ramakrisnan, Yahya, Hasrol and Aziz (2012) presented eLearning framework that is made up of the 8 dimensions named "Khan Octagonal blended learning framework". The other eLearning frameworks presented by Ramakrisnan, Yahya, Hasrol and Aziz (2012) are End User Training framework addressing learning process for achievement of appropriate outcomes, covering training method, learning techniques, individual differences, learning outcomes, scaffold support and target system. Huang, Webster, Wood and Ishaya (2006) also presented what is named Intelligent semantic eLearning framework, addressing learning resources, learning objects, learning environment, worldwide web, ontologies, learning models, learning activities, users and personal agents. They further illustrated the differences between semantic and traditional eLearning.

DISCUSSIONS OF THE FINDINGS

The current state of affairs is very challenging to institutions of higher learning, especially public institutions such as universities. This is because these academic institutions are expected to accommodate and meet academic requirements for all citizens who are willing to pursue their studies in any period of their choice and at any age. People prefer to study for different purposes, at different geographical locations, and coming from different socio-economic and cultural backgrounds. "Many South African students are from disadvantaged backgrounds with poor socio-economic conditions and inferior schooling Universities, on their part, are expected to accommodate all these backgrounds and all this diversity" (Queiros & de Villiers, 2016). At some stage in their development, educational systems may be disrupted by national disasters such as the current Covid-19 (Coronavirus) pandemic as alluded to by World economic forum (2020). This pandemic has left the government with no choice but to announce a national emergency lockdown to restrict citizens' movement in order to curb the spread of the virus. Covid-19 resulted in a global standstill in which a major part of the world population was ordered into lockdown. This also affected employees and students, from first grade to tertiary level, who were expected to quarantine at home. Movement on the streets and social gathering in public venues were prohibited, except for buying food or other essentials, or visiting the pharmacy for medication or consulting a medical doctor. These restrictions have inevitably and seriously disrupted face-to-face contact education. In distance e-learning, however, teaching and learning could be continued, with lecturers still rendering their services to students under lockdown or in quarantine at home. Formative assessments were also still possible without interruption in institutions such as UNISA, where submission, marking

and feedback are also done online. However, tertiary education faced a general challenge with regard to writing final examinations, since the culture of students writing their examinations physically at venues of their choice under invigilation was still predominant. This has led to most universities making urgent efforts to put in place a virtual examination system. UNISA, for instance, has announced to students that "the May/June 2020 examinations would be completed in the form of non-venue-based online assessments" (UNISA 2020b).

RECOMMENDATIONS

This study recommends that universities move to an open-distance electronic learning platform as supported by Eke (2010); Hadullo, Oboko, and Omwenga (2017). Unlike learners at primary and secondary school levels, who are expected to attend class to receive lessons, tertiary-level students are expected to be at a level of maturity where they can study neutrally and independently and receive lessons on their own at a time and place of their own choosing. Students at this level are expected to know and understand what they want and appreciate the importance of what they are doing, that is, studying. At certain levels of their studies, they may also be able to find casual profession-related employment or internships or leadership, which may in a way enable them to acquire practical experience while in the learning process. The open distance e-Learning system may open doors for many students from previously marginalized communities, since for them studying will simply be a matter of creating time for learning activities as supported by ISpring (2019); Eke (2010); Larocque and Latham (2003). It could also give community members who have already given up on their studies a second chance at tertiary education. These are people who may not afford costs such as accommodation, extra food, and travel to the physical location of a university as Eke (2010); Larocque and Latham (2003) allude. This, in turn, may relieve government and education funders from providing large amounts of money to fund the study of a few people. Instead, they may be able to fund whoever wants to study within the country or in a company's field of specialization. Therefore, it is the recommendation of this study that tertiary education be rendered holistically online for all study activities, including formative and summative assessment as UNISA enjoys the benefits (UNISA 2020b). Besides, all universities may share responsibility or collaborate for the provision of facilities for services such as libraries for all students and laboratories for science students across different areas of the country for practical lessons and study.

Proposed ODeL system framework

The literature reviewed in the preceding sections provided the context to eLearning and anomalies that may need to be disrupted using ODeL technologies. The literature also guides on the academic activities and resources required for implementation of the virtual system. On this basis, the study was able to provides a proposed framework for an open distance e-Learning (ODeL) system to correct anomalies in institutions of higher learning in South Africa as shown in Figure 2. According to the framework as illustrated, the university needs to be an initiator as a ***service supplier,*** to develop a ***service delivery system*** that will be used to render an ODeL platform to students, and in the process to play the role of ***service recipient***. As in the business environment, the university may choose to have both students and academic staff operate or do their work from their respective homes or households through the ODeL system. Only administrative staff or support staff may operate from the university premises or offices to save office space and

avoid overcrowding by large numbers of teaching staff in the different academic departments. The academic staff may meet only when necessary for assemblies or conferences. The academic staff must be able to render academic activities including tuition and support to students by putting the ODeL system in place. The library as an academic support function must be able to support both academic staff and students through the system while they operate from their respective homes, except those who may need reading room services to visit university library centers across the country. Students must also be able to receive different kinds of support through the system while at home, whether social, academic, or technical. Academic staff may also need to be provided with various kinds of support while working from their homes, such as finance, human resources, and ICT. The university may establish a task team or committee comprising of all role players including their ICT and academic staff, to develop the system software and hardware that will best support the preferable kind of service earmarked for rendering by the institution covering the eight dimensions of the eLearning framework. Academic staff must be able to take care of all academic functionalities including setting both formative and summative assessments through the system to test the capability of students after lessons, while ICT staff take care of the technical part and design. The eight dimensions as presented by Andriotis (n.d); Ramakrisnan, Yahya, Hasrol and Aziz (2012) include technical, ethical, interface design, resources, institutional, pedagogy, management, and evaluation. After the development of the appropriate system, the university must be able to provide both staff and students with the necessary electronic hardware (laptops and Wi-Fi modems), uploaded with appropriate software and a certain amount of data per month for teaching and learning.

The system must be capable of performing all the necessary activities in accordance with the requirements of the academic staff for their modules. For instance, the system may have a functionality for the registration of modules and billing that enables students to see the amount due for payment and to access online payment through the system by linking to a bank account. Alternatively, financial support institutions must be able to make direct payments for students into the university system for the amount due for study fees. Students and staff must also be able to communicate on different issues through e-mail, social media and blogs on the system. Furthermore, there should be a platform where students are able to receive lessons from academic staff or lecturers on study-related issues, for instance discussion forums, links to share appropriate sources, and many more. Students must be able to submit their assessments on the system and lecturers or markers must be able to mark and give feedback on the same system as regards both formative and summative assessments. Study material from lecturers and the library needs to be accessible to students through the same system. It must be possible to develop and moderate study material and assessment tools online in the system. The system must be flexible in order to allow future enhancement in case new functionalities become necessary. Ultimately both staff and students must be able to access the system through the appropriate application ("app") in their laptop or smartphone or tablet to engage in the lessons and study-related issues. Details are as illustrated in figure 1. In addition, the ICT expert must consider other system requirements, such as security against hacking of information and disaster, that may affect the system and data stored in the system. Finally, the system must be capable

of keeping an audit trail of activities discharged and transactions concluded, and provide a report based on certain activities to students and staff for reporting and looking back on how the work has being done in the previous periods. The system must also be usable to auditors with a limited access for the period of audit.

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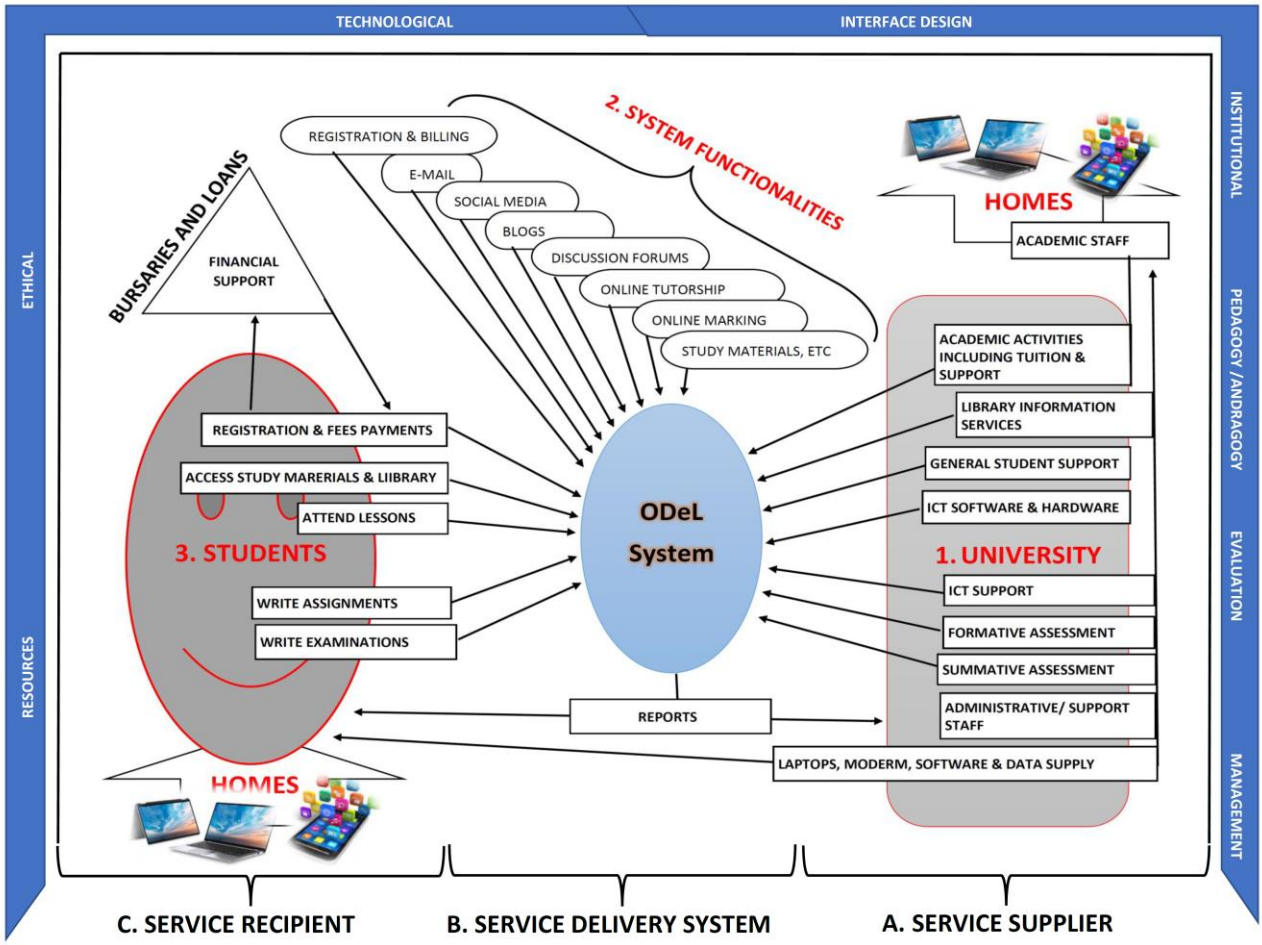

Figure 2: A framework for application of open distance e-learning system in the institutions of higher learning

Implications for research, practice, and society

It is hoped that this study may improve service delivery in the industry and the quality of life in the community. Institutions of higher learning may benefit from the information in this paper when planning to move from face-to-face to virtual teaching and learning platform. They may also use this paper as a resource for educational curriculum transformation and development. The community, especially those from marginalized rural areas may also be able to conveniently access quality education from any institution of their choice since with virtual service there may be no limit for intake. Community and staff members attached to different institutions of higher learning may be able to avoid infections from different health-threatening pandemics like coronavirus, currently and in

the future while continuing with their studies in case this framework is properly implemented. Researchers may also apply the proposed framework in their studies as a theoretical framework to guide their studies.

CONCLUSION

Nowadays, delivering any service manually is usually overwhelming, considering the current high demand from clients for various kinds of service, including academic service. Organizations regularly and frequently improve their technology in order to discharge their services with ease without disappointing their clients. This poses a challenge to every industry, including academia, to review their modus operandi from time to time with the introduction of new technology and enhancements. That is why we have witnessed technology changing several times in institutions of higher learning. It changed from in-class contact lessons to correspondence distance learning, then to open distance learning, and now we have technology that can support open distance electronic learning, which academic institutions need to consider seriously. Currently, institutions involved in teaching and learning face various challenges, such as a constantly growing student population and the consequent high annual student influx to academic institutions, putting them under pressure to admit large numbers of students during relatively short registration periods, with others turned back home. This challenge is exacerbated by health-threatening pandemics such as COVID-19, which may be followed by other pandemics that future generations will have to face. Institutions of higher learning need to move with changes in technology. It is hoped that the framework provided in this study will help institutions of higher learning to benchmark the adoption of systems appropriate for their own kinds of operations or teaching and learning systems. ODeL will assist institutions of higher learning to accommodate people with different commitments and from different backgrounds. These would predominantly be people from marginalized and disadvantaged backgrounds living in remote rural areas, and breadwinners who are already working and cannot quit work to study, as well as housewives and their counterparts.

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