Technology and its impact in post Covid-19higher education

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Abstract

One wonders how the education landscape will look like in the post Covid-19 pandemic era. The itchy question is: What role will technology play in the new normal within the higher education sector, particularly in Zimbabwe? This paper highlights the impacts and disruptions that the Covid-19 pandemic caused in the higher education sector.In addition, the study examines the opportunities offered by technology in the education sector post Covid-19. A qualitative study based on the Delphi theoretical framework, coupled with a desk research methodology was applied in the study. Experts in educational technologies within the higher education discipline were selected using a snowball sampling technique. Content analysis was used to analyse qualitative data while a desk research was used to support the findings. The study offers a futurist view of the educational landscape where technology will be playing a major role in content delivery, research and learning. Emerging technologies such as eLearning, MOOCs, and Data Driven Decision Making all seem to be earmarked to make meaningful contributions towards future higher education teaching, research and learning. Future research agendas with respect to technologies will provide a starting point for potential studies on areas that need urgent attention on identified technologies.

Keywords: *Technology, Covid-19, higher education, eLearning, MOOCs, DDDM, Zimbabwe*

Introduction and background

The crisis of 2020 reminds one of Alvin Toffler (1970), a futurist author of the massively bestselling book, *Future Shock*. In the early seventies, Toffler declared that the world was fast becoming a technocratic society, characterised by rapid and radical change caused by emergent crises impatient for solutions. This world, as predicted by Toffler (1970), is indeed upon us as we are confronted by serious problems requiring immediate solutions. For instance, the Corona virus disease or the Covid-19 pandemic and the exponential growth of cybercrimes are negatively affecting the information society, businesses, and society in general. The Covid-19 virus caused by the novel corona virus, was discovered in China in late 2019(Hirooka, 2020). Fast forward, a year later, the Covid-19 virus, which by March 2020 had been declared a pandemic by the World Health Organisation (WHO), has spread across the surface of the whole world. It is wreaking havoc among communities, resulting in more than one and a half million deaths as of August 2020 (Schleicher, 2020; United Nations, 2020).To date, many countries are reporting of a second wave while others (South Africa, India and Zimbabwe) are reporting of a third wave of the virus attack.

Every fabric of society has been negatively affected by the global pandemic. However, the higher education sector seems to be the hardest hit (Dhawan, 2020) and is currently experiencing its largest

ever disruption in history (Pokhrel & Chhetri, 2021)where over 1.6 billion learners in over 190 countries have been affected as schools closed(United Nations, 2020). The pandemic further worsened the fragile state already in existence in the education sector, particularly in countries with low human per capita development, ultimately threatening the achievement of the 4th Sustainable Development Goal (SDG) on education. While no one can fore tell, with certainty, when the pandemic will end, what appears to be certain is that the education landscape will be forever changed. Schools' and higher education institutions' (HEI) administrators and management, therefore, need to quickly ride the wave and focus on future opportunities that technology could potentially offer so as to mitigate the devastating effects of the Covid-19 scourge. Thus, a paradigm shift towards digital leadership is required now more than ever before. Organisations will be equipped to navigate their industries if digital leaders are well versed with digital trends and disruptive technologies that are shifting and shaping the way organisations craft strategy and compete locally and globally.

Higher education in Zimbabwe

Higher education in Zimbabwe prior to the Covid-19 outbreak was characterised by a dedicated face-to-face lecture delivery model. The use of online learning technologies was regarded as inferior and qualifications obtained through such means were greatly questioned by educational authorities. For example, there are numerous cases where lecturers who had obtained their qualification through online degree programs were denied promotional opportunities by their universities because of the negative perceptions that their qualifications were dubiously obtained. To compound to that, prior to the Covid-19 pandemic, debates on acceptability of technology in the classroom waged on (Chimbo, 2016; Cox et al., 2017; Decˇman, 2015; Hung, 2017; Kimmerle et al., 2015; Maringe & Sing, 2014; Ngai et al., 2007; Pretorius, 2017; Reynolds et al., 2019; Stanhope & Corn, 2014; Weaver et al., 2008). While some are of the view that technology is a disruption in the classroom (Joyce-gibbons et al., 2018; Kuznekoff et al., 2015; Thomas et al., 2013, 2014; Vahedi et al., 2019; Welsh et al., 2018) and some claiming that it results in a number of divides (Adhikari et al., 2017; Dolan, 2016; James, 2005; Mutula, 2008; Reynolds et al., 2019), resulting in an overall ban of its use (Baker et al., 2012; Grace & Cln, 2018; Thomas et al., 2013, 2013) others have argued that technology is a necessary evil which has the ability to engage and possibly improve students' achievements (Ahmad, 2019; Al-Ahmad, 2010; Lorente et al., 2020; Ponelis & Holmner, 2015). Among the many changes imposed on us by the Covid-19 pandemic are shifts in how educational content is delivered, with a migration away from the traditional in-classroom experience to more technology-based virtual learning experiences (Shah et al., 2020).

The poor economic environment that characterises the study's Zimbabwean context(Alwang et al., 2002; Clemens & Moss, 2005; Makina, 2010;Chinyoka & Mutambara, 2020)renders stakeholders and institutions incapacitated to acquire technological infrastructure and might also have contributed to

the limited utilisation of technologies in higher education in the pre Covid-19 era. This means that even though stakeholders might have valued educational technologies as fundamental entities in higher education, the economic situation rendered their use unsustainable. Three main equity implications are emerging in this first flush of change brought about by the pandemic: lives have been uprooted and left unmoored; the digital divide exposes the socioeconomic inequity of distance learning; and there is a disproportionate likelihood that under-served and at-risk students will not return when campuses reopen. Recognising these equity challenges as early as possible should allow institutions and governments to fashion interventions that mitigate the impacts and environmental barriers to students' returning to their studies.

Zimbabwean higher education institutions have been left in a quandary by the Covid-19 pandemic, with two options remaining; either to continue classes via technological platforms or defer the resumption of lectures indefinitely. Serdyukov (2017) however highlights that education must continuously evolve to meet the challenges of the fast-changing and unpredictable globalised world. As such, changes mean accepting and harnessing educational technologies to facilitate continued teaching and learning amongst the global Covid-19 pandemic.

Objective and research question

In this paper we dissect the role of technology in mitigating some of the adverse effects of the Covid-19 pandemic within higher education in a developing country context. This study divulges some of the challenges brought about by the Covid-19 pandemic within the higher education sector in developing countries particularly in Zimbabwe. We seek to understand how these challenges could be addressed through technology implementation and utilisation.

Research question

- Which educational technologies could be used to address challenges posed by Covid-19 in higher education institutions in Zimbabwe?

Theoretical underpinning

The Delphi technique theoretical framework was used to conceptualize the study. The term 'Delphi' was derived thousands of years ago from the ancient Oracle of Delphi. It is believed that this oracle would be consulted by the Greeks and Romans to define their futures by responding to crucial questions related to their lives(Massaroli et al., 2017).History recognises that the oracle was so successful that people from different places began to consult it for various purposes such as outcomes of wars, among others. In research circles, "The main purpose of the Delphi method is to acquire the most reliable consensus of a group of experts opinion by a series of intensive questionnaires combined with controlled opinion feedback"(Habibi et al., 2014). By obtaining the consensus of a group of

experts using the process, researchers can identify and prioritise issues and develop a framework to recognise them(Habibi et al., 2014). It is an approach to research that seeks to achieve consensus through the use of data collection tools such as questionnaires and interviews from participants who have expertise in key areas under study (Massaroli et al., 2017). “This method is especially useful when researchers need to collect ideas from isolated experts on a specific topic and establish agreement to discover the underlying assumptions or perspectives among the experts.”(Massaroli et al., 2017).The Delphi methods has thus become more favourable and reliable in studies where the main aim is to acquire the consensus of a group of specialists regarding a complex problem, or for planning and forecasting for the future of a specified area(Keeney et al., 2011; Massaroli et al., 2017). In a qualitative research, it is recommended to use a group of between ten to twelve experts with different specialties(Habibi et al., 2014). A possible sampling technique that can be applied in such a research is snowball sampling while a Likert scale could be used to gather the experts' opinions. Key activities in the Delphi technique are shown in Figure 1 below.

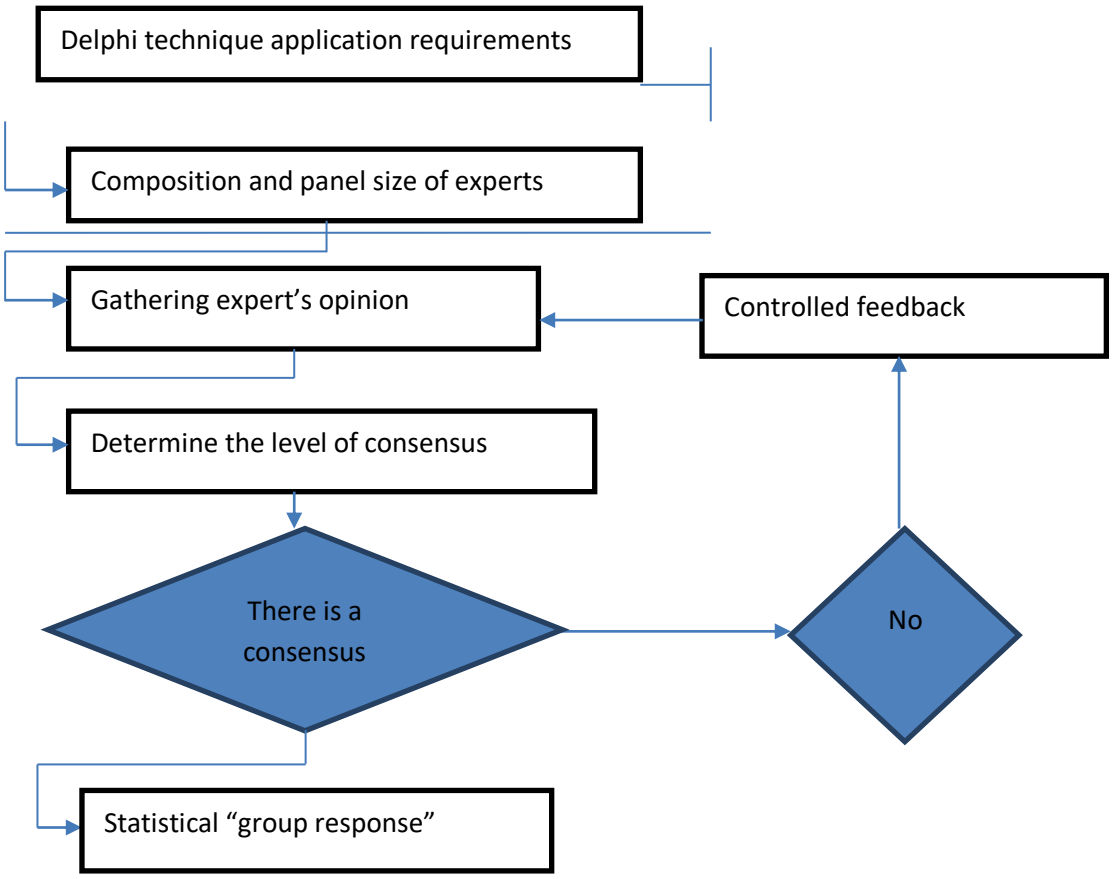

Figure 1: Theoretical framework of Delphi technique in qualitative research adapted from (Habibi et al., 2014)

Methodology

The study adopted a qualitative approach supported by a desk research methodology. A snowball sampling technique, where experts in educational technologies were interviewed through referrals, was utilised. As supported by the theoretical framework, the idea behind this research approach was to acquire a consensus among participants on educational technologies to watch out for in the future. Interviews were organised and conducted over a period of thirty days, beginning on the 2nd day of February 2021, in an iterative manner to facilitate for consensus building in line with the Delphi technique. Content analysis was utilised to analyse the data obtained through the qualitative study. The literature survey would also be used to support research findings thereby increasing generalisability and triangulation of research findings. Through the desk study, we reviewed literature on educational technologies for the future available during the Covid-19 era. All in all, two hundred and forty(240) journal articles on the topic understudy were retrieved via various search engines such as Google Scholar and Worldcat. Of the two hundred and forty (240) journal articles, two hundred and three (203) were discarded as they did not specifically address the topic as anticipated. The remaining thirty seven (37) journal articles (which discussed potential educational technologies for higher education) were reviewed and analysed to support findings from the qualitative study undertaken. The sampled articles were published in the years between 2007 to 2021. The main idea was to identify technological trends in higher education which could potentially have a great impact in the near future.

Findings

Twelve (12) experts in higher education technologies participated in the study. The findings reveal how emerging technological innovations can be used to transform institutions of higher learning in developing countries so as to mitigate some of the adverse effects caused by the global Covid-19 pandemic.

Massive Open Online Courses (MOOCs)

From content analysis, literature generally indicated that Massive Open Online Courses (MOOCs) were greatly gathering momentum especially in first world countries. The experts were quick to note this trajectory in education. There is a consensus that way before the advent of the Covid-19 pandemic, numerous attempts had been made to ensure education supports society's smooth transition into the information age. As part of this initiative, MOOCs have attracted much attention and stimulated worldwide enthusiasm as a model to revolutionise and expand higher education(Paton et al., 2018).MOOCs were initially introduced in 2008 and became widely used in education from 2013(Khan et al., 2017). MOOCs can potentially improve the quality of instruction and learning (Jung & Lee, 2018). MOOCs are online learning environments that allow students to take courses on a wide variety of subjects with no restrictions (Al-rahmi et al., 2019)and with the least economic

burden(Alraimi et al., 2015). In the context of this study, MOOCs are defined as special types of online courses that are openly available to an unlimited number of participants for free. MOOCs usually run at a grand scale allowing a limitless number of students to participate without them paying anything or being restricted somehow(Porter, 2015). Such courses can be of any form emulating the traditional courses and can include some kind of assessment which can sometimes result in some form of accreditation(Li & Baker, 2018). These courses can be run by institutions such as universities or schools or any other institutions that will provide both the teaching and learning support using online platforms.

While this technological innovation (MOOCs) is a recent phenomenon, it promises to be the new order in the new normal to come. Considering such conditions as the increasing student enrolment, overcrowded lecture rooms, the need for continuous training and retraining, the advent of lifelong learning among other things, MOOCs promise to be one of the most ideal offerings to subdue some of these challenges affecting higher education. As costs associated with higher education continue to increase, MOOCs are emerging as a cheaper and more accessible model for attaining higher qualifications (Kromydas, 2017b; Li & Baker, 2018).As the Covid-19 pandemic continues to bite, mass physical interactions among humans have been restricted. This ultimately limits the potential of higher education as training opportunities are hindered. Most of the experts reiterated that considering that humans need to continuously assimilate new knowledge, MOOCS promise a brighter future for higher education and thus institutions in developing countries could take a share of this low hanging fruit. A research by Liyanagunawardena et al. (2014) show that there is very limited participation from Asia and even less from Africa in as far as implementation of MOOCs is concerned, hence the need to rectify this anomaly.

E-Learning

The twelve experts were also in agreement that electronic learning (eLearning) could be a panacea to some of the challenges posed by the Covid-19 pandemic. Also known as online learning, eLearning is an approach that emulates the traditional lecture delivery model albeit via internet platforms. Zhu and Mugenyi (2015) define eLearning as learning facilitated online through network technologies. The impetus of online learning is that it is a cost-effective solution that delimits learning boundaries. eLearning also provides flexibility and accessibility of education more so in uncertain environments (Cloete, 2017). This means that learning can occur ubiquitously, being facilitated by technological gadgets such as smartphones, computers and internet connectivity. The Covid-19 pandemic forced HEIs to close their doors leaving HEIs with two choices, either to waste an academic year or to seek for other means to instruct and assess their students. Migration to eLearning emerged as the ideal choice among many institutions.

Research has shown that pursuit of this learning model or the blended approach (which encompasses both the traditional face-to-face and online lecture delivery) in HEIs can potentially improve the standards of education (Aldiab et al., 2019; Ching-Ter et al., 2017; Chowdhury, 2019). The benefits of online learning include ubiquitous learning opportunities, increased students' satisfaction with offered courses, improved students' learning performance as well as reduced students' dropout rates (Cheng & Yuen, 2018; Mtebe, 2015; Pavlenko et al., 2020).

Data driven decision making (DDDM)

Traditionally, university students often encounter numerous challenges, including financial challenges, conceptually challenging subjects, lack of academic support, curriculum overload, among others. All these have a negative impact on student performance (Al-Barashdi et al., 2014; Bailey & Phillips, 2016; Cross & Adam, 2007; Luckett, 2016; Ramrathan, 2016; van Rooy & Coetzee-Van Rooy, 2015). The Covid-19 induced shift to online learning has also contributed to the demise of students (Dhawan, 2020; Pokhrel & Chhetri, 2021). Such challenges have led to an outcry by governments and other stakeholders on the apparent high rates of students dropping out of universities with developing countries seemingly being the mostly affected (Letseka& Maile, 2008; Moodley & Singh, 2015). This is in sharp contrast to the calls for a paradigm shift to a competency-based educational framework which emphasises on a self-directed lifelong learning and learner centeredness approach (Schumacher et al., 2013; Soares & Dias, 2018). A competency-based approach allows students to advance their abilities to master a skill or competency at their own pace, regardless of environment.

Before the advent of Covid-19, most students especially in higher education, were used to a didactic face-to-facebased method of lecture delivery. The abrupt shift to online learning platforms meant that students were left to "cope alone" with very limited physical interactions with their teachers. Poor achievements and high dropout rates among university students negatively affect nations in a number of ways. For instance, there financial losses associated with investments that fail to materialise, especially in theera of free fees, as well as failure to fill critical skills gaps in the economy due to lack of graduates (Calonge & Shah, 2016; Ramrathan, 2016; van Rooy & Coetzee-Van Rooy, 2015). In response, administrators have put in place measures like free university education, academic support for both learners and lecturers, capacity development programs, use of technology, among others, to alleviate some of the problems of low achievement(Ramrathan, 2016). However, even though there is a slight improvement on the dropout rates, stakeholders in the higher education fraternity are still concerned with the current statistics (Moodley & Singh, 2015; Ramrathan, 2016).

As highlighted above, one major challenge experienced by learners is poor decision making. Poor decisions often lead to wrong choices being made, and ultimately, low achievements among learners

(Vanlommel et al., 2017). Of late, there have been increasing calls and emphasis,both locally and internationally, on data use among educationists and practitioners to aid decision making leading to improved student achievement (Farrell & Marsh, 2016; Jimerson et al., 2016; Lai & McNaughton, 2016; Little, 2012). Mandinach (2012) remarked that data driven decision making (DDDM) entails the systematic gathering and organising, analysing, examining and interpreting of data to inform practice and policy. This is particularly important from two perspectives: it enables school management to make more informed decisions with regards to resources provision in areas of dire need (Bharara et al., 2018) as well as provide feedback to stakeholders (students, teachers and parents) about the learning outcomes of students (Bharara et al., 2018). The twelve experts interviewed all agreed that implementing technologies that facilitate DDDM was critical in higher education contexts. They asserted that DDDM could be used to optimise learning for a better learning experience in learners. The proposition to use data to improve learning is seemingly simple: if students have access to their learning and academic data as well as teachers' anticipated outcomes, they can adjust their performance accordingly (Campbell & Levin, 2009).

Discussion and future research agenda

While all these and more technological innovations have the potential of transforming higher education, the need to evaluate their efficacy remains valid. This is supported by Cloete (2017), who highlights that it is important to critically examine and have a thorough understanding of the nature of the technological innovations before redesigning or reconfiguring or repurposing them as educational environments. It is reasonable for such inquiries to be conducted, especially in higher education, due to the diverse nature of cross cultural students (coming from diverse backgrounds) who bring with them different characteristics, expectations and experiences into the classroom (Hajhashemi et al., 2018). Future research should therefore continuously reflect on these innovations to find means to improve the effectiveness and efficacy in higher education.

With regards to MOCCS

While MOOCS can potentially improve some of the highlighted challenges within higher education, their recognition and acceptance in mainstay education is very limited. Future research should focus on how such an educational model could be "officialised" as an acceptable method of qualification attainment. Qualifications acquired through such platforms are often treated as inferior and are often unaccredited. Although some literature on emerging practices in assessment, credentialisation and recognition in Massive Open Online Courses is available (Witthaus et al., 2016), more research is still needed on how these could be improved especially in developing countries.

With regards to E-learning

Although a wide range of literature on online learning is readily available, especially for developed countries, such studies are still necessary in developing countries which are still in their infancy stages when it comes to e-learning adoption. This is buttressed by Ching-Ter et al. (2017), Cloete (2017),and Mohammadi (2015) who claim that impacts of technology use differ from context to context, hence its implications in developing countries should be studied. Kromydas (2017) argues that context cannot be neglected in higher education research "as institutional and policy dynamics differ across not only time, but also between countries and political regimes." Developing countries are confronted with more significant challenges as compared to the developed world in issues such as internet connectivity and availability, ICT gadgets and resources availability and affordability, and electricity availability among others. While many studies have shown that eLearning is effective in a blended learning approach (Al-Busaidi, 2012), its impact in a mandatory and exclusive usage context, such as is the present case, need to be investigated.

With regards to data driven decision making

While the academic fraternity has experienced growth in the volumes of research in data use systems and data use activities that teachers, administrators and students alike engage in, what they actually do under the banner of data use or DDDM, "remains substantially underdeveloped" (Little, 2012). Many higher educational institutions have put in place systems, from Learning Management Systems (LMS) such as Moodle, Blackboard, Canvas, among others, to School Performance Management Systems (SPMS) to assist students, teachers, schools and districts with learning data management that enable them to make more informed decisions. Despite that, DDDM, is still not being used (Scherman et al., 2016).

Students potentially have access to a lot of data that give them information regarding their learning performance through LMSs. The question, however, is whether it is being displayed in a fashion that will help them to manage their learning experience optimally? Research on students' use of data in decision making has largely been ignored in past literature and future research ought to seek to address that gap. To what extent do students make use of data to improve their performance? What are the drivers of the optimal learning experience? To what extent do systems developed for data management in schools encompass students' requirements to assist them in making more informed decisions?These are some of the questions that future researchers should attempt to address so that the potential of DDDM can be successfully realised.

Conclusions

While technology promises to offer unlimited benefits to higher education, more research on technological efficacy, adoption, appropriation, use and how it could be improved needs to be conducted. For starters, the educational sector is the only discipline whose principles and values

(teacher-centred approach) have remained deeply rooted in traditional approaches (Allen, 2007; Mosweunyane, 2013; Williams, 2017) and any attempt to shift could likely be met with deep resistance (Gitlin & Margonis, 1995; Van Wyk et al., 2014). For instance, the traditional face-to-face delivery approach has remained the dominant means of lesson delivery worldwide (Gambari et al., 2017; Hamamra et al., 2020; Hamza-Lup & White, 2015). Online acquired qualifications are often treated as inferior, with some institutions failing to recognise these. We argue that the mindsets of educators need to be moulded to take into cognisance the important role of technology. We highlight future directions that researchers in the education and information systems discipline should engage in, concerning the highlighted innovations.

References

Adhikari, J., Scogings, C., Mathrani, A.and Sofat, I. (2017). Evolving digital divides in information literacy and learning outcomes A BYOD journey in a secondary school. *The International Journal of Information and Learning Technology*, *3*4(4), 290–306. https://doi.org/10.1108/IJILT-04-2017-0022

Ahmad, T. (2020). Undergraduate mobile phone use in the Caribbean. *Journal of Research in Innovative Teaching & Learning*, *13*(2), 191–210. https://doi.org/10.1108/jrit-01-2019-0001

Al-Ahmad, W. (2010). The importance of introducing a course on information and communication technologies for development into the information technology curriculum. *International Journal of Education & Development Using Information & Communication Technology*, *6*(1), 1–10. http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=51837694&site=ehost-live&scope=site.

Al-Barashdi, H., Bouazza, A. and Jabur, N. (2014). Smartphone addiction among university undergraduates: A literature review. *Journal of Scientific Research and Reports*, 4(3), 210–225. https://doi.org/10.9734/jsrr/2015/12245.

Al-Busaidi, K. A. (2012). Learners' perspectives on critical factors to LMS success in blended learning: An empirical investigation. *Communications of the Association for Information Systems*, 30(1), 11–34. https://doi.org/10.17705/1cais.03002

Al-rahmi, W., Aldraiweesh, A., Yahaya, N., Kamin, Y. Bin, and Zeki, A. M. (2019). Data in brief massive open online courses (MOOCs): Data on higher education. *Data in Brief*, 22, 118–125. https://doi.org/10.1016/j.dib.2018.11.139

Aldiab, A., Chowdhury, H., Kootsookos, A., Alam, F.and Allhibi, H. (2019). Utilization of

learning management systems (LMSs) in higher education system: A case review for Saudi Arabia. *Energy Procedia*, 160(2018), 731–737. https://doi.org/10.1016/j.egypro.2019.02.186

Allen, S. J. (2007). Adult learning theory &leadership development. *Leadership Review Claremont McKenna College Kravis Leadership Institute, Leadership Review*, 7(7), 26–37.

Alraimi, K. M., Zo, H.and Ciganek, A. P. (2015). Computers &education understanding the MOOCs continuance : The role of openness and reputation. *Computers & Education*, 80, 28–38. https://doi.org/10.1016/j.compedu.2014.08.006

Alwang, J., Mills, B., & Taruvinga, N. (2002). *Why Has Poverty Increased in Zimbabwe?* The World Bank. https://econpapers.repec.org/RePEc:wbk:wbpubs:14060

Bailey, T. H.and Phillips, L. J. (2016). The influence of motivation and adaptation on students' subjective well-being, meaning in life and academic performance. *Higher Education Research and Development*, 35(2), 201–216. https://doi.org/10.1080/07294360.2015.1087474

Baker, W. M., Lusk, E. J.and Neuhauser, K. L. (2012). On the use of cell phones and other electronic devices in the classroom: Evidence from a survey of faculty and students. *Journal of Education for Business*, 87(5), 275–289. https://doi.org/10.1080/08832323.2011.622814

Bharara, S., Sabitha, S.and Bansal, A. (2018). Application of learning analytics using clustering data mining for students' disposition analysis. *Education and Information Technologies*, 23(2), 957–984. https://doi.org/10.1007/s10639-017-9645-7

Calonge, D. S.and Shah, M. A. (2016). MOOCs and graduate skills gaps: A systematic qualitative review of the literature. *International Review of Research in Open and Distributed Learning*, 17(5), 68–90. https://doi.org/10.1016/j.techfore.2017.03.024

Campbell, C. and Levin, B. (2009). Using data to support educational improvement. *Educational Assessment, Evaluation and Accountability*, 21(1), 47–65. https://doi.org/10.1007/s11092-008-9063-x

Cheng, M. and Yuen, A. H. K. (2018). Student continuance of learning management system use: A longitudinal exploration. *Computers and Education*, 120(November 2017), 241–253. https://doi.org/10.1016/j.compedu.2018.02.004

Chimbo, B. (2016). *Cooperative design of a cross-age tutoring system based on a social*

networking platform. University of South Africa.

Ching-Ter, C., Hajiyev, J. and Su, C. R. (2017). Examining the students' behavioral intention to use e-learning in Azerbaijan? Thegeneral extendedtechnologyacceptance model for E-learning approach. *Computers and Education*, 111, 128–143. https://doi.org/10.1016/j.compedu.2017.04.010

Chinyoka, A.and Mutambara, E. (2020). The challenges of revenue generation in state universities: The case of Zimbabwe. *Cogent Social Sciences*, 6(1), 1-10. https://doi.org/10.1080/23311886.2020.1748477

Chowdhury, F. (2020). Blended learning: how to flip the classroom at HEIs in Bangladesh? *Journal of Research in Innovative Teaching & Learning*, *13*(2), 228–242. https://doi.org/10.1108/jrit-12-2018-0030

Clemens, M., and Moss, T. (2005). Costs and causes of Zimbabwe's crisis. *Center for Global Development Notes, January 2005.*

Cloete, A. L. (2017). Technology and education: Challenges and opportunities. *HTS Teologiese Studies / Theological Studies*, 73(4), 1–7. https://doi.org/10.4102/hts.v73i4.4589

Cox, B. E., Reason, R. D., Tobolowsky, B. F., Brower, R. L., Patterson, S., Luczyk, S. and Roberts, K. (2017). Lip service or actionable insights? Linking student experiences to institutional assessment and data-driven decision making in higher education. *Journal of Higher Education*, *88*(6), 835–862. https://doi.org/10.1080/00221546.2016.1272320

Cross, M. and Adam, F. (2007). ICT policies and strategies in higher education in South Africa: National and institutional pathways. *Higher Education Policy*, 20(1), 73–95. https://doi.org/10.1057/palgrave.hep.8300144

Decˇman, M. (2015). Modeling the acceptance of e-learning in mandatory environments of higher education : The influence of previous education and gender. *Computers in Human Behavior*,49, 272–281. https://doi.org/10.1016/j.chb.2015.03.022

Dhawan, S. (2020). Online learning: A panacea in the time of Covid-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5–22. https://doi.org/10.1177/0047239520934018

Dolan, J. E. (2016). Splicing the divide: A review of research on the evolving digital divide among K-12 students. *Journal of Research on Technology in Education*, *48*(1), 16–37. https://doi.org/10.1080/15391523.2015.1103147

Farrell, C. C.and Marsh, J. A. (2016). Contributing conditions: A qualitative comparative analysis of teachers' instructional responses to data. *Teaching and Teacher Education*, 60, 398–412. https://doi.org/10.1016/j.tate.2016.07.010

Gambari, A. I., Shittu, A. T., Ogunlade, O. O. and Osunlade, O. R. (2017). Effectiveness of blended learning and e-Learning modes of instruction on the performance of undergraduates in Kwara State, Nigeria. *Malaysian Online Journal of Educational Sciences*, *5*(1), 25–36. www.moj-es.net

Gitlin, A. and Margonis, F. (1995). The political aspect of reform : Teacher resistance as good sense. *American Journal of Education*, 103(4), 377–405.

Grace, N.and Cln, N. (2018). Problems caused by the students ' use of cell phones in university libraries in Anambra State , Nigeria . *Library Philosophy and Practice (e-Journal)*.

Habibi, A., Sarafrazi, A.and Izadyar, S. (2014). Delphi technique theoretical framework in qualitative research. *The International Journal of Engineering and Science (IJES)* , 8–13. www.theijes.com

Hajhashemi, K., Caltabiano, N. J.and Anderson, N. (2018). Lecturers ' perceptions and experience of integrating online videos in higher education. *Australian Educational Computing*, *33*(1)1-24.

Hamamra, B., Alawi, N.and Daragmeh, A. K. (2020). Covid-19 and the decolonisation of education in Palestinian universities. *Educational Philosophy and Theory*, *0*(0), 1–15. https://doi.org/10.1080/00131857.2020.1865921

Hamza-Lup, F. G.and White, S. (2015). Hybrid course delivery: Impact on learning and assessment. *ELmL - International Conference on Mobile, Hybrid, and On-Line Learning*, *2015-Janua*(January), 48–54.

Hirooka, Y. (2020). Covid-19. *Journal of Medical Ultrasonics*,47(2), 33-9. https://doi.org/10.1007/s10396-020-01014-w

Hung, H. (2017). Clickers in the flipped classroom : Bring your own device (BYOD) to promote

student learning. *Interactive Learning Environments*, 25(8), 983–995. https://doi.org/10.1080/10494820.2016.1240090

James, J. (2005). The global digital divide in the Internet: developed countries constructs and third world realities. *Journal of Information Science*, 31(2), 114–123. https://doi.org/10.1177/0165551505050788

Jimerson, J. B., Cho, V.and Wayman, J. C. (2016). Student-involved data use: Teacher practices and considerations for professional learning. *Teaching and Teacher Education*, 60, 413–424. https://doi.org/10.1016/j.tate.2016.07.008

Joyce-gibbons, A., Galloway, D., Mollel, A., Mgoma, S., Pima, M.and Deogratias, E. (2018). Mobile phone use in two secondary schools in Tanzania. *Education and Information Technologies*, 23, 73–92. https://doi.org/10.1007/s10639-017-9586-1

Jung, Y.and Lee, J. (2018). Computers &education learning engagement and persistence in massive open online courses (MOOCS). *Computers and Education*, 122(February), 9–22. https://doi.org/10.1016/j.compedu.2018.02.013

Keeney, S., Hasson, F., & McKenna, H. (2011). The Delphi Technique. In *The Delphi Technique in Nursing and Health Research* (pp. 1–17). https://doi.org/https://doi.org/10.1002/9781444392029.ch1

Khan, M. S. H., Nambobi, M.and Ali, M. S. (2017). *MOOCs in TVET Sectors of Developing Countries: Benefits, Possibilities, and Challenges* (Issue January, pp. 22–47). https://doi.org/10.4018/978-1-5225-3465-5.ch003

Kimmerle, J., Moskaliuk, J., Oeberst, A.and Cress, U. (2015). Learning and collective knowledge construction with social media: A process-oriented perspective. *Educational Psychologist*, *50*(2), 120–137. https://doi.org/10.1080/00461520.2015.1036273

Kromydas, T. (2017a). Rethinking higher education and its relationship with social inequalities: past knowledge, present state and future potential. *Palgrave Communications*, 1–11. https://doi.org/10.1057/s41599-017-0001-8

Kromydas, T. (2017b). Rethinking higher education and its relationship with social inequalities: Past knowledge, present state and future potential. *Palgrave Communications*, *3*(1), 1–11.

https://doi.org/10.1057/s41599-017-0001-8

Kuznekoff, J. H., Munz, S.and Titsworth, S. (2015). Mobile phones in the classroom: Examining the effects of texting, twitter, and message content on student learning. *Communication Education*, 64(3), 344–365. https://doi.org/10.1080/03634523.2015.1038727

Lai, M. K.and McNaughton, S. (2016). The impact of data use professional development on student achievement. *Teaching and Teacher Education*, 60, 434–443. https://doi.org/10.1016/j.tate.2016.07.005

Letseka, M., & Maile, S. (2008). *High university drop-out rates : A threat to South Africa's future. The Human Sciences Research Council (HSRC)*. http://www.hsrc.ac.za/uploads/pageContent/1088/Dropout rates.pdf

Li, Q.and Baker, R. (2018). Computers &education,the di ff erent relationships between engagement and outcomes across participant subgroups in massive open online courses. *Computers & Education*, 127(April 2017), 41–65. https://doi.org/10.1016/j.compedu.2018.08.005

Little, J. W. (2012). Understanding data use practice among teachers: The contribution of micro-process studies. *American Journal of Education*, 118(2), 143–166. https://doi.org/10.1086/663271

Liyanagunawardena, T., Williams, S.and Adams, A. (2014). In-depth the impact and reach of MOOCs : A developing country'sperspective. *ELearning Papers*, *January*. (33), 1-8 https://www.researchgate.net/publication/282017429%0

Lorente, L. M. L., Arrabal, A. A. and Pulido-Montes, C. (2020). The right to education and ICT during Covid-19: An international perspective. *Sustainability (Switzerland)*, 12(21), 1–17. https://doi.org/10.3390/su12219091

Luckett, K. (2016). Curriculum contestation in a post-colonial context: A view from the South. *Teaching in Higher Education*, 21(4), 415–428. https://doi.org/10.1080/13562517.2016.1155547

Makina, D. (2010). Historical perspective on Zimbabwe's economic performance: A tale of five lost decades. *Journal of Developing Societies*, 26(1),99–123. https://doi.org/10.1177/0169796X1002600105

Mandinach, E. B. (2012). A perfect time for data use: Using data-driven decision making to inform practice. *Educational Psychologist*, 47(2), 71–85. https://doi.org/10.1080/00461520.2012.667064

Maringe, F.and Sing, N. (2014). Teaching large classes in an increasingly internationalising higher education environment: Pedagogical, quality and equity issues. *Higher Education*, 67(6), 761–782. https://doi.org/10.1007/s10734-013-9710-0

Massaroli, A., Martini, J. G., Lino, M. M., Spenassato, D.and Massaroli, R. (2017). The Delphi method as a methodological framework for research in nursing. *Texto Contexto Enfermagem*, *26*(4), 1–9. https://doi.org/10.1590/0104-07072017001110017

Mohammadi, H. (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers in Human Busersehavior*, 45, 359–374. https://doi.org/10.1016/j.chb.2014.07.044

Moodley, P., & Singh, R. J. (2015). Addressing student dropout rates at South African universities. *Alternation*, 17(17), 91–115.

Mosweunyane, D. (2013). The African educational evolution: from traditional training to formal education. *Higher Education Studies*, 3(4), 50–59. https://doi.org/10.5539/hes.v3n4p50

Mtebe, J. (2015). Learning management system success : Increasing learning management system usage in higher education in sub-Saharan Africa. *International Journal of Education and Development Using Information and Communication Technology*,11(2), 51–64.

Mutula, S. M. (2008). Digital divide and economic development: Case study of sub-Saharan Africa. *Electronic Library*, *26*(4), 468–489. https://doi.org/10.1108/02640470810893738

Ngai, E. W. T., Poon, J. K. L.and Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education*, 48, 250–267. https://doi.org/10.1016/j.compedu.2004.11.007

Nwankwo, Ndidi Grace CLN; Obiadazie, Regina Eyiuche; and Ofordile, Julius Okeke CLN, "PROBLEMS CAUSED BY THESTUDENTS' USE OF CELL PHONES IN UNIVERSITY LIBRARIES IN ANAMBRA

STATE, NIGERIA." (2018).LibraryPhilosophy and Practice (e-journal). 2187.https://digitalcommons.unl.edu/libphilprac/2187

Paton, R. M., Fluck, A. E.and Scanlan, J. D. (2018). Computers &education engagement and retention in VET MOOCs and online courses : A systematic review of literature from 2013 to 2017. *Computers & Education*, *125*(January), 191–201. https://doi.org/10.1016/j.compedu.2018.06.013

Pavlenko, D., Barykin, L., Nemeshaev, S.and Bezverhny, E. (2020). Individual approach to knowledge control in learning management system. *Procedia Computer Science*, 169(2019), 259–263. https://doi.org/10.1016/j.procs.2020.02.162

Pokhrel, S. and Chhetri, R. (2021). A literature review on impact of Covid-19 pandemic on teaching and learning.*Higher Education for the Future*, 8(1), 133–141. https://doi.org/10.1177/2347631120983481

Ponelis, S. R. and Holmner, M. A. (2015). ICT in Africa: Enabling a better life for all. *Information Technology for Development*, 21(1), 1–11. https://doi.org/10.1080/02681102.2014.985521

Porter, S. (2015). *To mooc or not to mooc : How can online learning help to build the future of higher education?* (Issue 2015, pp. 4–6).

Pretorius, L. (2017). Effective teaching and learning: Working towards a new, all-inclusive paradigm for effective and successful teaching and learning in higher education and training. *Educor Multidisciplinary Journal*, 1(December), 6–29.

Ramrathan, L. (2016). Beyond counting the numbers: Shifting higher education transformation into curriculum spaces. *Transformation in Higher Education*, *1*(1), 8. https://doi.org/10.4102/the.v1i1.6

Reynolds, R., Chu, S., Ahn, J., Buckingham Shum, S., Hansen, P., Haythornthwaite, C., Huang, H., Meyers, E. M.and Rieh, S. Y. (2019). Inaugural issue perspectives on information and learning sciences as an integral scholarly nexus. *Information and Learning Science*, *120*(1–2), 2–18. https://doi.org/10.1108/ILS-01-2019-138

Scherman, V., Smit, B. and Archer, E. (2016). The usefulness of academic performance feedback

to primary and secondary schools. *The Journal for Transdisciplinary Research in Southern Africa*, *9*(1), 81–93. https://doi.org/10.4102/td.v9i1.219

Schleicher, A. (2020). *The impact of COVID-19 on education - Insights from Education at a Glance 2020* (Vol. 110, Issue 2). OECD. https://doi.org/10.1787/69096873-en

Schumacher, D. J., Englander, R. and Carraccio, C. (2013). Developing the master learner: Applying learning theory to the learner, the teacher, and the learning environment. *Academic Medicine*, 88(11), 1635–1645. https://doi.org/10.1097/ACM.0b013e3182a6e8f8

Serdyukov, P. (2017). Innovation in education: what works, what doesn't, and what to do about it? *Journal of Research in Innovative Teaching & Learning*, 10(1), 4–33. https://doi.org/10.1108/jrit-10-2016-0007

Shah, S., Diwan, S., Kohan, L., Rosenblum, D., Gharibo, C., Soin, A., Sulindro, A., Nguyen, Q. and Provenzano, D. (2020). The technological impact of Covid-19 on the future of education and health care delivery. *Pain Physician*, 23(4 Special Issue), S367–S380.

Soares, D. and Dias, D. (2018). Perspectives of lifelong education in Portuguese higher education: A critical analysis of learning outcomes. *International Journal of Lifelong Education*, 00(00), 1–9. https://doi.org/10.1080/02601370.2018.1559890

Stanhope, D. S.and Corn, J. O. (2014). Acquiring teacher commitment to 1:1 Initiatives: The role of the technology facilitator. *Journal of Research on Technology in Education*, 46(3), 252–276. https://doi.org/10.1080/15391523.2014.888271

Thomas, K. M., O'Bannon, B. W.and Bolton, N. (2013). Cell phones in the classroom: Teachers' perspectives of inclusion, benefits, and barriers. *Computers in the Schools*, *30*(4), 295–308. https://doi.org/10.1080/07380569.2013.844637

Thomas, K. M., O'Bannon, B. W.and Britt, V. G. (2014). Standing in the schoolhouse door: Teacher perceptions of mobile phones in the classroom. *Journal of Research on Technology in Education*, *46*(4), 373–395. https://doi.org/10.1080/15391523.2014.925686

Toffler, A. (1970). *Future Shock*.

United Nations. (2020). Policy brief: Education during Covid-19 and beyond.*United*

Nations Educational, Scientific and Cultural Organization (Issue 26). https://doi.org/10.24215/18509959.26.e12

Vahedi, Z., Zannella, L.and Want, S. C. (2019). Students' use of information and communication technologies in the classroom: Uses, restriction, and integration. *Active Learning in Higher Education*, 1–14. https://doi.org/10.1177/1469787419861926

van Rooy, B.and Coetzee-Van Rooy, S. (2015). The language issue and academic performance at a South African University. *Southern African Linguistics and Applied Language Studies*, 33(1), 31–46. https://doi.org/10.2989/16073614.2015.1012691

Van Wyk, A., Van Der Westhuizen, P. C.and Van Vuuren, H. (2014). Resistance to change in schools: Perceptions of principals and teachers in a South African province. *Problems and Perspectives*
in Management, 12(4), 457–465.

Vanlommel, K., Van Gasse, R., Vanhoof, J.and Van Petegem, P. (2017). Teachers' decision-making: Data based or intuition driven? *International Journal of Educational Research*, 83(March 1994), 75–83. https://doi.org/10.1016/j.ijer.2017.02.013

Weaver, D., Spratt, C. and Nair, C. S. (2008). Academic and student use of a learning management system: Implications for quality. *Australasian Journal of Educational Technology*, 24(1), 30–41. https://doi.org/10.14742/ajet.1228

Welsh, K. E., Mauchline, A. L., France, D., Powell, V., Whalley, B., Park, J., Welsh, K. E., Mauchline,
A. L., France, D.and Powell, V. (2018). Would Bring Your Own Device (BYOD) be welcomed by undergraduate students to support their learning during fieldwork ? Would Bring Your Own Device
(BYOD) be welcomed by. *Journal of Geography in Higher Education*, *8265*, 1–15. https://doi.org/10.1080/03098265.2018.1437396

Williams, M. (2017). Dewey in the 21 st century. *Journal of Inquiry & Action in Education*,9(1), 91–102. https://digitalcommons.buffalostate.edu/jiae/vol9/iss1/7/

Witthaus, G., Inamorato dos Santos, A., Childs, M., Tannhäuser, A.-C., Conole, G., Nkuyubwatsi, B.

and Punie, Y. (2016). Validation of non-formal MOOC-based learning. An analysis of assessment and recognition practices in Europe (OpenCred). In *JRC Science for Policy Report*. https://doi.org/10.2791/809371

Zhu, C.and Mugenyi, K. J. (2015). A SWOT analysis of the integration of e-learning at a university in Uganda and a university in Tanzania. *Technology, Pedagogy and Education*, *24*(5), 1–19. https://doi.org/10.1080/1475939X.2015.1093537