

LIGHT AT THE END OF A TUNNEL: AN APPRAISAL OF ONLINE TEACHING AND LEARNING IN AND POST COVID-19 ERA

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ABSTRACT

The COVID-19 pandemic was like a magic bullet in pronouncing the fourth education revolution, a period of swift migration to online teaching and learning (T&L) platforms. This became evident at the dawn of lockdown periods from March 2020, when countries all over the globe shut down businesses to contain the virus. The shutdown impacted economies negatively. Thus, the educational sector, particularly higher education, was hard hit as the shift from physical to online distance T&L exposed the wide digital divide in both developed and developing worlds. The challenges have been widely recorded, and although these seem to be clouding the opportunities that are yet to be synthesised, it is worthy of corroborating the noted opportunities to prepare for T&L trajectories. Thus, the current study is an appraisal of online teaching and learning, by critically reviewing related literature from various sources dating to the dawn of migration to distance and online T&L platforms across the globe in 2020. The objective is to identify some themes for opportunities for curriculum development brought about by the unprecedented migration to online T&L, to more effectively model current and future scenarios. The major findings, which are explanatory, indicate that online T&L increases access to education by trumping physical and geographical boundaries. Multimedia T&L formats can cater for various capabilities and learning styles. Online T&L has further prompted some education institutions to invest more in information and communication technologies (ICT) thus aligning with the fourth industrial revolution and in some cases the fifth industrial revolution. The COVID-19 era has created opportunities for the adoption of online T&L technologies among both educators and learners to align themselves accordingly. This historical epoch has significantly prompted more commitment to collaboration, partnerships, and associations in the whole education sector to solicit more resources. It is rational to conclude that the fourth industrial revolution (4IR) is manifesting itself across the globe, with some developed parts already in the fifth industrial revolution, despite the challenges and albeit at different levels. A conceptual model of a general fourth education revolution, that education institutions, particularly in the developing world, can adapt and adjust to suit their specific circumstances, has thus been developed. The model aims to improve preparation for online education instruction, which has striven, and an unknown future.

Keywords: COVID-19, online T&L, fourth education revolution, fourth industrial revolution, opportunities

INTRODUCTION

The tunnel: Teaching and learning in the era of Covid-19

The dawn of the coronavirus pandemic, which came to be known as COVID-19 descended upon the world in December 2019 (Shereen et al. 2020) and saw the closure of business activities (lockdown) across the globe from March 2020. That was unprecedented. This pandemic was a blow to the education sector among other sectors worldwide since it became impossible for physical contact education because of the highly infectious nature of the disease. Thus, educational institutions were forced to move swiftly to online instruction or to close, based on their circumstance. This has become a crucial historical epoch as it has revealed the digital divide in the world amid the fourth industrial revolution buzz and a looming fifth industrial revolution. Developing economies were the hardest hit. According to OECD (2020, 5) “online learning is not necessarily conducted remotely but can be used as a complementary method to traditional pedagogies in physical classrooms where it is referred to as blended learning”. In the current study, online learning refers to the use of digital technology supported by the Internet to provide instruction.

The problems that have emerged with migration to online instruction hitherto are multifaceted and are mainly entrenched in the digital divide. Moyo (2021) identifies some themes into which the problems of online teaching and learning can be categorised, drawing from testimonies in an article published by Jandrić, P. et al. (2020): *Teaching in the Age of Covid 19*. These themes include disturbances in personal life working from home, social isolation, technological and technical challenges, difficulty adapting to the new normal, adjusting working and preparation time, inequality of access to technological infrastructure, a lack of digital literacy, adapting curricular to online mode, and a lack of information and data protection (Moyo 2021).

These problems are confirmed by several authors. For example, disturbances in personal life working from home (Zhang et al. 2020; Statista2 2020). Social isolation has been confirmed by authors like Muhammad and Kainat (2020); and Dhawan (2020) who report a lack of human interaction and contact between students and instructors, a lack of physical socialisation, and group study hurdles. Technological and technical challenges have been confirmed such as low bandwidth, slow internet, operational issues such as coordination, and inadequate technical support resulting in some difficulties accessing online instruction, problems downloading materials, and conducting online assessments since some students use their cellular phones, and can thus find it difficult to respond to an assignment on the phone (Alturise 2020; Kapasia et al. 2020; Mahyoob 2020; Mseleku 2020; Rajab, Gazal, and Alkattan 2020).

Some empirical findings indicate the challenges of online instruction. For example, a study by Kapasia et al. (2020) in West Bengal, India shows that “30.6% of students were studying through reading textbooks and did not participate in e-learning mainly due to lack of access to online learning platforms”. This has been a common scenario in developing economies. Difficulty adapting to the new normal has been confirmed by Ramorola (2013), citing technophobia, Isabirye and Dlodlo (2014), indicating a lack of e-learning culture, motivation, incentives, training, and facilitation conditions, and Strydom et al. (2020) citing separation of students. A study by Coman et al. (2020) cites teachers’ reluctance to change and the difficulty of changing students’ perceptions of online instruction as the major problems faced by the higher education system in Romania.

Constraints of adjusting time to prepare for and work in an online environment, which is more involving than a physical environment, have been alluded to (Ramorola 2013; Almazova et al. 2020). A lack of preparation and management has been confirmed by (Isabirye and Dlodlo 2014), while extra and heavy workload re-packaging learning content to suit online modes has been a concern (Heng and Sol 2020). These difficulties have strained academic personnel, impacting their physiological, physical, mental, and psychological welfare, beyond the scope of institutional wellness centres’ capabilities. Inequality of access to technological infrastructure has been reiterated by Isabirye and Dlodlo (2014), Mahyoob (2020), indicating demographic divide, technology access shortage, inadequate coordination and limited technological support, and limited infrastructure capacity due to technological cost, and limited user penetration. DePaul (2020) indicates a general lack of internet access and computers, particularly in rural areas, as hindrances to online instruction. Access to technological infrastructure is a challenge not only in rural areas but also in urban areas in the developing world due to wide socio-economic inequalities.

A lack of digital literacy has been echoed by Heng and Sol (2020), Rajab et al. (2020), Marek, Chew, and Wu (2020), indicating inadequate literacy of online applications, limited online education experience, and poor information technology skills among educators, hindering the uptake of online sessions. For example, some surveys conducted in Germany have shown that many schools lack the appropriate information and communication technology transformation process in educational systems (Fraillon et al. 2019; Autorengruppe Bildungsberichterstattung 2020). The foregoing finding indicates that digital literacy is lacking in both the developing and developed worlds. The difficulty of adapting curricula to online modes has been echoed in Ali’s (2020) finding, citing a lack of confidence in administering the different tools and learning platforms. According to Gaur et al. (2020), the coronavirus pandemic has prompted curriculum transformation as in the cases where some medical field

students have had to use simulation in place of practical activities. Rose (2020) presents a concern that a lack of hands-on training in the preclinical years may incapacitate medical students, and they may struggle later in the clinical years. Importantly, one emerging overarching problem with online instruction is a lack of information and data protection which has significantly been elaborated on by Rudman (2021), who gives examples such as “cyberbullying, trolling, doxing, harassment, zoom bombing live lectures, hijacking lectures” that can be detrimental.

Yet, in the midst of these myriad problems resulting from the swift transition to online instruction, which seems like a dark tunnel, some opportunities are noted. These opportunities should be embraced in the context of the fourth education revolution seized by modern technologies in education. Some opportunities are yet to be recorded. Lockee (2021) testifies that the COVID-19 crisis provided a golden opportunity to reconsider strategies for online learning. Therefore, education institutions should utilise whatever opportunities emanate from online instruction precipitated by the COVID-19 crisis to develop applicable instructional models in preparation for future scenarios.

PURPOSE OF THE STUDY

The purpose of the current study is to appraise online instruction, using an integrative literature review, to develop a general model of the fourth education revolution. The model is intended to promote teaching and learning that fits the requirements of the fourth industrial revolution, particularly in developing economies. The model further seeks to adequately prepare for unknown future scenarios, at the same time preparing for the fifth industrial revolution characterised by advanced technologies wherein humans work side by side with machines in daily deliberations. The purpose is achieved by exploring the following objective: (1) to identify opportunities brought about by the swift transition to online instruction in education due to COVID-19 and determine how these opportunities can shape future education.

THEORETICAL FRAMEWORK

Closing the digital divide

The COVID-19 pandemic has made explicit, the digital divide discourse in education among other sectors. According to Journell (2007), the digital divide is categorised under different social strata such as “poverty, status, caste, class, and inequity”, and entails a broad range of indicators. Some are notable, such as “language literacy, computer skills, availability of instruction or social support and access to technology hardware and broadband” (Warschauer

2010, 1552). Importantly, researchers like Santally et al. (2021) suggest low-cost services to reduce the digital divide, such as “community communication centres, radio, television, to cater for rural communities and cut on costs, massive open online courses, or the use of social media as learning platforms, as well as community learning centres and libraries, and print media” as modelled by UNESCO. For such kind of projects to succeed, Osman and Keevy (2021) implore governments to assist in enabling a digitised education system, indicating that “once it is in place, the mechanism provides access to online modules designed for distance learners at a lower cost, or to free online courses on the web”. Osman and Keevy’s (2021) ideas concur with those of Correia (2020), who advocates utilising free resources and tools as well as alternative assessment methods to close the digital divide. De Los Santos and Rosser (2021) further suggest collaborations, investing in technology, and curriculum alignment as ways of closing the digital divide.

Notably, research has dwelt on discussing the digital divide and literature is scanty on empirical studies of closing this divide. Thus, the current study is important in its endeavour to identify and synthesise opportunities brought about by the COVID-19 pandemic and to develop a model of embracing ITC that can close the digital divide in education.

RESEARCH METHODOLOGY

The study was conducted as an integrative literature review to identify and synthesise the opportunities of the shift to online instruction caused by the COVID-19 crisis, to develop an applicable model of the fourth education revolution. An integrative review is relevant to combining perspectives and insights from different fields of research traditions. Various types of sources were consulted based on availability since literature is still being documented on this overarching subject. Thus, the sampling strategy used is snowball sampling, based on the availability of relevant literature, where opportunities can be identified from the challenges brought about by the swift transition to online instruction.

RESEARCH FINDINGS

Some themes are identified from literature that reveal opportunities which can be harnessed for future instructional models. Thus, the findings are analysed using a thematic approach, based on the following themes: prompt investment in information and communication technologies, more rapid and widespread embracing of online instruction, partnerships, attitude change towards online instruction, blended learning models, and enforcing information and data protection laws.

Light at the end of the tunnel: Opportunities for a swift transition to online instruction

Despite the seemingly gloomy situation due to the various problems emanating from swift migration to online education in the COVID-19 era, some important lessons should be utilised to model future teaching and learning scenarios. Thus, the findings are discussed under the stated themes which are viewed as opportunities to embrace the fourth education revolution in tandem with the 4IR, and in some parts, the fifth industrial revolution.

Prompt investment in Information and Communication technologies

Embracing ICT in education is a pending project across the globe, despite the 4IR, characterised by technological applications in the world of work. However, the prevalence of COVID-19 precipitated consideration for and investment in ICT in the education sector, to continue with tuition when countries went on lockdown in March 2020. Despite the technological and technical challenges faced at different levels across the globe, the provision of technological infrastructure had to be prioritised in educational institutions to avoid a total shutdown of the sector, which could have had serious repercussions on the training and employment cycle. Importantly, the COVID-19 pandemic has exposed the digital divide in the education sector and yet education institutions, at their various levels, are the training hubs.

In most South African universities, technological materials were already there before COVID-19 but have not been fully utilised because tuition has been mainly by physical contact (Xie et al. 2021). Thus, the constraints posed by COVID-19 have been a good opportunity to compel institutions to invest more in technological infrastructure for teaching and learning, thus making graduates more industry-relevant in the business world dominated by modern technologies. This view is supported by Maree (2022), concurring with Waghid (2021) who both highlight an opportunity in online instruction, despite the challenges. To this end, institutions, particularly at the tertiary level, have made efforts to provide technological hardware such as laptops, tablets, and other useful gadgets as well as data to students to keep tuition going. At the school level, this era has prompted both teachers and parents to embrace technology where in some cases, teachers used online instruction and parents had to learn technical skills to assist their children, particularly those at the primary school level. However, this is not to turn a blind eye to some poor and rural communities where tuition had to be suspended due to the unavailability of ICT. This has laid bare the digital divide that exists in the world, and that is an important lesson to humanity to learn to share with the poor and practice philanthropy to make the world a better place for all humankind, considering that the world has become a global village.

Improved online instruction adoption has been confirmed by some researchers, for example, Ali (2020), based on a study in Fiji, echoes that COVID-19 has provided opportunities to adopt online instruction as education systems need to be abreast with the rapid emergence of new technologies, thus making online, blended, and remote learning a necessity, particularly at tertiary level. Ali (2020) indicates that many universities and educational institutions have adopted ICT tools such as “laptops, projectors, tablets, smartphones, pads and interactive whiteboards”. However, for developing economies, this is skewed towards some social classes, making the harmonisation of the virtual learning project almost impossible. As such, Obana (2020) notes with concern, the inequalities that exist in the world and thus cautions that education institutions must assess their capabilities based on contextual realities such as power availability, internet connectivity and teacher readiness. Though this is a rational argument, it should be noted that, despite the discrepancies in the level of progress, particularly in the developing economies riddled with inequality and poverty, this unprecedented occurrence has brought about development in the education sector wherein institutions have been taught to prepare for unforeseen and future scenarios. This implies that institutions should develop models that are applicable to their own circumstances and seek assistance where possible.

Elsewhere, in the developed economies, an example of an opportunity created by the COVID-19 crisis is that some Internet service providers have offered socio-economic intervention programmes such as the provision of free broadband to college and K-12 learners in the USA (Fishbane and Tomer 2020). Notably, the provision of zero-rated data to university students has also been realised in developing economies like South Africa. The COVID-19 situation has seen “increased use of zero-rated applications and educational websites, social media, Facebook, Twitter, WhatsApp, Internet websites, YouTube, Microsoft Teams, Skype, Zoom, Blackboard, and Smart Notebook” (Mhlanga 2021, 25). As such, this has been an opportunity for the education sector to embrace the various 4IR technological tools that are beneficial in facilitating online instruction.

In South Africa, for example, some universities such as The University of Cape Town and Sol Plaatje University had already put measures in place for learners to have personal mobile learning devices before the pandemic (Brown and Pallitt 2015) and provided free internet for their students and faculty (Ogunmokun and Timur 2019). Some network providers such as Vodacom have launched special bundles and increased their zero-rated offer to all public institutions of learning in South Africa to enable access to online learning platforms (Joosub 2020). The Organisation of Economic Corporation and Development (OECD) confirmed the provision of laptops with internet connections to disadvantaged students in several countries to strengthen the digital infrastructure during the COVID-19 crisis (OECD 2020). The OECD

confirmed that “some countries are now considering funding internet access as a basic service that all citizens should have access to, including those living in rural regions or from poorer economic backgrounds” (OECD 2020). If achieved, this is a great opportunity to create an informed world in which knowledge and information trump socioeconomic classes and geographical boundaries.

The more rapid and widespread embracing of online instruction

Social isolation has been regarded as a serious challenge in online education, whereas the world is viewed as human. However, the COVID-19 pandemic has taught the world to accept change. Therefore, with adequate training, instructors and learners can manipulate digital technologies to be equally engaging in the absence of physical contact, for example, by using emoticons found on digital platforms to imitate human emotions (Moyo 2021). Training has been a long-overdue opportunity to prepare knowledge instructors and learners to meet the requirements of the 4IR and in preparation for an unknown future. Training is also an opportunity for innovation and capacity development (Mseleku 2020). In Italy, for instance, “Cultura Sviluppo”, a leading non-profit organisation in the Technical and Vocational Education and Training (TVET) sector “has developed virtual internships in response to the COVID-19 lockdown (<http://italymobility.com/>)”, and other developed countries like Brazil and Switzerland have followed suit (OECD 2020). Such innovations as virtual internships, where possible, enable students to get practical work experience at less cost, without having to travel or relocate for internship and thus offering more students the much-desired work experience.

Another example of an online instruction opportunity born out of the COVID-19 crisis is that in Germany, the Ministry of Education, Youth and Sports in the Federal State of Baden-Württemberg is offering selected providers “to benefit from their digital learning platform (Digitaler Weiterbildungscampus – <https://www.digitaler-weiterbildungscampus.de/>), and the content can be shared across institutions where Ministry co-funds 50–70 per cent of the costs of using the platform for providers” (OECD 2020). Similar initiatives have been set up in “France, Ireland, Belgium, Spain, Croatia, and Romania”, among others (OECD 2020). Ministries of education, with the help of governments, in developing economies, should emulate such noble causes to make online instruction possible across the divide. Suffice it to say that the provision of free and subsidised, cheaper online instruction platforms increases access to education. These developments are more notable in the developed world, thus developing economies can also learn from them by forming partnerships to improve access to online instruction which has become increasingly popular since the dawn of COVID-19.

Partnerships

Collaboration among institutions has been found useful (Dhawan 2020). For example, “universities in partnership with the governments and the private sectors can build on current efforts to provide free devices, data, and connectivity to all students” (Du Preez and La Grande 2020, 101). Such provisions will enable universities to revamp their learning spaces so that online instruction has a smooth adoption (Schleicher 2020). Notably, the COVID-19 pandemic has affected countries to varying extents, prompting sudden and innovative contextual responses. Despite these contextual responses, it remains crucial to learn from the experiences of other countries. In that regard, UNESCO (2020) emphasises the importance of consulting with teachers and academic experts as well as other sectors to broaden the scope for developing curricula and assessment methods. UNESCO (2020) emphasises that learning materials and content be built within the pedagogical contexts, not ready-made from outside, for alignment purposes. Collaboration and communication are crucial to support teachers, students, and families in online learning during a crisis (Fisher, Frey, and Hattie 2020). Ongoing educational reforms and innovations are reported to be great opportunities for tackling inefficiencies (United Nations 2020). In that light, the pandemic has been a worthy opportunity to improve education systems. Thus, education ministries should utilise the COVID-19 crisis lessons to strengthen dialogue with finance ministries to maintain and, where possible, increase the share of the national budget for education “in particular when internal reallocation is feasible” (United Nations 2020, 21). Various Education stakeholders have taken on additional responsibilities in the COVID-19 era. Thus, engaging these stakeholders such as teachers, learners, education management, parents, and the marginalised, provides an opportunity to elevate the education system’s robustness. Online education uses various effective techniques such as “debates, learning based on discovery and experiences, learning about policies”, therefore, education institutions and the government should form strong collaboration for sustainability (Huang et al. 2020).

Attitude changes towards online instruction

In a study of testimonials by Jandrić et al. (2020), a significant 41 per cent of the testimonial voices are open to learning and gaining new insights into online education. A study by Odit-Dookhan (2018) on students’ attitude toward E-learning, revealed that their attitude was positive and that it improved when they observed that E-learning systems were accessible. Slimi (2020) concurs that online education has been an opportunity for students to learn new skills and thus change their attitude towards online instruction. Importantly, feedback from academics and support staff, as well as students on their experiences of online teaching/learning “could

inform the development of future learning programmes and feed into professional development programmes offered to staff” (Du Preez and La Grande 2020, 101).

Korkman and Toraman identify some support programmes that can influence a positive attitude to online instruction summarised as follows: enhancing network capacity, internet speed, information technology, training educators to use online learning management systems, guaranteeing every student’s access to the internet or other necessary equipment, organizing special training about getting ready for another potential outbreak in the future, dynamising educator-student and parent cooperation, ... making effective plans for extraordinary conditions in the future by the educational decision-makers, revising all educational practices starting from the concept of education itself and making a new structuring program, taking measures to promote educators’ creative thinking skills, considering educators as professionals who can manage complex processes rather than technical employees, and making effective plans for the potential extraordinary conditions in the future and taking measures about the post-COVID educational practices ... (Korkmaz and Toraman 2020).

Zhao and Watterston (2021) assert that trajectories for greater access and opportunities to online education have been paved for online education adoption, through the provision of resources. Therefore, educators and learners, should themselves be motivated to partake in training to harness the skills for online education.

Blended learning models

The COVID-19 crisis has enhanced opportunities for both physical and online engagement (OECD 2020; Strydom et al. 2020), known as blended learning. Integrated learning entailing physical and remote synchronous (real-time) and asynchronous (time-independent) models, could curb the myriad challenges. Though blended learning poses another challenge of the need for more training, extended preparation and work time, it can be made possible with enough support. The thought of adapting curricula designed for physical contact to online mode must have been daunting for every affected teacher (Moyo 2021). Notably, before the onset of COVID-19 in 2020, some students and lecturers from traditional universities were not acquainted with the distance mode of learning and teaching. The lesson learnt is that curriculum design should be integrative where possible. However, this also points to a redesign of teaching models to prepare for multimodal learning possible. E-learning platforms offer multiple benefits to learners such as “control over the content, control over the time spent learning, and thus the process can be adapted according to learner needs and objectives of learning as well as the study level” Suresh, Priya, and Gayathri (2018). An earlier study by Lochner et al. (2016) found that, when used as an additional method to traditional classes, “E-learning enhanced

students' learning experience and increased their engagement with the instructors". This finding concurs with later research like that by Gerber and Eybers (2021) that found positive results in a flipped classroom, which is a type of blended learning. In a crisis such as COVID-19, teachers can develop innovative pedagogical approaches (Dhawan 2020; Alturise 2020), using cheap applications that can be accessed via mobile phones. Thus, the (United Nations 2020) emphasises that it is noticeable that "this crisis has stimulated innovation within the education sector". Broadening the range of online courses is crucial to making online learning more inclusive (OECD 2020). Therefore, the opportunities for introducing blended learning are expanding access at the same time being cost-effective and efficient (Mhlanga 2021). It is rational to assert that adopting blended learning models in education could be the best way to prepare for future crises and unknown scenarios.

Enforcing information and data protection laws

A lack of information and data protection can be detrimental to copyright, intellectual property, and patent owners if unguarded. However, though difficult to safeguard information, policies and procedures to protect the owners have been made more stringent due to the recently strengthened Protection of Personal Information Act (POPIA). Nonetheless, the widespread online instruction in education and communication, in general, has been an opportunity for more stringent measures against offenders of POPIA.

Considering the opportunities noted in the swift transition to online education, a conceptual model of the 4th education revolution is herein developed in Figure 1. Figure 1 is a model of the 4th education revolution developed in light of the opportunities identified from the literature regarding online education during a crisis. The model is intended to influence all stakeholders concerned, to show more commitment to investing in the education sector to embrace the 4th education revolution characterised by the adoption of ICT in education. Thus, the education sector will be able to keep abreast with the fourth industrial revolution trends characterised by modern and advanced technologies in the workplace, and in preparation for a looming fifth industrial revolution, particularly in the developing world. The COVID-19 crisis has exposed the gap that has been existing in learning and training spaces, and they have been lagging in the uptake of technology. This has increasingly seen challenges where institutions produce students that are not industry-relevant due to a lack of skills in utilising modern technologies. It is acknowledged that the relatively new prerequisite of work-integrated learning and industrial exposure for students and staff in higher education institutions in developing economies like South Africa is an endeavour to be industry-relevant. The model thus displays some major opportunities that stakeholders should utilise to be relevant in the 4IR

era. These include forming partnerships to share ideas and resources, investing more in ICT for teaching and learning to keep abreast with industry trends, increasing access to training opportunities, creating platforms to encourage attitude change such as providing incentives for the adoption of ICT in education, utilising blended learning models to prepare for future scenarios, and enforcing and strengthening available information and data protection laws. The one-way arrows imply that it is the stakeholders' initiative to embrace the presented factors that are crucial opportunities to realise the fourth education revolution.

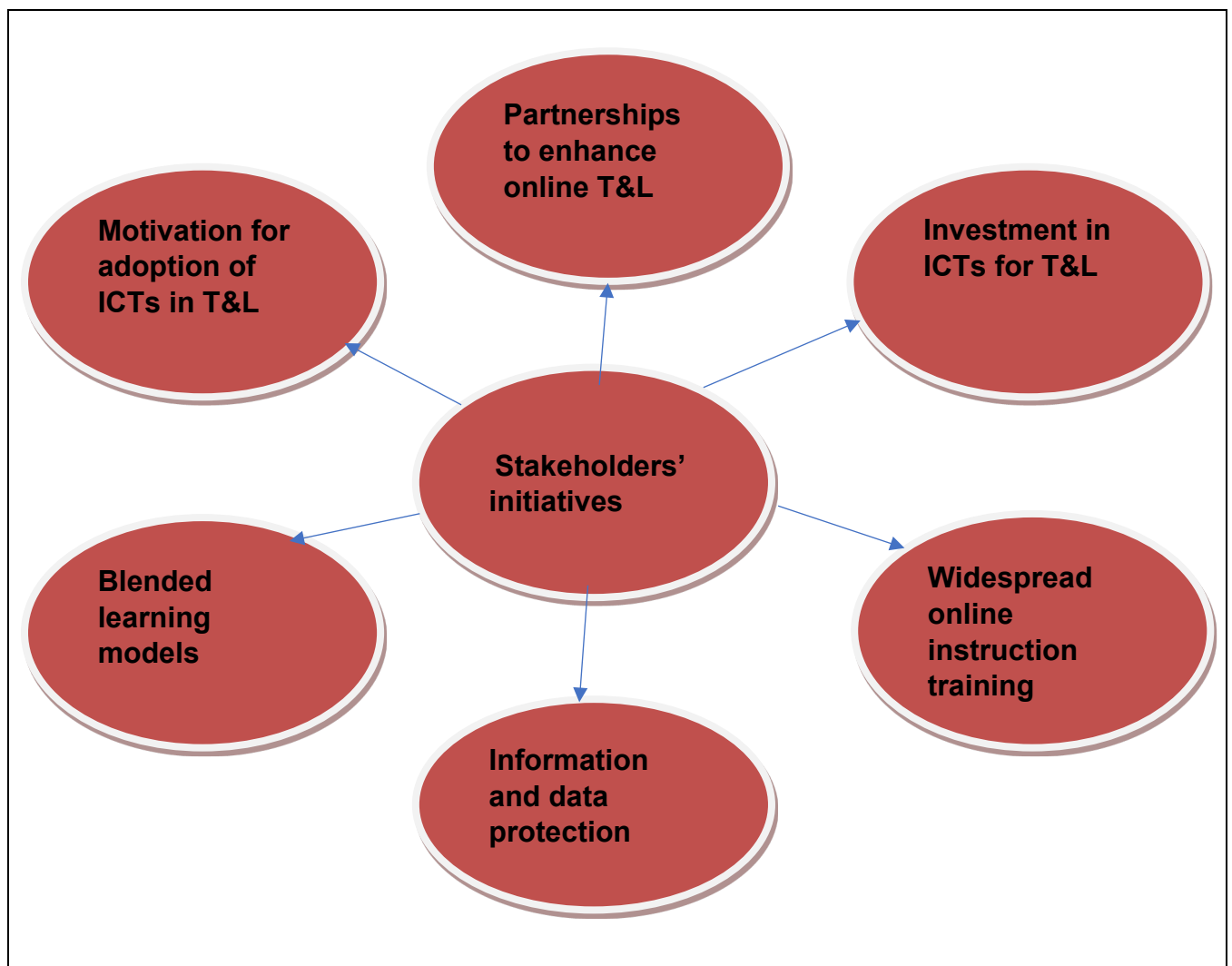


Figure 1: A conceptual model of the 4th education revolution developed by the researcher

CONCLUSION

Despite the seemingly gloomy challenges faced in online instruction brought about by the COVID-19 constraints, there are some opportunities identified that if embraced, can transform the education sector in tandem with the fourth and a looming fifth industrial revolution, particularly in developing economies. One major recommendation is that education institutions,

with the support of governments, should form partnerships to enable the pooling of resources applicable to their own contexts, that can enhance the 4th education revolution and realise advancement to the 5th education revolution.

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