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Examining the Adoption of Emergency Remote Teaching and Virtual Learning During and After COVID-19 Pandemic

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Abstract

Purpose

The Coronavirus 2019 (COVID-19) pandemic has already had a significant disruptive impact on the society, posing challenges to the provision of education across the world. Due to this crises governments over the world have temporarily closed educational institutions to help reduce the spread of COVID-19. Accordingly, educational institutions are deploying innovative Emergency Remote Teaching (ERT) and Virtual Learning (VL) approaches for students to study at home. Digital technologies are being employed as a positive response to COVID-19 pandemic. Therefore, this study draws on existing literature and theories of online learning and change management to provide evidence on the state of art of ERT and VL.

Design/methodology/approach

This current study employs a systemic review of 53 sources to provide descriptive analysis leveraging on secondary sources from the literature and document reports on theories of online learning and change management, COVID-19, pandemic, emergency remote teaching and virtual learning.

Findings

Findings from this study presents the theories of online learning and change management and significance and challenges of adopting ERT and VL during the COVID-19 pandemic. Also, our findings present application platforms that are been deployed for the adoption of ERT and VL during and after COVID-19 pandemic. Lastly, the findings explore potential strategies as recommendations to be employed to improve current and future adoption of ERT and VL in educational institutions.

Originality/value

This study draws on existing literature and adds to existing body of knowledge by exploring the adoption of emergency remote teaching and virtual learning during and after COVID-19 pandemic. This study provides a timely guide on the potential of emergency remote teaching and virtual learning in higher education as a response to COVID-19 crises now and into the future. This study discusses the theories of online learning and change management and also offers provide recommendations to educationalist and policy makers in educational institutions on addressing the crisis.

Keywords: Education management; Online leaning theories; Emergency remote teaching; Learning crisis and school closures; Virtual learning tools; COVID-19 pandemic.

1. Introduction

Over the decade's crisis have always have an impact on education and students' right to quality education is disrupted during crisis that may arise due to disasters such as earthquakes, hurricane, cyclones, war, tsunamis, disease outbreak, etc. (Basilaia and Kvavadze, 2020; Peters

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et al., 2020). The global landscapes of the academe acceded to sweeping changes because of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, more commonly referenced as Coronavirus 2019 (COVID-19) (Andersen *et al.,* 2020). One of the significant changes emitted from campus closures is transitioning from face-to-face deliveries to modified virtual formats to curb the spread of COVID-19 (Toquero, 2020). Other adopted protocols included precipitous paradigm shifts from active collegiate athletic program engagements to deferment (Yousfi et al., 2020), fiscal responsibility re-adjustments (Ceylan and Ozkan, 2020), housing and culinary modifications (Crawford et al., 2020), and new considerations for international students and the returning students from abroad (Chinazzi et al., 2020).

According to UNESCO (2020), the viral pandemic affected about 1.5 billion students. As a result of the reactive maneuvers to facilitate the dampening of the viral spread, questions about student vulnerabilities and educational emergency preparedness emerged (Bozkurt and Sharma, 2020). The pandemic is a huge challenge to education systems. Thus, the COVID-19 pandemic has forced educational institutions across the world to suspend physical learning in order to help manage the infection spread (Zayapragassarazan, 2020). Additionally, to ease the burden on the health sector many countries have decided to temporarily close schools as to promote physical distancing initiatives (Mian and Khan, 2020; Van Lancker and Parolin, 2020). This has resulted to a paradigm shift in terms of learning (Jnr *et al.*, 2020; Mulenga and Marbán, 2020), forcing educational institutions to employ alternate approaches for engaging students learning during the pandemic (Mian and Khan, 2020). Due to the disruption of COVID-19 on the society (Jnr, 2020), institutions such as universities and colleges are now employing digital technologies (Anderson *et al.*, 2020; Keefe, 2020; Mulenga and Marbán, 2020; Zayapragassarazan, 2020) such as Emergency Remote Teaching (ERT) and Virtual Learning (VL) for educational activities.

The adoption of ERT tools help guide teachers towards delivering educational contents within the complete context of student's curriculum (Anthony *et al.*, 2019; Daniel, 2020). ERT helps to organize communication within classes (Kerres, 2020). Likewise, VL offers flexible learning by providing a learner-based approach that provides rich learning choices to students (Zayapragassarazan, 2020). VL provides tools to deliver learning resources and materials to students (Kerres, 2020). Therefore, this current study employs descriptive analysis leveraging on secondary sources from the literature and document reports, to provide a timely guide on the potential of emergency remote teaching and virtual learning in higher education as a response to COVID-19 crises now and into the future. This study provides recommendations to educationalist and institutional heads on addressing the crisis. In ramping up capacity to teach remotely, schools and colleges should take advantage of ERT and VL tools during and after the pandemic. The rest of the article proceeds as follows: section 2 is the methodology. Section 3 is the findings and discussion. Section 4 is the implications for research, policy, and practice. Lastly, section 5 is the conclusion.

2. Methodology

This current study adopts review of secondary sources to explore deployment of emergency remote teaching and virtual learning during and after COVID-19 pandemic. To conduct this review study, a systemic review protocol was developed on the basis of the standard review similar to prior study (Bokolo, 2020). Figure 1 depicts the systemic review protocol.

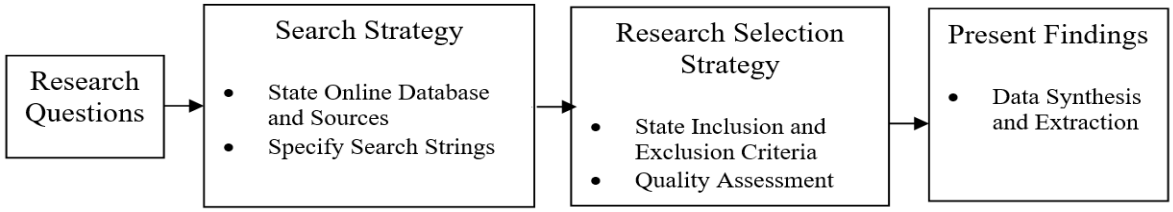

Figure 1. Systemic review protocol

The employed systemic review protocol includes four main activities: specification of research questions, deployment of search strategies, study selection strategies (inclusion and exclusion criteria, and quality assessment criteria, and lastly reporting of findings by synthesizing and extracting evidence from the selected sources. The following sub-sections describes the specified activities that were conducted to provide evidence for this study.

2.1.Research Questions

The aim of this study is to explore emergency remote teaching and virtual learning to manage the unprecedented educational disruption during the COVID-19 pandemic by investigating the following research questions:

- **RQ 1** What are the theories of digital or online learning and change management applicable for adoption of ERT and VL?
- **RQ 2** What are the significance and challenges of adopting ERT and VL during the COVID-19 pandemic?
- **RQ 3** What are the platforms been adopted for the adoption of ERT and VL during COVID-19 pandemic?
- **RQ 4** What are the strategies to be employed to improve ERT and VL during and after COVID-19 pandemic?

2.2.Search Process Strategy

2.2.1. Data Sources

To search for related papers, the search strategy began with an online search from digital libraries and websites. Prior research related to this current study were gotten from online database resources, namely, Google Scholar, PubMed, ScienceDirect, ProQuest, Springer, Wiley, IEEE Xplore, ACM, Emerald, Taylor & Francis, ISI Web of Science, Sage, Inderscience, and Scopus. These online libraries were employed because they are considered appropriate search engines for review in educational studies, information systems, and medical sciences. To ensure that a comprehensive search was employed search terms or keywords were formulated on the basis of the research questions (see section 2.1).

2.2.2. Search Strings

In carrying out the search from online databases search strings were framed with Boolean operators (AND, OR) to improve searching of relevant studies and to increase the quality of the search process. Thus, the search strings were formulated based on the title, abstract and keyword of the current paper. The main search terms comprise of emergency remote teaching OR virtual learning OR digital learning OR remote learning OR technology mediated learning OR digital learning theories OR online learning theories OR change management AND (coronavirus 2019 OR pandemic), COVID-19 OR pandemic AND (crises OR disaster).

2.3.Research Selection Strategy

Research selection strategy is carried out to evaluate whether or not the retrieved studies in the initial stage of the search process have to be included to provide answers to the explored research questions (see section 2.1). In this article, the research selection strategy is employed based on the inclusion and exclusion criteria, and quality assessment criteria.

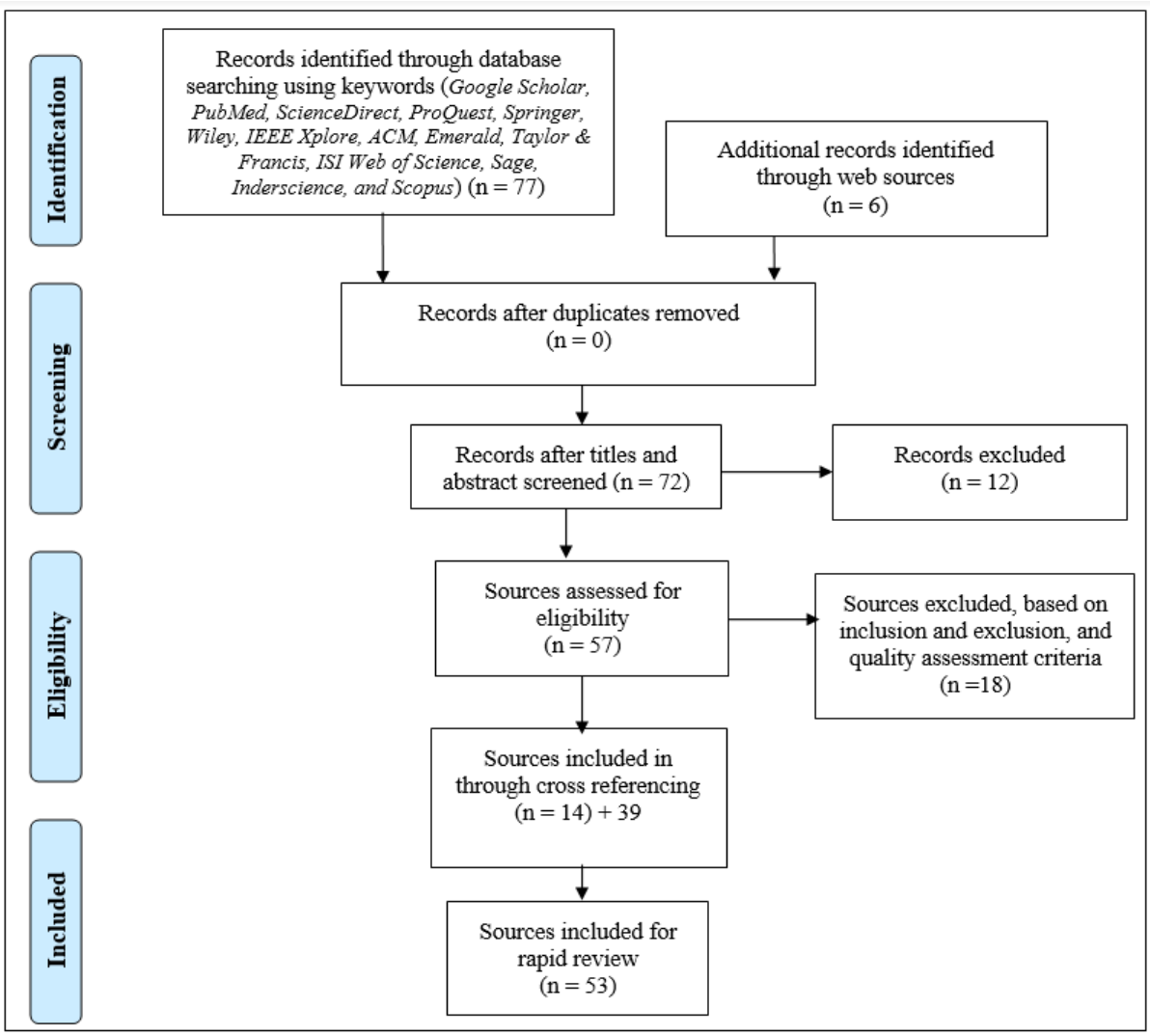

Figure 2. PRISMA flowchart for study selection process

Figure 2 depicts the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) employed in this study similar to prior study (Jnr, 2020) for study selection. Thus, as seen in Figure 2, 77 sources were retrieved from digital libraries and websites. Although, no duplicated were excluded. 12 studies were removed due to title and abstract not related to the research questions. Next, the selected studies were assessed based on inclusion, exclusion, and quality assessment criteria and 18 sources were excluded. 14 new sources were included via cross referencing. Thus, a total of 53 sources were utilized to provide evidence as regards to the research questions being explored.

2.4.Inclusion, Exclusion and Quality Assessment Criteria

Inclusion and exclusion criteria were designed based on the research questions. First, the title and abstract of the retrieved sources were carefully examined. Next, papers that were not related to COVID-19 pandemic, theories, emergency remote teaching and virtual learning were excluded. The studies included in this research were published between 2019-2020. In addition, all sources written in languages other than English language were excluded. To ensure that each of the selected studies provide quality evidence the Quality Assessment Criteria (QAC) is employed on the selected sources. The QAC was applied by precisely evaluating the content of the title, abstracts, and contents of all selected 53 sources. Also, the authors ensure that more than 50% of the included sources are indexed in Scopus or ISI Web of Science databases.

2.5.Data Extraction and Synthesis

This stage of the study aims to synthesize and extract empirical evidence from the included sources as related to the research questions being explored. Thus, the selected studies were studied in detail and secondary data were extracted to provide answers to the research questions as seen in section 3.

3. Findings and Discussion

This section presents the findings from secondary sources based on the research questions presented in section 2.1.

3.1.Theories of Digital or Online Learning and Change Management

Learning theories are important component for developing an effective emergency remote teaching and virtual learning curriculum for students and lecturers. Therefore, this study presents a review of theories of digital or online learning and change management. The theories are shown in Figure 3;

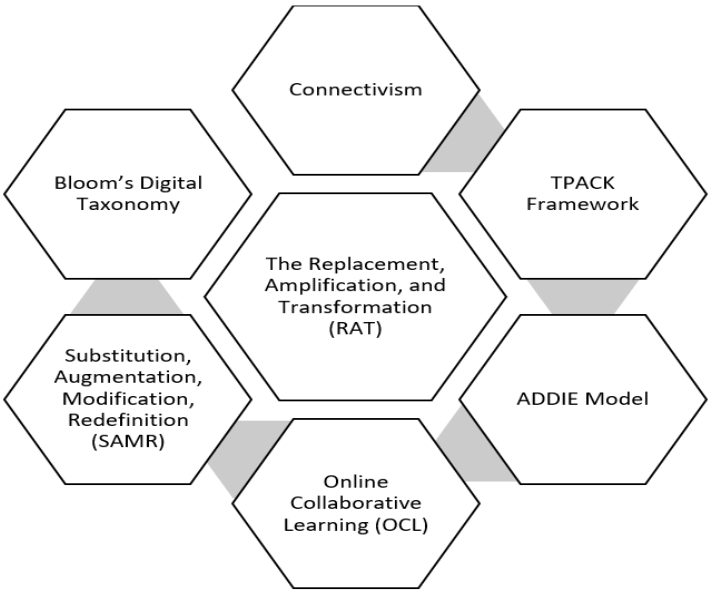

Figure 3. Theories of digital or online learning and change management

3.1.1. The Replacement, Amplification, and Transformation (RAT)

RAT was proposed by Joan Hughes as an assessment model for examining the role of digital technology in learning, teaching, and curricular practices, initially developed for PK-12 education. But RAT has been adopted in higher education, mainly in pre-service teacher education (techedges, 2020). The RAT framework was to be adopted as a self-assessment tool for preservice and in-service teachers to improve digital technological decision-making (techedges, 2020). Also, RAT helps educators evaluates the effectiveness of digital technology in relation to amplification, replacement, or transformation in pedagogical practice (thetechedvocate, 2020).

3.1.2. TPACK Framework

Technological Pedagogical Content Knowledge (TPACK) extends Shulman's notion of Pedagogical Content Knowledge and aims to identify the type of knowledge needed by educators for digital technology integration in their teaching, while addressing the multifaceted, complex, and nature of teacher knowledge (tpack, 2020). The TPACK framework mainly comprises of an interplay of three main domain of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). The TPACK also comprise of Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK) (tpack, 2020). Fundamentally, the TPACK framework highlights that teachers should understand how technology relates to both content and pedagogy. A relationship of digital technological knowledge, pedagogical knowledge, and content knowledge is important for effective use of digital technologies for teaching (thetechedvocate, 2020).

3.1.3. Connectivism

Connectivism is a theory put forward by George Siemens, as a learning theory for the digital age. According to this theory, learning is achieved from forming connections. As such teachers

must support students connect prior knowledge to new knowledge, and learners should be able to identify gaps in their knowledge appropriately (thetechedvocate, 2020). With digital technology, learners have an increased capability to autonomously seek the most current resources and information. This type of self-motivated and exploration learning should be stimulated by teachers. Connectivism promotes the notion that learning is no longer based on an internal process, thus students should have prospects to connect knowledge, independently via adoption of digital technologies (thetechedvocate, 2020).

3.1.4. ADDIE Model

The ADDIE Model is adopted in instructional and curriculum design to support educators to efficiently implement digital technologies in their teaching. The ADDIE model comprises of different steps which includes analysis, design, development, implementation, and evaluation (thetechedvocate, 2020). Thus, for teachers to use the ADDIE model they must first specify their curriculum goals (analysis), then design academic activities and lesson blueprints that will help achieve learning goals. Next, teachers can further develop and assimilate their pedagogy into an organized lesson (thetechedvocate, 2020). Then, the teacher can implement the lesson and evaluate it based on how it was deployed based on pre-defined questions such as: did digital technologies adopted improve student learning, was the teaching goals achieved, what would the teacher prefer to continue doing in the future as related to learning, and what could be done differently in future teaching (thetechedvocate, 2020).

3.1.5. Online Collaborative Learning (OCL)

OCL is a theory that related to learning via online discussions. In this theory learners engage in collaborative problem-solving which is facilitated by the lecturer. Students employ brainstorming to analyze and compare their ideas before integrating these ideas to reach an agreement. The lecturer supports this learning process by providing learning resources and information to students. Besides, the teacher provides feedback and input. OCL highlights the need for discussion as compared to memorization and reading (thetechedvocate, 2020).

3.1.6. Substitution, Augmentation, Modification, Redefinition (SAMR)

SAMR is a model proposed to facilitate teachers in adopting digital technology into teaching and learning. It was propagated by Dr. Ruben Puentedura, as a model that supports educators to design, develop, and adopt digital learning. SAMR aims to transform student learning in improving academic achievement (schrockguide, 2020). The main component of the model comprises of substitution (where digital technology acts as a medium to directly substitute learning with limited functional change), augmentation (where digital technology acts as a medium that directly has functional change), modification (where digital technology supports significance learning redesign), and lastly redefinition (where digital technology supports the creation of new learning mediums, formerly inconceivable) (schrockguide, 2020).

3.1.7. Bloom's Digital Taxonomy

Bloom's digital taxonomy was proposed by Andrew Churches as an extension of the novel Bloom's Taxonomy which provides a pyramid of learning activities within a digital

environment. Bloom's taxonomy classified learning into three psychological areas which comprises of cognitive (for information processing), affective (feelings and attitudes), and psychomotor (mostly physical skills). Within those area, the taxonomy progressed through six other levels which includes analysis, application, knowledge, synthesis, comprehension, and evaluation. Bloom's digital taxonomy supports educators to understand cognitive development allowing teachers to prioritise certain learning activities and resources during pedagogy planning (niallmcnulty, 2020).

3.2.Overview of ERT and VL in Educational Institutions During COVID-19

Emergency remote teaching and virtual learning utilizes online educational resources to enhance didactic and knowledge of students digitally. Due to the crisis, the incorporation of and ERT and VL in education has drastically increased. ERT and VL goes beyond delivering course materials online (Crawford *et al.*, 2020), ERT and VL help manage the flow of information to students (Zayapragassarazan, 2020). In ERT and VL environments supports lecturers to teach and improves students' knowledge in the form of reflective learning (Zayapragassarazan, 2020). VL allows students to study remotely at home. The use of VL platforms such as videoconferencing for teaching is highly recommended to help minimize the stress of social distancing faced during the pandemic (Schwartz *et al*., 2020).

Results from Mulenga and Marbán (2020) suggest that prospective teachers believe that ERT enables them to have a pedagogical shift to a less formalized approach of teaching that is interesting and entertaining as compared to the traditional style of teaching (Mulenga and Marbán, 2020). ERT gives lecturers flexibility in preparing course. Lecturers can periodically check on student participation digitally via ERT platforms (Abusalim *et al.*, 2020; Daniel, 2020). Therefore, leveraging on ERT and VL during and after the pandemic offers an innovative way to expand both the learner and educator knowledge, thereby fostering team-based learning (Pillai and Sivathanu, 2019). Conversely, it is important to state that adoption of ERT and VL has its weaknesses, particularly for the assessment of student's skill and development. Additionally, it may restrict the lecturer's ability to assess personal development of students (Koumpouras and Helfgott, 2020).

During the pandemic prior studies have investigated the adoption of ERT or VL, among these studies Affouneh *et al.* (2020) explored the how educators can design quality online learning environments for ERT as a response to the COVID-19. Also, Aguliera and Nightengale-Lee (2020) investigated ERT across urban as well as rural areas in perspectives on educational equity. Researchers such as Bozkurt and Sharma (2020) examined the adoption of ERT in a time of global crisis due to COVID-19 pandemic. Rahim (2020) provided a set of guidelines to support the adoption of online assessment in ERT during the COVID-19 pandemic. Toquero (2020) researched the role of ERT amid the COVID-19, which serves as a turning point for educationalist.

Furthermore, Whalen (2020) explored if teachers should be trained by adopting ERT and provides a set of recommendations grounded on lessons learned during the COVID-19

pandemic. Although the reviewed six studies contributed to explore ERT during the COVID-19 pandemic within the students and/or teacher's context, there are no studies that examined adoption of VL or ERT and VL during the COVID-19 pandemic. Hence, this current study adds to existing body of knowledge by examining the adoption of ERT and VL during and after COVID-19 pandemic.

3.3.Significance and Challenges of Adopting ERT and VL During the Pandemic

The COVID-19 pandemic has academic institutions across the globe to renege their face-to-face teaching and learning experiences to online environments to avert the spread of the virus and health decline amongst students, faculty, and staffs. Moreover, ERT became the product of a reactionary and temporary solution from well-designed face-to-face or hybrid learning experiences to online deliveries because of a crisis or tragedy (Olo *et al*., 2020). As in the quality and characteristics of any emergency solution, ERT functions as a meteoric conversion of the norm (Larson and Lockee, 2019). In this case, it substitutes all forms of face-to-face teaching with online knowledge dissemination and ought not to be confused with the quality of the online learning experiences designed by educational technologists and instructional designers (Affouneh *et al*., 2020).

The significance of modeling the ERT is to enable flexibility in students' learning experiences, teachers' facilitation and deliveries, and abate the façade of uncertainty, perturbation, and despondency (Abdulrahim and Mabrouk, 2020). Unexpectedly, the transition from the planned hybrid and face-to-face delivery to untethered platforms by several stakeholders such as students, parents, and teachers as a result of the pandemic occurred at an astounding and exceptional pace (Valko and Osadchyi, 2020). According to Espino-Díaz *et al*. (2020), the demand for stakeholders' technical support systems clashed with the availability of smaller and displaced support teams. Though institutions lacked the requisite preparation to support the level of assistance demanded of the support teams, practitioners used survival methods to assist in forming the platform which matriculated challenges into solutions (Abdulrahim and Mabrouk, 2020). Faculty of learning institutions devised means of improvisation to engender resolutions and educational continuity to mitigate impending constraints students faced during the pandemic crisis (Karalis and Raikou, 2020).

There is a proclivity to compare or simulate ERT with online teaching or online learning experiences (Alvarez, 2020). The emerging learning experience of ERT shares verbiage and experiential similarities with online learning, but the components are not similar in manner (Whalen, 2020). Health and political agencies launched the transition to avert community spread of the virus and sustain learning, but it failed to provide the ideal teaching and learning environment as evident in the professionally designed online learning platform (Karalis, 2020). For instance, teachers thrown into the online teaching arena through the ERT environment, lacked the preparatory training needed to facilitate online learning. Learners commencing their programs by choosing a face-to-face modality, succumbed to the online platform without prior

notification (Aguliera and Nightengale-Lee, 2020). The swift action to activate an ERT approach as a result of the pandemic crises negated the careful considerations the level of explicit planning necessitated for the smooth operation of online learning (Krishnamurthy, 2020). Additionally, facilitators were denied the planning time necessary to consider an appropriate online communication synchrony to fittingly facilitate the learners' need to achieve optimum expectations (Mehall, 2020).

Although an ERT application draws upon the usage of virtual resources and learning tools, the purpose and aim should entice the collective efficacy within the learning community to promote exponential functionality (Toquero, 2020). A learner-driven learning community will affect meaningful learning experiences by creating motivation and learner involvement (Zhou *et al.*, 2020). For instance, a lesson plan could center around learners' giving feedback on their perspective of the regional quarantine, or medical concerns of COVID-19. ERT has learning constraints and can become detrimental if it is an online replication of planned face-to-face learning activities only. Moreover, it can produce positive social change through social learning and human-based projects that are meaningful (Zhou *et al.*, 2020). ERT, by nature, may not accommodate all socioeconomic levels that are present in a face-to-face setting (Khlaif and Salha, 2020). Additionally, repetitious learning methods may result because of limited resources or time to learn innovative technologies. Also, practitioners of ERT may have to adjust to the possibility of constrained or inadequate technology proprietorship amongst learners (Bokolo Jr *et al.*, 2020).

Online learning necessitates adequate time for preparation and development before the commencement of the learning experience with trained facilitators at the helm (Lowenthal *et al.*, 2020). On the other hand, a regional or worldwide crisis such as COVID-19 may factor variables causing ERT instructors to convert face-to-face curricula into online modalities (usually based on text materials) to sustain learning within a temporary period (Wu *et al.*, 2019). The conversion process used by ERT instructors does not accommodate backward planning. Additionally, uncertainty usually results in compromising assessments (Onofrei and Ferry, 2020). Online learning designers ascertain the learning outcomes of each learner to determine the assessment strategy for the process. Enclosed in the rubrics are explicit objectives to meet desired expectations (Rahim, 2020). Each component implemented into the learning experience leads methodologically towards desired outcomes. The emergent and unexpected transition from face-to-face deliveries to an ERT setting because of the crisis may accompany technological limitations and disruption towards a clear path resulting to the desired learning experience (Eachempati and Ramnarayan, 2020). Thus, in the event of this online transition, ensured support services and managed expectations are necessary.

3.4.ERT and VL Platforms Adopted During COVID-19 Pandemic

The COVID-19 crises have hindered educational institutions (Mulenga and Marbán, 2020; Peters *et al*., 2020). Accordingly, Ministry of Education (MOE) around the world has imposed measures to manage the spread of infection by suspending physical educational activities and encouraged using digital technologies such as ERT and VL to enhance teaching and learning

(Basilaia and Kvavadze, 2020; Reimers and Schleicher, 2020). During this crisis, ERT and VL platforms are providing a viable option for students to learn (Zayapragassarazan, 2020). MOEs` advocates the use of online courses to temporarily deliver quality educational courses (Koumpouras and Helfgott, 2020; Zhu and Liu, 2020). Therefore, countries have introduced different solutions during the pandemic to provide remote education. Educational resources such as online libraries, online educational channels, TV broadcasts (Reimers and Schleicher, 2020), video lectures, were deployed in several countries (Basilaia and Kvavadze, 2020; Rose, 2020). According to Jones and Sharma (2020) Massive Open Online Courses (MOOCs), YouTube, and Khan Academy are one of the platforms being adopted to provide digital courses.

MOOCs is being used by teachers to teach short term courses with authorization of course providers who suggest students to enroll (Karalis, 2020). After completion of such digital courses the students are awarded academic credits (Zayapragassarazan, 2020). In countries such as China, a new virtual semester has just commenced where online courses are deliver to students via TV broadcasts and online platforms (Leung *et al*., 2020). Similarly, Georgia also lunched a TV educational channel that broadcast live transmission of different subjects' curriculum nationwide during the pandemic (Basilaia and Kvavadze, 2020). Companies such as Google, Microsoft, Slack, and Zoom are offering features for their products for free to support lecturers in carrying out online teaching. Microsoft Teams is offering six months premium version for free (Basilaia and Kvavadze, 2020). Likewise, Google is offering its enterprise video conferencing functionality which can accommodate up to 250 people and recording feature for free remote learning via Hangouts to all G Suite users. Also, Zoom has lifted the time limit of video calls in some countries (United States, China, Italy, Japan, etc.) (Basilaia and Kvavadze, 2020).

Additionally, finding from Basilaia and Kvavadze (2020) reported Google's G Suite is being used for educational purpose integrated with existing school management platform for videoconferencing. To this end, Google Hangouts is being used to deliver educational videos, curriculum modules, and online lectures for students (d'Orville, 2020; Zayapragassarazan, 2020). Simulations are being deployed to provide students with real life scenarios for practicing their skills with an attending lecturer. Furthermore, School Management Digital System (SMDS) is being used in several countries. The SMDS is cloud based platform which comprises of a mobile application and web portal for effective educational management for schools. The SMDS provides an automated timetable, messaging features, curriculum design, attendance management, homework and grading (Basilaia and Kvavadze, 2020). Some institutions are using online enrolment course systems such as FutureLearn, for remote learning.

The FutureLearn system is used by lecturers to manage courses and it enables the upload of short videos of about 5 to10 minutes to be shared to students (Daniel, 2020). Open educational resources from The OpenLearn portal are also being used by teachers for curriculum development to get abundance of freely usable high-quality teaching material. The OpenLearn portal provides about 1,000 courses for schools up to tertiary levels (Daniel, 2020). Besides, other platforms such as Blackboards, voice-over PowerPoint teaching, YouTube live

streaming, WebEx, etc. are being used for teaching during the COVID-19 pandemic (Crawford *et al*., 2020).

3.5.Strategies to Improve ERT and VL During and After COVID-19 Pandemic

Due to COVID-19 pandemic the educational system is now facing a completely new crisis. According to UNESCO (2020), 87% of the students in 165 countries have been affected by the temporary closure of schools (d'Orville, 2020). The digitalization in education has been made more important due to the COVID-19 crisis. The disruption from COVID-19 have offered an opportunity for stakeholders in the educational sector to rethink the current teaching and learning approaches previously employed (d'Orville, 2020; Koumpouras and Helfgott, 2020). Accordingly, countries are now embracing the importance of innovative approaches such as emergency remote teaching and virtual learning platforms during the recovery period (d'Orville, 2020; Leung *et al.,* 2020). Educational institutions have been deploying ERT and VL for supporting teachers in delivering content, facilitating online instruction and distribution of course material. Thus, due to the adoption of ERT and VL the closure of schools does not interrupt teaching and learning (Bozkurt and Sharma, 2020; Crawford *et al.,* 2020; Toquero, 2020).

Therefore, this pandemic provides a new opportunity for institutions to initiate collaboration. As stronger cooperation involving international public-private companies, governmental bodies, institutions might help provide an improved focus and provide solutions (Crawford *et al*., 2020; d'Orville, 2020). Respectively, there is need to encourage collaboration between international organizations such as World Health Organization, The United Nations Educational, Scientific and Cultural Organisation (UNESCO), educational institutions, civil society, private sector, and other stakeholders to promote high-quality digital learning for present and future generations (Zhu and Liu, 2020). To promote improve learning, schools should ensure students are properly trained to maintain flexibility regarding using virtual learning platforms (Anderson *et al.,* 2020; Daniel, 2020; Inchausti *et al.,* 2020; Koumpouras and Helfgott, 2020). Likewise, there should be provision of faculty-wide online support (Bokolo Jr *et al*., 2020) to teachers. Similarly, online training should be provision to support knowledge dissemination (Daniel, 2020; Inchausti *et al.,* 2020; Zhu and Liu, 2020).

Further, pedagogical professionals or experts should be invited to train teachers on using specific emergency remote teaching in regard to online courses delivery platform, class size management, scheduling, etc. (Zhu and Liu, 2020). Moreover, there is need to provide continue development of open educational platforms which promotes access to the high quality learning resources (Zhu and Liu, 2020). Governments should also initiate policies to improve the effectiveness of ERT and VL to ensure that the courses contents meet the educational requirements (Leung *et al.,* 2020). Efforts should be made to uphold academic content quality and limit educational cost leveraging on opportunities during and after the pandemic (Anderson *et al*., 2020).

Additionally, it is mandatory to create a support infrastructure to support students and lecturers (Bokolo Jr *et al*., 2020). This infrastructure may comprise of online technical support, helpdesk, etc. Support infrastructure can help to provide practical guide during the pandemic serving as a starting point for initiating links and collaborative networking, and increasing active participation (Karalis, 2020). Thus, during the pandemic educational institutions should deploy a system of communication and follow-up for students by using a checking-in form for each student. Government can provide adequate support for vulnerable students during the crises and provide alternative education plan. A website can be created to communicate with, students and teachers about curriculum and learning resources and activities (Reimers and Schleicher, 2020).

4. Implications of Study

4.1.Implications for Research

Learning theories are required for developing an effective emergency remote teaching and virtual learning curriculum to improve students learning and teaching pedagogy. Therefore, this study presents a review of theories of digital or online learning and change management. Findings from this study presents learning theories such as the replacement, amplification, and transformation, TPACK framework, connectivism, ADDIE model, online collaborative learning, substitution, augmentation, modification, redefinition, and Bloom's digital taxonomy (as discussed in section 3.1). The presented theories of digital or online learning and change management are applicable for the adoption of ERT and VL in higher education. Besides, findings from this current study suggest that the COVID-19 crises offer an opportunity to transform the entire educational system as envisaged in the Sustainable Development Goals (SDGs). According, this study advocates for the use of emergency remote teaching and virtual learning to provide digital pedagogical tools and learning management platforms to digitized educational resources, towards achieving a remote learning. Additionally, findings from the literature indicate that the adoption of VL in schools provides a medium for students to complete required continuing education courses online (Basilaia and Kvavadze, 2020; Zhu and Liu, 2020).

Therefore, VL provides 24/7 accessible online resources and interactive platforms for continuous learning (Bozkurt and Sharma, 2020; Crawford *et al.*, 2020; d'Orville, 2020). ERT provides a means to improve learners' skill by offering an accessible platform for knowledge dissemination (Zayapragassarazan, 2020). As the impact of COVID-19 is gradually declining across the world, the use of ERT and VL in education should be adopted beyond COVID-19 era. Theoretically, this study offers strategies that can be adopted to improve teaching and learning during crises for effective educational responses. The strategies can be employed to improve the adoption of ERT and VL during and after COVID-19 pandemic (as discussed in section 3.5). Beside the study provides various challenges that influence the adoption of ERT and VL during the pandemic. These identified issues are recommended to be considered by schools to develop plans for continuation adoption of ERT and VL platforms during and beyond the pandemic.

4.2.Implications for Policy and Practice

This study suggests that given the current circumstances, educational institutions can leverage on the opportunities to be derived from adoption of ERT and VL. Therefore, this study highlights that the adoption of ERT and VL as a response to COVID-19 pandemic can stimulate the usage of digital learning in educational institutions. Practically, this study intended to support educational leaders in formulating equitable, coherent, and adaptive education responses for crisis learning. Findings presented in this study suggest that institutions are currently adopting VL platforms such as Google Classroom, Moodle, Skype, Microsoft Class Notes, Facetime, Microsoft Teams, etc. to substitute face-to-face classes to online classes (Crawford *et al.,* 2020). Similarly, ERT platforms which are being used to deliver virtual classes by teachers include in-house e-learning platforms, Moodle, Blackboard, Lightboard Video Technology, Zoom, etc. Although, some of the aforementioned ERT and VL tools were well-used before the COVID-19 pandemic, but the crisis has accelerated adoption of these platforms.

Furthermore, we recommend that educational policy makers and stakeholders to re-evaluate the role of ERT and VL in education during and after COVID-19 pandemic. As use of ERT and VL platforms for digital learning as a response to COVID-19 stimulates growth of digital learning in schools (Mulenga and Marbán, 2020). Also, findings from this study provides a pragmatic guidance to educationalist, schools, policy makers, and stakeholders with the potentials of ERT and VL to foster continuous learning. Correspondingly, for effective adoption of ERT and VL, institutions should provide adequate infrastructure as they mobilize stakeholders to use alternative ERT and VL platforms during the period of the pandemic.

5. Conclusions

In response to COVID-19 crises, educational institutions have quickly transitioned the entire academic activities online. Hence, emergency remote teaching and virtual learning platforms is being adopted as a response to the COVID-19 crisis by schools. Thus, it is important that in the midst of this pandemic institutions should learns from the experience gained to initiate policies for the adoption of ERT and VL platforms. There are existing studies that exclusively focused on digital learning and COVID-19 pandemic. However, only fewer studies explored the adoption of emergency remote teaching and virtual learning during the COVID-19 crisis (see section 3.2). Therefore, this study draws on existing literature and adds to existing body of knowledge and explored theories of digital or online learning and change management and adoption of emergency remote teaching and virtual learning during and after COVID-19 pandemic.

Findings from this study presents the issues and significance of ERT and VL. Besides, the findings present applications that are been deployed for the adoption of ERT and VL during and after COVID-19 pandemic and discuss strategies as recommendations to be employed to improve current and future adoption of ERT and VL. This study employs only secondary data from document reports and existing literature on online learning theories, ERT, VL, and COVID-19 pandemic. Future studies will be directed to collect primary data using survey

questionnaire from students, lecturers and institutions administration to investigate the impact of the pandemic on teaching and learning. This will create a roadmap to further improve the adoption of ERT and VL beyond the pandemic. Moreover, primary data will collected to validate the impact of the discussed issues that influence adoption of ERT and VL.

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