ELECTRONIC LEARNING FOR EDUCATIONAL SUSTAINABILITY IN THE PANDEMIC ERA: A CRITICAL REVIEW

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ABSTRACT

Education is one of the key aspects of states' economies around the world, and it has served as the foundation for all significant achievements in any country.Since it has been established that the sustainability of the education sector is critical to the development of any nations' economy and all round development, no nation conscious of development can therefore allow her educational system to be paralyzed or shut down for any reason. Therefore, the viability of the education sector of any nation must be sustained irrespective of any threatening factor that may be confronting the nation. It is worth noting that electronic learning, often known as virtual or e-learning, was previously neglected, particularly in underdeveloped nations. However, because of the outbreak of the COVID-19 pandemic, the whole world is obliged to resort to virtual learning for educational purposes. Most countries throughout the world were forced to impose a non-negotiable lockdown on all sectors, including education, as a result of this pandemic.virtual learning was also imperative in order to ensure the sustainability of academic work at the national level in every country across the world. Since its introduction, electronic learning has risen to prominence and came to the rescue of education sectors in the face of the ravaging pandemic.Be that as it may, many other institutions were unable to do so in view of some circumstances beyond their control. This pandemic however brought to the fore, the unreadiness or unpreparedness for virtual learning.The aim of the project is to examine the adoption and usage of electronic learning for educational sustainability in the pandemic era.This study took the form of a review of relevant literature. The review collected and summarized qualitative data connected to keywords that are closely related to the four research questions that have already been proposed to lead the research.

Keywords: COVID-19, pandemic, education, sustainability, Virtual

Introduction

The sustainability of the education sector is critical to the development of any nations' economy and all round development, no nation conscious of development can therefore allow her educational system to be paralyzed or shut down for any reason. The viability of the education sector of any nation must be sustained irrespective of any threatening factor that may be confronting the nation. It is worth noting that electronic learning, often known as virtual or e-learning, was previously neglected, particularly in underdeveloped nations. However, because of the outbreak of the COVID-19 pandemic, the whole world is obliged to resort to virtual learning for educational purposes (Zalat, Hamed&Bolbol, 2021). In January 2020, the World Health Organization (WHO) identified COVID-19 (a global public health emergency) as a novel corona virus disease epidemic, thereafter in March 2020 as a pandemic. Most countries throughout the world were forced to impose a non-negotiable lockdown on all sectors, including education, as a result of this pandemic.

The Covid-19 pandemic resulted in the closure of schools and areas of congregation around the world, and students particularly were exposed to the risk of losing an entire semester or possibly more as numerous schools, colleges, and universities stopped offering in-person instruction. Implementation of online education was recommended as an instrument that adds to the preservation of students' and instructors' health, as well as the wellbeing of parents and grandparents. Furthermore virtual learning was also imperative in order to ensure the sustainability of academic work at the national level in every country across the world. Since its introduction, electronic learning has risen to prominence and came to the rescue of education sectors in the face of the ravaging pandemic. E-learning is vital in promoting energy and environmental research and education, and the impact of this pandemic on the global energy ecosystem emphasizes the necessity of virtual learning even more. In the wake of the COVID-19 Pandemic Peak Period, the world and in alignment with the global orientation towards sustainability, it became essential that studies be conducted to explore the synergy between distant learning models and sustainable development. Al-Jaber and Al-Ghamdi (2020) argued that Education for Sustainable Development is a term used to describe this synergy (ESD).

The education that promotes changes in skills, knowledge, attitudes, values to allow a more sustainable and just society for all is termed "Education for Sustainable Development (ESD)". According to Leicht, Heiss and Byun (2018), the issues and trends in Education for Sustainable Development, can be resolved by harmonizing and integrating the social, economic, and environmental components of sustainable development. The aim and objectives of ESD is to empower and equip present and future generations to satisfy their need. To achieve ESD, there is need for the education sector to engage in massive adoption and usage of ICT facilities for e- learning as this will ensure sustainable education in the face of any environmental challenges that may face the planet in the future. Within the context of the aforementioned, Higher Education providers are committed to the usage of ICT facilities to enable electronic learning as this can be considered the future of educational sustainability.

The pandemic era has emphasized a global reality which is that the world lives in a period which is described as

one of thegreatest threats to global education, a pending enormous educational crisis. The year 2020 saw the outbreak of the novel Corona virus otherwise referred to as the COVID-19 pandemic. This resulted in the closure of all institutions of learning and necessitated the resort to e-or virtual learning. Be that as it may, many other institutions were unable to do so in view of some circumstances beyond their control. This pandemic however brought to the fore, the unreadiness or unpreparedness for virtual learning. Many institutions of learning therefore had to start devising ways of deploying available technology which proved challenging. This notwithstanding, the pandemic makes virtual learning a necessity for educational sustainability. Events unfolding indicated that most institutions of learning are confronted with the developmental difficulties associated with the use of ICT in terms of e-teaching and e-learning processes.

This study sought to examine the adoption and usage of electronic learning for educational sustainability in the pandemic era. Specifically the objectives of the study were to:

1. Identify the e-learning tools adopted for educational sustainability in the pandemic era.
2. Establish the extent of e- teaching and learning in the pandemic era.
3. Discuss the benefits of e-learning for educational sustainability during and post pandemic era.
4. Analyse the inhibiting factors to electronic learning for educational sustainability in the pandemic era.

Literature Review

In order to situate this study in proper perspective and as it customary in academic research, there is a necessity for a close review of extant literature in the field. Much as the pandemic era appears to have passed, there is no doubt that it left in its wake an indelible effect on various aspects of national life especially in education. E-learning has become a norm in educational institutions. For many it has become the preferred method of learning due to its supposed benefits. It is in line with this position that this study presents certain views from scholars who have conducted studies in the area from different climes.

Ionescu et.al (2020) noted in their study that the extraordinary circumstances of the COVID-19 pandemic have produced enormous changes throughout the world's education system, forcing instructors and students to quickly adjust to new the online learning method. Ionescu et al. (2020), in Romania during the pandemic, investigated the long-term viability of the e-learning system. Their study was based on opinion poll by the use of questionnaire, the questionnaire was structured on middle, high and University education which are the three levels of schooling in Romania. The study was analyzed using the teachers–students–parent's perspective, and identified the possible psychological effects on students as a result of the justification of social isolation with the online environment, and the possible psychological effects. While e-learning was not widely used by students or instructors due to the outbreak, the findings of the study revealed that students have embraced learning online rather than the traditional schooling method. E-learning is a long-term and effective learning solution both now and in the future from the student-teacher–parent viewpoints. E-learning entails cooperation amongst teachers and parents, as well as careful observation of children's/students' behavior to detect and fight potential effects caused by changing learning styles and social realities.

According to Yang, Peng, Wong, and Chong (2021) in their study that examined e-learning, environmental stimuli influence determinates of learning engagement in the context of COVID 19 from a SOR model perspective. Their study revealed that COVID-19 pandemic at its inception in 2020 has altered the traditional learning method for most students at schools all over the world. With reference to the Stimulus–Organism–Response (S-O-R) paradigm as a guide, the researchers studied the connection that existed between perceived closeness, peer referent, perceived control, and learning arrangement among Chinese college students. The study revealed that perceived control, perceived closeness, and peer referents in e-learning had a positive influence on students' self-efficacy and well-being, therefore enhancing their passion for learning. The goal of the study was to help other academics, educators, designers, and others figure out how to construct and assess student participation in e-learning.

In line with, Qatar's sustainable development goals, Al-Jaber and Al-Ghamdi (2020) conducted another intriguing study on the impact of virtual learning on education delivery. Most countries have halted labor, industrial activity, enterprises, and educational activities because of the recently found COVID-19 pandemic, according to the authors. They went on to argue that the pandemic had a tremendous influence on energy and environmental studies, both of which are crucial for achieving sustainable development. However, they learned that because to the epidemic, Qatar had to halt all on-site education activities and instead rely on virtual learning approaches (or distance learning). Distance learning, according to the study, has the potential to alter the quality of education and research, particularly in the sectors of energy and the environment. They also observed that, while virtual learning has a positive overall impact, it may have a negative influence on the country's educational quality and growth.

Naatuk, Elberkawi, Aljawarneh, Rashaideh, and Alharbi (2021) investigated the COVID19 Epidemic and E-learning: Challenges and Opportunities from the Perspective of Students and Instructors. COVID-19's expansion, according to the authors, is a serious threat to the human race because it has halted many global sector of the economy, including educational activities. They went on to note that, in order to prevent the virus from spreading, educational institutions have mostly decided to change to e-learning utilizing current educational platforms, irrespective of the challenges the transformation brings. Students and staffs of the University of Benghazi's Information Technology (IT) faculty are included in the study. The data were examined using a descriptive-analytical methodology and statistical methodologies. The two types of surveys that were produced and distributed were the student and teacher questionnaires. Four aspects were highlighted in order to accomplish the intended outcomes: the level of e-learning use during the COVID-19 outbreak, the benefits, drawbacks, and hurdles to creating E-learning in the IT faculty. By analyzing the data, the research was able to uncover some of the concerns, problems, and benefits of using e-learning systems instead of conventional education in higher education in general, and in emergency situations in particular.

In a similar vein, Dhawan (2020) conducted a study on electronic learning as a panacea during the COVID 19 pandemic, reporting that prior to the COVID pandemic, Indian educational institutions (schools, colleges, and universities) relied mainly on traditional methods of learning, such as face-to-face lectures in a classroom. According to the researchers,

the fast spread of a devastating disease called Covid-19 caused by a Corona Virus (SARS-CoV-2) shook the whole world, prompting the World Health Organization to declare it a pandemic. This occurrence presented a challenge to the global education system, forcing educators to instantly switch to an online style of instruction. Many academic institutions that previously refused to modify their traditional pedagogical approaches now have no choice but to fully embrace online teaching–learning. In a moment of crisis, the research emphasizes the need of online learning and a SWOC (Strengths, Weaknesses, Opportunities, and Challenges) analysis of e-learning approaches. The study also provides insight into the creation of EdTech start-ups in the aftermath of pandemics and natural disasters, as well as advice for academic institutions on how to address the challenges of online learning.

In the same vein, in the face of the Nigerian Covid-19 epidemic, Buba, Suleiman, Adamu, and Idris (2020) investigated virtual learning environments as a possible alternative approach for teaching business education. According to the report, the swift disruption of educational settings in Nigeria caused by COVID19 was shocking to many colleges and universities, because the school academic calendar was halted abruptly. The bulk of Nigeria's tertiary institutions, if not all, were caught off guard by the unexpected interruption. According to the findings, a change from the normal face-to-face method of teaching toward alternate teaching and learning modalities is necessary. Virtual Learning platforms identified in the study include Telegram, Webex, Google Hangout Meet, Google Classroom, Blackboard, Microsoft Teams, Facebook, WhatsApp, Video Conferencing, all these enhance a distinct way of learning perspective than conventional face-to-face setting and can be embraced and used as a viable approach to orthodox method of teaching in Nigeria. According to the report, Nigerian postsecondary institutions must embrace the realities of today's global education system.

In the Kingdom of Saudi Arabia, Mohammad ZiaulHoq (2020) conducted an empirical study using online learning during the COVID-19 pandemic. The Saudi Arabian Ministry of Education used TV and social media to disseminate education to all grade levels, according to Hoq's report. It has proposed around 127 administrators and teachers to provide consistent instruction in 112 enlightening courses over 19 TV channels (transmitting nationally from a classroom in Riyadh). The government offers learners five options for online education. Students are offered five separate options by the Saudi Arabian ministry for online education.Hoq observed that even though many scholars have argued that the unplanned as well as swift resort to virtual learning without adequate guidance, insufficient bandwidth, and little or no homework has the tendency to result in an unsatisfactory user experience which does not facilitate educational sustainabilitythere are those scholars who posit that this method has some merits for educational sustainability.

Therefore, available literature have supported the view that e-learning has enormous benefits for the education sector across countries. These benefits have been captured and projected previously. It is therefore necessary for more examination of this fact and to see if there are challenges that need to be surmounted in order for e-learning to be more beneficial for sustainability of nations' education sector.

Research Methodology

This study took the form of a review of relevant literature. The review collected and summarized qualitative data connected to keywords that are closely related to the four research questions that have already been proposed to lead the research. The study conducted a computerized search of academic journals as detailed subsequently, as well as a human search of references in carefully selected hard copies of journals and newspapers that are relevant to the topic under investigation. Because the subject/topic of discussion is an issue that affects many nations of the world as it relates to the government and its various agencies, particularly the educational sector, it was deemed expedient to carry out reviews on 'grey' issues, such as the report of government. In addition, organized analyses of quantitative evidence was accepted for the study, qualitative evidence reviews can bring together data from educators, students, instructors, and parents who have had direct or indirect experience with e-learning throughout the pandemic and post-pandemic era. To evaluate how e-learning can help to sustain education in the pandemic era, a study of qualitative research is necessary.

Since the study based on secondary studies, meta-studies were included in the review. It was decided that studies from developing countries would be includedthus the study opted to accept studies from all countries because the topic is a worldwide issue that impacts every nation on the planet, regardless of development level. Though the topic of e-learning has been since the expansion of ICT, its usage for educational sustenance came to limelight two years ago as a result of the pandemic (COVID 19) that paralyzed the world. As a result, the majority of the research that are judged appropriate for the topic are those published between 2020 and now.

A theme synthesis was performed by identifying significant ideas that emerge from the various researches. There are certain key concerns for undertaking a synthesis of information from various studies, as identified by Cherry et al (2017). It was critical for the study to include contextual information from the included studies in my review to aid in the interpretation of any variations in the result. The findings were qualitatively together with a quality assessment of the included study.

Discussion of Findings

The COVID 19 epidemic highlighted a developing reality in the modern world. The greatest way to promote teaching and learning in physical classroom settings, as well as distance learning and online instruction programs, is through the use of technology. These programmeswere poised to prepare citizens to engage in the changing, dynamic and technology based society. In order to quickly respond to the pandemic's reality, educational institutions all around the world went online.In a flash, kids went from being in physical locations where they might engage in much-needed social connections to sitting in front of a screen.This chapter examines key issues which the study set out to achieve. These include E-learning tools adopted for educational sustainability in the pandemic era, extent of e-teaching and learning in the pandemic era, benefits of e-learning for educational sustainability during and post pandemic era and inhibiting factors to electronic learning for educational sustainability in the pandemic era.

E-learning tools adopted for Educational Sustainability in the Pandemic Era

Observations from studies indicate that several e-learning tools were adopted by educational institutions during the pandemic era. These platforms include but are not limited to the following as revealed by Basilaia et al. (2020).

Zoom App

Due to its position as the industry leader in contemporary enterprise video and audio communications and its easy-to-use, dependable cloud platform for video and audio conferencing, chat, and webinars across mobile, desktop, and room systems, the ZOOM app was one of the platforms used to conduct e-learning (UNESCO Institute for Statistics, 2020). Additionally, the ZOOM app offered a social-constructivist learning environment, enabled teachers to plan and assign relevant tasks for students on time, and incorporated a wide variety of materials and assessment methodologies (UNESCO Institute for Statistics, 2020).

The ability for students and lecturers to ask questions during the teaching and learning process by raising their hands, share the whiteboard to solve, write notes on, and draw or illustrate problems, as well as share the screen to broadcast the notes, is another compelling reason why teachers and students chose the Zoom app (UNESCO Institute for Statistics, 2020). Furthermore, when teaching and studying in the midst of the COVID-19 pandemic, the ZOOM app allowed instructors and students to add participants, mute people in the event of noise distortion, and submit lecture notes (UNESCO Institute for Statistics, 2020). The ZOOM app enabled students and professors the ability to audio and video conference, giving them more freedom in how they could learn and engage with one another and lecturers.

Google Classroom

For schools, Google Classroom is an online learning environment that enables the creation, delivery, and evaluation of assignments virtually.It is an online learning environment that fosters academic activity-related social interaction, teamwork, and critical thinking.Google Classroom is an e-learning environment that may be utilized in any educational setting to address the challenges associated with producing assignments without paper. The programme was linked to a deep calendar, email, Google Drive, Hangout, and YouTube.

As a platform that enables educators to create, arrange, and manage online assignments using Google Documents and Google Drive, it strives to be a paperless educational system. Everywhere in the world, there is access to the Google classroom as a tool for improving the teaching and learning process. Google Classroom offered a variety of features that make it simpler for teachers to conduct educational activities. Positive results have come from the application's paperless teaching and learning opportunities. According to Udosen and Adie (2019), Google Classroom technology has shown to be a useful platform for online learners especially during the pandemic era and even beyond.

E-guests

E-guests aided students in their learning since they contribute real-world knowledge to the online learning environment. Students got the chance to learn from experts they might not normally have access to in a typical classroom due to e-guests from other places (Fulton, 2020). According to

Haythornthwaite (2019), learning outcomes can be linked to online network connectivity and free information interchange in the context of numerous modern information practices. As a result, the learning process was viewed as a social network relationship, an interpersonal relationship, and the outcome of interaction and connectivity. Network connectivity was also used as an input when creating new learning settings.

Extent of E- Teaching and Learning in the Pandemic Era

As alluded to in the foregoing sections, e- learning proved to be the viable option for educational sustainability during the COVID-19 era. And as observation showed, many countries' educational systems migrated to this option.

The teacher had to make a multifaceted effort to ensure that online learners are highly engaged in the learning process. Student engagement in online learning was established through communication, ongoing feedback on student performance, and critical conversation. In a setting where students learn online, communication with them is crucial (Arghode, Brieger and Wang, 2019). The amount of time students spend online during the online learning process is directly correlated with the amount of time teachers spend online and with how quickly teachers respond to student inquiries regarding their online behavior (Dwivedi, A.et al, 2019).

The teacher's supervision had a tremendous impact on the student's learning process (Riley et al, 2017).The following indications can be used to evaluate how well online students are learning: course logins, lesson reading, lesson quiz activities, and lesson quiz results.From a pedagogical perspective, it is important to encourage students to complete as many online courses as they can, including examinations, and to take exams before, throughout, and at the end of the course. Higher grades resulted from all of these factors which is advantageous for both students and educational institutions. Because every student and teacher had to communicate, and because those messages must be intelligible, online education helped students build their communication skills. Interactive tutorials were preferred by students over self-accessible online courses and materials. Additionally, students tended to utilize online resources that they believed would help them get better grades and choose those that were tied to assessment results over those that are meant to help them comprehend the course material better.

Benefits of E-Learning for Educational Sustainability during and Post Pandemic Era

E-learning during the COVID 19 era proved to be beneficial for educational sustainability. Some of the benefits by Peter (2019) are highlighted in the following paragraphs.

i.Newly Developed Technological Skills: The students gained familiarity with new tools and applications as well as digital problem-solving abilities through regular engagement with digital learning materials and group assignments. These abilities aided the learners in thriving in a society where technical proficiency is required, even after the programme has ended.

ii. Enhanced Capacity for Critical Thought: The learnerswere exposed to critical thinking about the assignments in class and outside of class because of their self-paced and self-motivated learning style. Students used critical thinking to complete academic work well both individually and in groups,

and this skill sticks with them both throughout and after the programme.

iii.Improved Networking, Cooperation, and Communication Online: It gave students countless opportunity to work together and network with classmates while carrying out a specific activity. Through virtual learning platforms, the exchange of specialized knowledge, information, and solutions to problems were improved.

iv.Increased Adaptability and Self-Directed Learning: Because they are not constrained by a set learning timetable, students had the freedom to complete educational tasks at their own pace while still finding time for work and family. Virtual learning's flexibility enabled effective time management for people who want to learn while continuing to work and advance in their chosen professions.

Several users of e-learning outlets believe that online education makes it easier to administer e-learning and gives students easy access to instructors and learning resources (Gautam, 2020; Mukhtar et al. 2020). Additionally, it assisted in lowering the effort, travel costs, and other costs associated with conventional learning. E-learning dramatically reduced the amount of administrative work required for planning, recording lectures, attendance, and exiting classes.

Both teachers and students are aware that online learning techniques enable learning from anywhere and in challenging situations that prevent students from traveling to universities and institutions. The student developed self-direction and learns anytime, anywhere, concurrently and asynchronously. However, there are a number of limitations to e-learning, the most significant of which is that it only provides theoretical information and that it does not allow students to put what they have learned into practice. There is no face-to-face learning experience, which could be of appeal to many students and teachers. The online exams, which may only include objective questions, have additional issues. Along with other obstacles that are constantly tied to the misuse of technology, challenges of e-learning include concerns about the security of online learning programs and user reliability (Gautam, 2020; Mukhtar et al. 2020).

Inhibiting factors to Electronic Learning for Educational Sustainability in the Pandemic Era

Numerous technologies are available for online education, but occasionally they provide significant challenges. These challenges and troubles with modern technology include things like download glitches, installation problems, login issues, audio and video issues, and more.

Online instruction proved to be occasionally tedious and uninteresting for students. Students never found the time to participate in online learning since it requires so much flexibility and time. A major problem with e-learning is the lack of individualized attention. Students desire two-way communication, which can be challenging to execute. Students need to put what they learn into practice in order for the learning process to be as effective as possible.

E-learning content was also occasionally entirely theoretical thereby making it difficult for students to practice and understand. Another serious problem is the subpar course material. Students believed that the biggest obstacles to online learning are a lack of community, technological issues, and difficulty understanding educational objectives (Song et al., 2004).

In a study, it was discovered that students were not adequately prepared for juggling their study lives with their employment, family, and social lives in an online learning environment. Additionally, it was discovered that students lacked enough preparation for a number of academic-style and e-learning competencies. Additionally, the pupils are only moderately prepared to use learning management systems (Parkes et al., 2014).

Due to differences in geographic locations, socioeconomic backgrounds, internet network strength, usage expertise, and platform quality of accessing devices, inequalities both traditional and platform-induced existed. All of these had an impact on students' learning attitudes, either directly or indirectly, depending on whether they have access to online learning resources, learning support, and assessment monitoring methods. Aldama (2020) and Kelly (2019) noted that most students in impoverished countries who participated in COVID-19 homestays frequently experienced being denied access to online learning tools (2020).This could be caused by things like geography, the inability to sign up for internet network data, and unstable remote internet networks. The industrialized nations reported having similar experiences. According to Aldama (2020), there is a difficulty with access that students experience when there is a barrier to accomplishing academic obligations because there is an internet issue at home. This problem is known as the homework gap and is prevalent in the United States. Kelly (2020) had a similar opinion with regard to the United Kingdom, where it was found that about 1.9 million households lacked internet connectivity and relied on pay-as-you-go services, causing a bottleneck in the availability of online platforms in the pandemic era which necessitatedlearning at home.

In poor nations like Nigeria, internet connection was generally unreliable due to intermittent network and power supply, particularly in rural areas where all these amenities and utilities are severely lacking. It is worthy of note that persistently denying students access to learning platforms may have an impact on their attitude toward learning because it may cause them to become perpetually frustrated and unable to keep up with the lesson.

E-learning also potentially harmed the socializing functions of institutions and the facilitation functions of teachers. This happened when learning interactions lacked individualized instruction and support for students who are academically weak. Additionally, it was noted that the biggest criticism of e-Learning is its total lack of crucial interpersonal contacts, both between students and instructors and inside classes.

Conclusion

The greatest way to promote teaching and learning in physical classroom settings, as well as distance learning and online instruction programmes, is through the use of technology. Several e-learning tools were adopted by educational institutions during the pandemic era. These platforms include but are not limited to the ZOOM app which was one of the platforms used to conduct e-learning. The ZOOM app enabled students and professors the ability to audio and video conference, giving them more freedom in how they could learn and engage with one another and lecturers.

Google Classroom is another online learning environment that enabled the creation, delivery, and evaluation of assignments virtually. Google Classroom offered a variety of features that make it simpler for teachers to conduct educational activities. Positive results have come from the application's paperless teaching and learning opportunities.

E-guests is another platform that aided students in their learning since they contribute real-world knowledge to the online learning environment. Students got the chance to learn from experts they might not normally have access to in a typical classroom due to e-guests from other places.

Interactive tutorials were preferred by students over self-accessible online courses and materials.Additionally, students tended to utilize online resources that they believed would help them get better grades and choose those that were tied to assessment results over those that are meant to help them comprehend the course material better.

The students gained familiarity with new tools and applications as well as digital problem-solving abilities through regular engagement with digital learning materials and group assignments.

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