




Educational Technology Adoption in Instructional Delivery in the New Global reality

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Received: 24 February 2022 / Accepted: 28 June 2022 / Published online: 16 July 2022

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Abstract

Educational technology is a discipline that has a lot of roles to play in the global education system yet, its services had been neglected over the years in Nigeria. The new global reality that was occasioned by the upsurge of COVID-19 has made educational technology a very consequential discipline with conspicuous roles to play in the face of such a global pandemic. COVID-19 has halted many human activities across the globe. Its effect in the education system has resulted to re-adjustment in the school calendar, prolonged graduation dates, and reduced research output. To combat this, many education systems now adopt the services of educational technology thereby changing the old norm. But for this new norm to be sustainable, this paper argues that the education system must show a pragmatic attitude towards the adoption of such innovation rather than a conservative attitude. Therefore, using the diffusion theory of innovation, this paper argues that necessity called for compulsory adoption of innovation in the Nigerian education system. This new opportunity, however, looks bleak as many educational practitioners lack the required skills and attitude to adopt the innovation. It, therefore, concludes that educational practitioners need in-service training to be part of these changes. The government is suggested to apply a systematic approach in procuring and installing ICT facilities that will enhance the diffusion of this innovation into the school system.

Keywords Digital technology · Education technology · COVID-19 · Innovation · Adoption

1 Introduction

Globally, there has been an increase in the development of new technology, knowledge, and idea otherwise called innovation. At one point or the other, these innova-

tions manifest to solve human problems. On some occasions, these innovations are used in the education system. For instance, the continuous evolution of technology such as the internet and social media, in this case, has impacted positively the education system of many nations in different ways (Al harafsheh & Pandian, 2016; Lucero et al., 2021). Currently, many global education systems adopt e-learning, distance education, e-assessment, artificial intelligence, cloud computing, gamification, and many other digital technology-based techniques in instructional delivery and assessment (Aldosari, 2020; Holmes et al., 2019; Kumar et al., 2013; Mbengo, 2014). These innovations, however, are better applied in a systematic manner that leads to effectiveness in the education system. But, on some occasions, many developing and underdeveloped nations such as Nigeria do not really embrace the pragmatic adoption of these innovations in their education system. This is why, in most cases, the Nigerian education system seems to be lagging behind among the league of nations in terms of digital technology adoption (Ridwan et al., 2019). This is not the case in other parts of the world such as Bulgaria (Peytcheva-Forsyth & Aleksieva, 2020), Ukraine (Shalatska et al., 2020), and South Africa (Appiah & Tonder, 2018).

Also, many education practitioners tend to show the attitudes of laggards in their adoption of some innovations in the teaching and learning process (Ikechukwu, 2021; Nwagwu & Azih, 2015). Many of them still prefer to use face-to-face teaching and learning without necessarily applying innovations. This is a problem that has continued to haunt down the discipline of educational technology in Nigeria.

In an ever-changing world of ours, the need to innovate in our education system is consequential. Regrettably, in Nigeria currently, the rate of adoption, acceptance, and integration of educational technology innovation has been discouraging. All over the globe, digital learning (Nwachukwu et al., 2021), e-learning (Lucero et al., 2021) e-assessment (Appiah & van Tonder, 2018) are fast taking a centre stage in the teaching and learning process, but in Nigeria, it is not basically the case. According to Peytcheva-Forsyth and Aleksieva (2020), in this era, the diffusion of these innovations is not done in line with the required speed of their need. This is more pronounced in public universities where the services of educational technology are either neglected or under-utilized unlike in private universities (Obiakor & Adeniran, 2020). Many education practitioners and even higher institutions show rather a conservative attitude towards the adoption of educational technology services, thus, the adoption of these innovations seems to be left in the hands of only a few. In many of the public universities where educational technology should have its sway of influence by dominating the process of teaching and learning, the case is different. This has rendered the discipline of educational technology to look a bit insignificant whereas, it is the most significant discipline in the education system. This is because, according to Spector (2016), to think and talk about education without thinking and talking about the kind of technology that could be used to facilitate its processes is almost impossible and it is an easy path to poor educational delivery.

Nevertheless, with the recent upsurge of COVID-19, a new global reality has emerged and new norm in teaching and learning has also followed suit. With the effects of COVID-19 on the education system of the world, the Nigerian education system has been left with no other option but to seek for ways of meeting up with its educational requirement even as face-to-face teaching and learning had been sus-

pended due to the pandemic. However, according to Peytcheva-Forsyth and Aleksieva (2020), the new global reality presented by COVID-19 did not present double options to education practitioners such as lecturers to adopt educational technology services in their practice, rather it forced them to adopt it. Thus, although the image of educational technology had been unpopular in Nigeria before the COVID-19 pandemic; the pandemic has given the discipline yet a new outlook and shape.

The outbreak of COVID-19 in Wuhan, China in the later days of December 2019 (Shereen et al., 2020; Cahapay, 2020) was to become the most remarkable event in the history of the world in the 21st century. For the first time, the world's economic activities and education system, social life, and even political life were, to an extent, put to a halt for some time. The disease which was first seen in China began to spread to other parts of the world in no distant time. According to Cahapay (2020), the first COVID-19 infection recorded outside China was on 13th January, 2020. By 2nd February, 2020, the first COVID-19 mortality took place outside its country of origin. With time, the spread of the disease was like a wildfire cutting across many continents of the world. Thus, by the early days of March 2020, the disease had shown to be a global disease that kills very fast. The World Health Organization had to declare it a global pandemic on 11th March, 2020 (Cahapay, 2020; Kaur et al., 2020). However, the first case of COVID-19 in Nigeria was recorded on 27th February, 2020 (Ehanire, 2020). With time the number of cases increased.

The rapid spread of the disease and its mode of spread made many governments to enact laws that led to either shut down or partial shutdown of activities involving the physical interaction of people. This however affected the education system very much since the first shut down was in the education institutions (Rajhans et al., 2020). To curtail the spread of the disease in Nigeria, on 29th March, 2020, the Federal Government of Nigeria declared a two-week lockdown in Lagos and Abuja (Kola, 2020). On 27th April, the lockdown was extended to every other parts of the nation and it lasted up till 29th June, 2020 (Ibrahim et al., 2020; Oyeyemi, 2020). The report of the World Health Organization (2020) showed that by May 2020, the disease had affected 215 countries of the world. The lockdown activities led to many side effects on human activities including education. In response to this situation, many education systems including Nigeria began to embrace educational technology services. Many education emergency response techniques to the pandemic surfaced (Mohammed et al., 2020). Online learning and assessment became more importantly valued by many nations and the digital divide among students and nations showcased itself fully (Ong, 2020; Esteban-Navarro et al., 2020). This shows that during the COVID-19 pandemic, educational technology became the best solution to curtail the halt in academic activities of many educational institutions globally.

2 Conceptualization of Educational Technology in Nigeria

Educational technology is a broad field that is involved with the study and application of theoretical knowledge, designing, development and implementation of instructional packages and systems that are all aimed at improving the education sector. It is a field of study that basically focuses on facilitation of the teaching and learning

process through the provision of a wide array of techniques and learning facilities. According to Huang et al., (2019), educational technology could be understood in terms of ethical considerations. By this, it could be seen as an ethical attempt made to help improve the teaching and learning process using research based procedures, processes, tools, resources, technologies, and strategies which can be done either in a formal, and informal learning environment. Spector (2016) averred that educational technology is a systematic application of ideas, tool and knowledge aimed at improving instructional delivery which is usually based on research findings. This definition suggests that educational technology is a research based discipline that is aimed at solving numerous educational problems relating to teaching and learning, assessment, publication of educational outcome and even educational administration using a systematic approach that could overhaul the problem and get it solved. From the definitions, it is obvious that educational technology has many roles to play in the Nigerian education system even though its application had been done unintentionally and its discipline has not really been appreciated and applied in the ways that could bring out its full potentials in the Nigerian education system since it was introduced.

Educational technology has a fragmentary history in Nigeria. This is mainly because the discipline and its services have not been applied in the education system in a calculated attempt to improve either the discipline or its services (Agun & Imogie, 1988; Salawu and Inegbedion, n.d.). However, tracing back to the introduction of western education in Nigeria in the late 19th century, it could be said that educational technology first had its way into the Nigerian education system through the introduction of some simple instructional materials such as chalkboards, slates, teaching apparatus, and many others by the early missionaries that brought in education to Nigeria (Babalola & Aramide, 2020). This era was called the visual era (Brown, 2015). After this era, educational technology moved into the radio and television era. In 1932 the first radio receiving station was mounted in Lagos (Babalola & Aramide, 2020; Brown, 2015), the then capital of colonial Nigeria. After this era, other events that unfolded in terms of expansion in digital communication in Nigeria were drastic. As a response to the innovations across the world, from 1940s to 50s, Nigeria witnessed the establishment of radio stations that aired educational contents in different parts of the country. Within this period, in 1951, the Nigerian Broadcasting Service (NBS) was founded. It aired its first educational programme in English language in 1953 (Salawu & Inegbedion, n.d.) under its Post and Telegraphs Department (Babalola & Aramide, 2020; Brown, 2015). Subsequently, this event was followed up by various regional governments' efforts to air educational programme in their regional media houses.

In 1954, the Northern Nigerian Government set up its School Broadcasting Unit (SBU) in Kaduna. According to Brown (2015), this was immediately followed up by the Western Nigerian Government that aired its first education programme in January 1958. Another landmark in this revolution in digital technology communication in Nigeria was in 1959 when the Western Nigerian Government set up the first television house in Africa in 1959 (Brown, 2015; Salawu & Inegbedion, n.d.) under the leadership of Chief Obafemi Awolowo. However, in 1957, when the Nigerian Broadcasting Service upgraded to Nigerian Broadcasting Corporation (NBC), the discipline of educational technology was given better attention. This allowed the cor-

poration to develop educational radio broadcasting. This was incorporated into the School Broadcasting Unit of NBC in 1960. Still, in the 1960s, the School Broadcasting Unit of the NBC was changed to the Educational Radio Service Unit (ERSU) and much later to Federal School Broadcast and Audio-Visual Aids Development Centre in 1982 (Babalola & Aramide, 2020; Brown, 2015; Oyelade & Abolade, 2017; Salawu and Inegbedion, n.d.).

As this evolution was going on, efforts were made to incorporate educational technology as a discipline into tertiary institutions. Support for this inclusion led to incorporating educational technology into the training of pre-service and in-service teachers (Brown, 2015). The University of Ibadan by 1962, through the support of the United Nations Educational Scientific Cultural Organization (UNESCO), established the audio-visual Unit and through this, many new instructional methods and techniques were introduced (Brown, 2015). Workshops were held in 1964 to train the instructors on how to adopt the new methods basically in Ahmadu Bello University, Zaria, and University of Ibadan. A Research Centre for Programme Instruction Techniques was established after that. With time, educational technology diffused into other universities such as the University of Nigeria, Nsukka, University of Benin, Obafemi Awolowo University, Ile-Ife, and many others in Nigeria.

These higher institutions championed the course of integrating technology into schools in Nigeria. Alvan Ikoku College of Education, for instance, launched the use of television monitors and videotape recordings, and cameras in its micro-teaching in 1970 (Babalola & Aramide, 2020). This was followed up by the establishment of an Audiovisual Centre and a Closed-Circuit Television (CCTV) by Obafemi Awolowo University, Ile-Ife in 1974. Others such as the University of Lagos set up Audio-visual Aid Centre which later metamorphosed into a Centre for Educational Technology. In Zaria (Northern Nigeria), Ahmadu Bello University set up the Educational Technology Centre, and down in the east, the University of Nigeria, Nsukka established the Curriculum and Instructional Materials Centre (CUDIMAC). With all these developments, it was clear that educational technology was gaining momentum in the higher institutions in Nigeria. In all, the role of its services in education was being recognized and appreciated in Nigeria. More steps towards supporting the discipline were taken in the 1970s, especially with the establishment of the National Educational Technology Centre (NETC), in Kaduna in 1977 (Brown, 2015).

From the 1970s, down to the 2000s, with the emergence of computers and the internet in the late 20th century in the world, and its entrant into Nigeria in the early 21st century, Information and Communication Technology (ICT) became a very important innovation that affects all human activities in the nation. Nigerian government then embarked on an ICT integration revolution into the education system. Many policies have been made in this regard. However, the implementation part of these policies has suffered setbacks. This shows that while the importance of Educational technology lies bare; its adoption still suffers setbacks. In 2010, National Policy on ICT was approved by the National Council on Education for the development and deployment of ICT facilities in the schools (Dele-Ajayi & Taddese, 2020; Federal Ministry of Education, 2019a). In 2019, a National Implementation Guidelines for ICTs in Education was kicked-off (Federal Ministry of Education, 2019b). But, even with all these, there were still loopholes in the implementation strategies. According

to Dele-Ajayi & Taddese (2020) the main groups in charge of implementing these policies – State Ministries of Education and Local Government Education Authorities – in most cases were unaware of the required training to be given to teachers to allow them to integrate ICT into their instructional delivery.

Hence, in Nigeria, even though there were some places, where a considerable amount of ICT facilities are available in the schools (Dele-Ajayi & Taddese, 2020), their usage was poor due to lack of technical know-how among the practitioners. Consequently, the old norm of teaching without the use of educational technology services is still dominant. This could be traced to the inability of the government to fully provide the avenue for the integration of ICT into teaching and learning. As they provide ICT facilities in the schools, insecurity (porous school compounds without fences) across most of the public schools in Nigeria renders futile the essence of providing ICT materials to the schools. However, teachers' incompetence in using the technologies stagnates these materials in their storerooms. This is why the face-to-face teaching pattern still dominates the instructional delivery process in Nigeria without aligning with the current innovations in instructional delivery such as e-learning, e-assessment, distance education, learning management system, digital multimedia learning, and others that are trending in many parts of the world. This is in sharp contrast with some nations, such as the United Kingdom (Beauvalle, 2015) that supplied ICT materials to its schools in the 1980s, with an effective monitoring team set aside. In addition, they organized in-service training for teachers and head-teacher/principals for the acquisition of ICT skills after delivering computer systems to them at a subsidized rate (Bates, 2019).

3 Adoption of Innovation in Necessity: the role of Diffusion Theory of Innovation

The COVID-19 pandemic really swung the pendulum of the adoption of innovation in the Nigerian education sector to a new direction. Although, it really exposed the weaknesses of the Nigerian education system in terms of un-readiness to adopt innovation (Obiakor & Adeniran, 2020). However, it opened a new opportunity for the discipline of educational technology to thrive. For instance, while the Federal Ministry of Education (FME) approved the indefinite closure of schools during the COVID-19 on March 19, 2020, about 46 million students in Nigeria were affected (Oyediran et al., 2020). In other parts of the world, reports of UNESCO (2020) and United Nations (2020) showed that 91% of students in Higher Institutions across the world were also affected by the lockdown caused by COVID-19 before the end of April 2020. However, in Nigeria, in response to the disruption of academic activities, the Ministry of Education embarked on an emergency response mission to devise alternative means in which students could still be learning even at home (Dele-Ajayi & Taddese, 2020). According to Obiakor & Adeniran (2020), amid the global health crisis caused by COVID-19, the only way Nigerian education could survive is by adopting technology in its learning process. Thus, the FME and the Universal Basic Education Commission collectively developed the Learn at Home Programme (LHP)

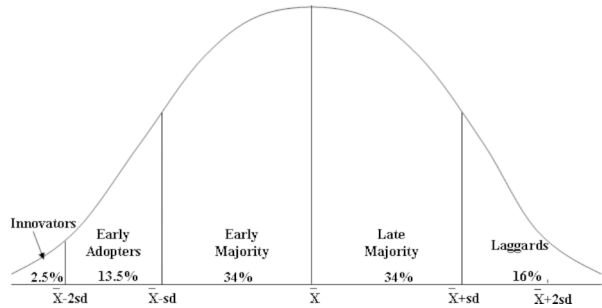
where instructional delivery was digitized and aired through radio and Television at a stipulated time (Dele-Ajayi & Taddese, 2020).

Furthermore, some higher institutions of learning embarked on the use of online means of instructional delivery, but this was one-sided. For instance, Obiakor & Adeniran (2020), lamented that digital divide existed between students in the public schools and those in the private school in the use of technology-assisted instruction in the face of COVID-19. While the students in the private universities keyed into using e-learning platforms such as Zoom meeting, Google Meet, and WhatsApp group video or voice calls, students in the public universities lacked these opportunities in most cases. This explains why most of the students in the private tertiary institutions in Nigeria never had (to an extent) an interrupted school academic calendar as a result of the COVID-19 pandemic (Nwachukwu et al., 2021; Oyediran et al., 2020). The increase in the adoption of online learning and departure from the face-to-face teaching and learning system really changed the narrative of innovation adoption among Nigerian education practitioners. According to Nwachukwu et al., (2021), many educational institutions resorted to digital modes of learning to cushion the effect of the COVID-19. This was because; the services of educational technology are the last resort of these practitioners if they must survive the pandemic. Therefore, their adoption of these services became a must for them. According to Peytcheva-Forsyth & Aleksieva (2021), even though the challenges of e-learning and e-assessment prevented practitioners from adopting them before COVID-19, they had no option but to forcefully learn how to adopt them during the COVID-19. This, notwithstanding gave a new look to the Rogers Innovation diffusion theory.

Diffusion of innovation theory by Rogers (2003) seeks to explain the how, why and at what rate new ideas and technology spreads through cultures. Rogers argues that diffusion is a process by which an innovation is communicated through certain channels over time among the participants in a social system (Rogers, 2003). Four main elements influence the spread of a new idea according to him, which are: the innovation itself, communication channel, time, and a social system that heavily relies on human capital. The innovation must be widely adoptable to be sustainable. The theory of diffusion of innovation posits that the process of innovation adoption passes through five different personalities namely, innovators who constitute 2.5% of the population, early adopters who are made up of 13.5%, the early majority who constitute 34%, later majority who are also 34% and lastly the laggards who constitute 16% of the population (Rogers, 1995; 2003) as reflected in Fig. 1. These personalities, view, accept and adopt innovation in different ways and at different times.

Usually, the innovation originates from a person or group of persons who are risk-takers (innovators), venturesome, and interested in new ideas from whose hands it diffuses into the larger society gradually. The early adopters constitute 13.5% of the population and are usually opinion leaders with higher social status. They are usually aware of the change and comfortable adopting new ideas. The early majority also adopt an innovation after a varying degree of time has passed. They are rarely leaders, but they do adopt new ideas before the average person. They need to see evidence that the innovation works before they are willing to adopt it. They constitute about 34% of the population. The late majority is usually people that are skeptical of change, and will only adopt an innovation after it has been tried by the majority and is

Fig. 1 Categorization of innovation adopters. (Source: Rogers 2003)



successful. They constitute about 34% of the population. Lastly are the laggards who are very conservative, resistant to change, down to tradition, and nonchalant in adopting any innovation. They constitute 16% of the population. Before these five groups of people adopt an innovation, they usually pass through five phases of decision making which are knowledge, persuasion, decision, implementation, and confirmation in order to reject or accept the innovation.

However, based on the new global reality caused by COVID-19, educational innovation adoption in Nigeria became very fast irrespective of the behaviour of adopters towards innovation adoption before the pandemic. These education innovation adopters became eager to adopt innovation by all means because of the emergency time. This new behaviour, therefore, reduced the number of groups of education innovation adopters in Nigeria from five to four which are: the innovators, early majority, late majority, and laggards as contained in Fig. 2.

This new model only has 4 sets of innovation adopters, excluding the early adopters. In this situation, the percentage of innovators remains 2.5% as contained in Rogers (2003), but the percentage of the rest of the adopters changed. While 45% constitute the early majority who eagerly adopt the innovation because the innovation is the last resort for survival, the late majority constitutes 44%. They are eager to adopt the innovation with evidence that it has worked even amid emergency situations, although, they might have heard about the innovation later than the early majority. This group of people sacrifices a lot of pride, ego, and principles to adopt the innovation concerning the emergency situation (pandemic). They are those that may not be willing to adopt the innovation except with a success story and evidence that it is alright. They can do anything within their reach to adopt the innovation provided it will help them survive the emergency (pandemic). These people could still cease to adopt the innovation if the emergency situation is over because their adoption of the innovation is situational. The laggards, in this case, are 8.5% of the adopters who are very conservative and reluctant to adopt the innovation. They do not mind the effect of the emergency situation; rather they may give many reasons for not

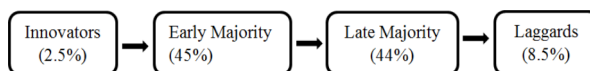


Fig. 2 Model of Categorization of innovation adopters in time of Pandemic. Adapted from Rogers (2003) (Source: Researchers)

adopting the innovation such as lack of technical know-how and lack of usefulness of the innovation. However, these groups of innovation adopters could be found in both the private and public universities in Nigeria. By this, the pandemic could be argued to have facilitated the modification of Rogers (2003) innovation diffusion theory. It ushered in new behaviour, belief, and acceptability rate of innovation among education practitioners by increasing their rate of adopting educational innovation within a short time as shown in the model in Fig. 2.

Nonetheless, due to the necessity caused by the pandemic, the adoption of educational innovations became a must, thus, many practitioners, unlike before the necessity, keyed into the adoption process of educational innovations. The majority of the practitioners had to adopt the innovation immediately without necessarily spending more time to think and decide. This is because adopting these innovations was the only means for the sustenance of academic activities in the face of the pandemic. Thus, the new global reality occasioned by COVID-19 presented educational innovation as the sine qua non for surviving the effect of the pandemic in the education system.

The models in Figs. 3 and 4 further explain the movement of educational practitioners from adopting the old norm to adopting a new norm. Figure 3 represents the old norm in innovation adoption among educational practitioners. Only a few practitioners were eager to adopt educational innovation in their instructional delivery process before COVID-19 based on research findings (Ikechukwu, 2021; Nwagwu & Azih, 2015; Obiakor & Adeniran, 2020; Ridwan et al., 2019). This is seen in the short length of the arrow between the practitioners and innovation. The arrow shows that the percentage (and weight) of practitioners that adopted innovation in their professional practice/instructional delivery process was fewer (and lighter) than those that used the old norm as seen in Fig. 3. However, the long arrow between practitioners and the old norm shows that the percentage (weight) of those that adopted the old norm was higher than those that adopted innovation based on research findings (Liu & Long, 2014; Nikoubakht et al., 2019). This is why the box of the old norm could lift the box of innovation very well showing the obvious difference in their weight. However, this situation was before the pandemic and it changed with the emergence of the world's emergency situation.

In Fig. 4, at the centre of the affairs of the educational practitioners, lies the world's emergency situation (COVID-19). This became the major issue in the world's educational practice that determined practitioners' response to innovation. However, in this situation, the pendulum swung 360° where the percentage (and weight) of adopters of innovation became more than those that still adopted the old norm. The weight of the innovation adoption box pulled down the weight of the old norm adoption box. This is an indication that many practitioners suddenly started to adopt innovation in the emergency time as indicated by previous studies (Peytcheva-Forsyth & Aleksieva, 2020; Dele-Ajayi & Taddese 2020; Nwachukwu et al., 2021). Therefore, such a model explains how a change of behaviour of innovation adoption by practitioners could occur at any emergency time. Out of necessity, the percentage of innovation adopters became massive suddenly as a way to survive the pandemic. The old norm, in this case, is the face-to-face teaching and learning; assessment; publication of results; conference; workshops; project, thesis and dissertation proposal, seminars,

Fig. 3 Model of the old norm in educational practice. (Source: Researchers)

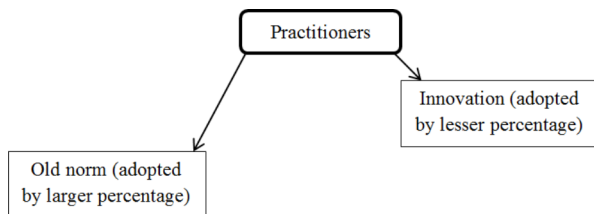
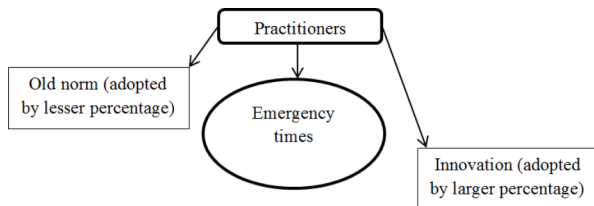


Fig. 4 Model of the new norm in educational practice in emergency times. (Source: Researchers)



and defense; while, the new norm (innovation) is a virtualized form of all these academic activities.

4 Changing the old norm in the Face of Pandemic: the place of Educational Technology

The COVID-19 pandemic presented a new story and challenge to every aspect of human society such as politics, economy, social life, religion, security, and education. Its' impact on the education system is very alarming. Surely, while it may have some negative side effects on the education system of the world, it has a positive side effect on the discipline of educational technology. This is basically because, according to Yamamoto & Karakose (2020), COVID-19 helped to change education practitioners' attitude toward technology and it has forced them to adopt some technologies that they have either not adopted before or were never willing to adopt. This made the application of educational technology services more relevant and appreciated. For instance, Obiakor & Adeniran (2020) opined that due to the upsurge of COVID-19, amid the global crisis, the only way Nigerian education could survive is by adopting technology in its learning process. This explains the new position educational technology took in the face of the pandemic.

Previously, practitioners preferred the face-to-face teaching and learning process because of its acclaimed advantages over any other form of learning. Scholars such as Liu & Long (2014) and Nikoubakht et al., (2019) argued that face-to-face teaching and learning remains irreplaceable with any other form of learning. Thus, based on this notion, some practitioners likely preferred such a form of teaching and learning. However, the pandemic changed the narrative. This is where the discipline of educational technology got its' sway of influence on the education system of the world, especially in Nigeria (Nwachukwu et al., 2021). With the closure of schools, many higher institutions engaged the students in different online-based learning, in order to meet up with their school calendar. Educational technology services in this regard

became highly priced because of their roles in preventing the spread of COVID-19 and containing the number of out-of-school children.

The place of educational technology in controlling the effect of COVID-19 in the world education system has been documented by previous studies (Ali, 2020; König et al., 2020; Ukata & Onuekwa, 2020). In Nigeria, due to lack of preparedness to adopt educational innovation before the pandemic, COVID-19 deprived so many students of the right to education especially when face-to-face teaching and learning was the dominant way of instructional delivery. In the face of this, Nwachukwu et al., (2021) maintained that educational technology became a great tool for adapting to the new global reality to ensure that students are not deprived of learning at any point in their lives. Also, many educational institutions in Nigeria resorted to digital modes of learning to cushion the effect of the pandemic. This further lays credence to the view of Chebib (2020) that the only solution to the obstruction of global education by COVID-19 is educational technology. This is because, educational technology can help bridge the literacy gap, and the gender gap in education and ensure that learning goes on even in difficult times. Based on these acclaimed roles educational technology could play, the Nigerian government and even other educational practitioners started adopting different educational innovations for educational practice during the pandemic. Basic among them is the Learn at Home Programme of the Federal Government of Nigeria. By initiating this programme, it indicates that the Nigerian Government was serious in applying drastic measures to curb the effect of COVID-19 on education. Therefore, through radio and television programmes lesson contents were delivered to the students across the nation. This was followed up by the development of some e-learning resources such as Mobile Classroom, School Gate, and an e-learning portal for examination classes and partnering with Internet Service Provider to supply free data to the students to allow them to use these services (Dele-Ajayi & Taddese, 2020). This, therefore, indicates that the pandemic gave educational technology a greater position in the education system of Nigeria. However, whether it could retain such a position after the pandemic or not is a thing of concern to educational technologists.

5 Consolidating the New Norm in the Face of the New Global reality: the Task ahead

Although COVID-19 has made educational technology to gain momentum in the Nigerian education system, such momentum may look bleak if the system approach is not used to consolidate this status. Since necessity called for the adoption of certain educational innovations by practitioners, some of these practitioners may tend to show a conservative mindset towards these innovations, if the pandemic is over. A concerted effort from the relevant stakeholders is, therefore, highly needed to consolidate this new norm. While some of the institutions and practitioners may likely be willing to continue adopting innovations that they adopted during the COVID-19 period, there may be some challenges that may obstruct their smooth continuous adoption of these innovations. For instance, lack of technical know-how could pose a challenge towards consolidating innovation adoption after the COVID-19 pandemic.

This is because, before the pandemic, many Nigerian universities operated on a traditional face-to-face learning system with few adopting the innovation (Nwachukwu et al., 2021) basically because they lacked the wherewithal to adopt these innovations (Agbele & Oyelade, 2020). This shows the level of their conservativeness.

The new global reality has called for a more pragmatic move towards the adoption of innovation in the education process rather than being conservative. COVID-19 made this new norm a necessity and not a want. But, to consolidate this new norm, Nwachukwu et al., (2021) argued that digital infrastructure and accessibility issues in many Nigerian public universities may pose a challenge. In addition, Chukwuemeka et al., (2021) pointed out that poor funding of public education in Nigeria could prevent the consolidation of this new norm. According to Azor & Ogwu (2019), many universities lack the needed infrastructure such as power, network, and educational technology specialists to coordinate the adoption of innovations in their education process. Moreover, Mpungose (2020) and Azubuike et al., (2021) argued that the basic hindrance towards the success of online learning during the COVID-19 pandemic in South Africa and Nigeria respectively is the digital divide among the students. Thus, without curtailing the digital divide, efforts to consolidate the integration of innovation in the education system after the pandemic will be a futile mission. In Nigeria, Oyediran et al., (2020) argued that although innovation (e-learning) is an answer to the COVID-19 pandemic, yet not all universities have the technological infrastructure to adopt it in Nigeria. Therefore, even though the COVID-19 has presented a greater opportunity to the discipline of educational technology, some foundational challenges still pose threats towards its full implementation.

6 Conclusions

Educational technology moved from a position where it is highly regarded during the colonial and post-colonial period to a position where it lacked regard and patronage in the post-second republic Nigeria (after 1983). It then took a position where it was the most regarded solution to the effect of a global pandemic on education in 2020. While in the 1970s, education practitioners in Nigeria were trained on how to use educational technology-related services for effective instructional delivery, in the 2000s, the case became different. Educational technology facilities though, are provided in some of the schools in Nigeria, but not based on a system approach. The practitioners were not given pre or in-service training on how to use these facilities effectively and the needed resources or environment to use these facilities seemed to be lacking. Thus, many of the practitioners became conservatives in innovation adoption, using basically the old norm in teaching and learning. But the emergence of COVID-19 created a necessity for them to adopt innovations by all means. This scenario adjusted the Innovation Diffusion theory by Rogers (2003) and ushered in a new norm for innovation adoption in the Nigerian education system.

By and large, the status of educational technology in Nigeria gained more momentum due to COVID-19, but consolidating such momentum after COVID-19 may be tasking especially as the human and material resources to ensure its consolidation are lacking in most of the universities in Nigeria. Based on the foregoing literature, this

review concludes that consolidation of the adoption of innovation in the education process in Nigeria could be made possible when educational practitioners engage themselves in in-service training on how to use these innovations. Moreover, even though ICT facilities are provided in the schools, the Nigerian government has to adopt a system approach in procuring and installing these ICT facilities so that their actual benefits may be felt by the education practitioners in their instructional delivery. A feasibility study of these ICT facilities has to be done to ascertain the level of institutional and staff preparedness to adopt these innovations. As the pandemic saw a radical shift in the rate of innovation adoption by the practitioners thereby adjusting the Rogers (2003) innovation diffusion theory, this review, therefore, proposed an innovation diffusion model in emergency times. This model shows the behavioural change of innovation adopters towards adopting innovation when they are faced with emergency situations (see Figs. 3 and 4) which could be a pandemic, war, natural disaster, or any other emergency situation.

Research Funding The authors did not receive any specific grant from funding agencies or individuals for this study.

Declarations

Disclosure of potential conflict of interest The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Informed consent The research is not an empirical study but a theoretical study. Therefore, no human was used as a subject and no human/subject's consent was sought for in this regard.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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