SMARTPHONE EDUCATION DELIVERY MODEL AMIDST LOCKDOWN IN NIGERIA

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Abstract

Despite the ills of COVID-19 across Nigeria, it has opened up the responsible use of the internet for educational purposes especially among teachers in the private primary and secondary education sectors. It has brought to the limelight the possibility of delivering lessons using what we may refer to as a smartphone education delivery model (SED-M). The availability of internet facilities and smartphone technologies helps greatly in the delivery of the lessons to pupils in the primary schools and the students in secondary schools and universities. Also, Government agencies in the educational management utilise the model in their meetings and professionals used it for webinars during the lockdown. There is a need to design a holistic framework for the use of this model in education delivery. In this work, we propose an enhanced SED-M to mitigate some of the challenges of engaging the internet enabled smartphones for teaching and learning in any lockdown situation as an emergency remote teaching approach.

Keywords: smartphone, lockdown, teaching and learning, internet technology, COVID-19

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1. Introduction

A smartphone is a mobile phone that can perform many tasks and computations like a personal computer. It is equipped with a high-performance operating system couple with intrinsic high-speed data communication capability. All smartphones are equipped with a myriad of useful applications like Facebook, Twitter, Wikipedia, YouTube, WhatsApp, Telegram, and Instagram. These functionalities have made smartphones a handy educational tool for teaching. The somewhat affordability and popularity of smartphones makes it easy for a household to have access to at least one smartphone [1]. The unpredictable outbreak of COVID-19 brought about periods of social distancing and isolation that kept pupils and students from classroom for quite a long time; students were strictly kept at home and isolated from their classrooms. This forces a lot of schools to shift towards digital forms of education or eLearning/mlearning. With the high functionality and easy accessibility of smartphones, it was possible for both teachers and students to use it as a tool for education during the COVID-19 lockdown. Teachers were urged to create online teaching and learning resources and began to consider the most suitable technologies to teach their courses [2] With an internet connection and groups/rooms on social media platforms, a teacher can send notes, assignments, and other teaching materials and more than one student can access it easily.

The COVID-19 pandemic is first and foremost a health crisis which caused many countries to shut down schools, colleges, universities, religious centers and market places. This shut down forced schools and institutions/universities around the world to move teaching, learning and student assessments online on an untested and unprecedented scale with a lot of trial and error and uncertainty for everyone [3]. The lockdown changed the educational system of face-to-face learning to virtual, whereby teaching is now undertaken remotely and on digital platforms. This sudden shift from face-to-face mode of learning to virtual in many parts of the globe is likely going to persist post-pandemic and would impact the worldwide education system. While the education authorities are working towards engaging alternative means of education delivery to students, the effectiveness of learning online among pupils is also to be considered as children can easily be distracted [4].

Educational institutions across African countries were closed during the lockdown due to the COVID19 pandemic [5.6.7]. As the lockdown persists, the government of some African countries started putting up measures to ensure continuity of education amidst the lockdown. Some of the measures include the use of TV/Radio stations which was found not so effective as the lack of facilities like constant electricity hindered the success of this new mode of teaching. Other measures like the online teaching/learning platforms suffered hindrances like ICT gadgets, data subscription, and lack of ICT trained teachers [8]. In South Africa, Makoe and Gatsha [9] prepared a policy brief on the Southern African Development Community in response to the emergence of the pandemic. The essence of the brief was to endorse the immediate implementation of strategies, models and systems that encourage and support remote online teaching and open distance learning during and after the lockdown and recommend ways the policies could be implemented. This was

necessary because Bhebhe and Maphosa [10] who examined the learning habits of students participating in distance learning in a South African University found out that while some students may be able to prepare appropriately for contact sessions, tests and examinations others may have difficulty balancing study, work and family. Hence the need for a proper orientation, strategies, models and systems in any distant learning situation like the lockdown period. The lockdown was indeed global and all-inclusive because apart from the African continent, in Asia, Bhaumik and Priyadarshini [11] carried out a survey in India to determine the e-readiness of 100 senior secondary school students to determine how prepared the students were to transit to the use of smartphones, computers and the internet for education. The study showed 70% of the students participated in online study with availability of both smartphone and internet. Another study by Veena et al. [12] investigated the technology adoption, student engagement and faculty experience during the lockdown from 20 faculties in a higher institution in India. The study showed that the students were more involved (with their smartphones) and had more attendance than offline class sessions.

The use of smartphones is paramount in the art of delivering education in any distance learning approach even before the lockdown. However, it has its drawbacks. For instance, in Malaysia, Foen et al. [1] carried out a survey to determine how well students in a Malaysian University use smartphone for school related purposes. The study which involved 180 students concluded that the use of smartphones affected their CGPA negatively because the students are easily distracted by social media and other forms of entertainment while using their smartphones for studies. Likewise, in the Kingdom of Saudi Arabia, Hejab-Ma'azer and Shaidah [13] conducted research to investigate the usage and effect of smartphones on academic staff at university level. The study involved 66 academic staff who own and use smartphones at the Northern Border University. The study showed that smartphone usage also affected academic staff by distracting their attention at work through an intermittent surf of their smartphone referred to as check habit. Furthermore, in Tanzania, Wulystan et al. [14] conducted research involving 30 teaching staff and 40 students of Sokoine University of Agriculture to study the smartphone-based applications used for teaching and learning and assess the impacts of using smartphones in teaching and learning, and show the types of teaching and learning activities that could be facilitated using smartphones. The research showed the enormous benefits of using smartphones in m-learning; however, it noted that the basic problem that stopped students from using m-learning applications to download their course materials is charges for internet access (data cost) associated with using the m-learning applications.

The research of Akande et al. [15] showed that the adoption of smartphones and emerging technologies for possible teaching and learning when schools are shut down are possible in Nigeria. With a dataset of 850 students, they showed that a larger percentage of the students prefer the use of smartphones than the laptops in accessing education. They also recorded Facebook Live, Google Classroom, Zoom, Instagram, and Twitter as the topmost embraced emerging technologies for education. However, irregular power supply and epileptic internet access were noted as major challenges to the adoption of technology in teaching and learning. Indeed, the place of face-to-face teaching methods cannot be overemphasized. This was shown in a study by Abbas et al. [16] which tried to determine the perceptions of students towards e-learning during lockdown with a sample size of 377 students. The result showed that 77% of the students have negative feelings towards e-learning because it comes with challenges of social isolation, lack of student-teacher interactions and poor internet

connectivity. In Bangladesh, the preparedness of the learners to adapt to online learning and its practicability is very low as most of the students lack basic technological infrastructure (laptops, smartphones). There are prime hindrances like high cost of internet, low speed of internet, family financial crisis, poor mental readiness/interest and financial crisis which has made many students to relocate to more remote areas where internet connectivity is limited [17]. Bhaumik and Priyadarshini [10] also noted the challenge of mental exhaustion on the part of the students caused by back-to-back online classes, extended on-screen time, and feeling of isolation and 'nervousness' toward independent studying without the technical support by a teacher. The social isolation problem however may be solved through a distance learning approach in a higher education context that employs peer-to-peer communication which could enhance collaborative learning in a virtual classroom. Blaine [18] implemented this in an English as a Foreign Language platform using text-messaging application and collaborative text-editing software with the aim to establish a communicative learning space. Students' interactions were analysed in slack workspace (a text messaging application). This indicated a variety of interpersonal, open, and cohesive communication that signalled psychological closeness in the virtual learning environment [19]. Again, research efforts are in place to discover novel ways to gain students interest in e-learning using tablets. A related study was that of Narayan and Naidu [20] which carried out research to determine how tablets are used by undergraduate students to aid their learning process. It was discovered that students appreciated the portability of tablets making it possible for them to study anywhere at any time with about 82.4% of the students positively responding to tablets helping them in their studies. In a similar study by Arulogun *et al*., [21], a dataset of 900 open and distance learning students from Ladoke Akintola University of Technology, Nigeria was used to determine the students' performance on open and distance learning. The intention was to portray the use of social media and emerging technologies for online facilitations so that academic works will not be completely disrupted in case of any pandemic outbreak. Although Remtulla [22] agreed that difficulty in accessing high speed internet in most developing countries is a challenge to e-learning amidst the COVID19 lockdown, the researcher highlighted that the use of online lectures/examinations, telemedicine, interactive technologies, and virtual reality are technological tools which could be used to provide education solutions to any pandemic especially in medical schools.

Concurring with the basic challenges of online learning as identified by other scholars above, Kamal et al. [23] in their work identified that instructiveness of the system can also be a determinant factor to successful implementation. Outside the challenges, they observed that there is tremendous success achieved within the scope of their research around discussions, collaborations, and individual learning on the part of the student. Also, there exists the fear of examination uncertainties such as cheating by the students, authentication of examination takers, and result validation. Irrespective of these challenges, time management with online learning is excellent and thereby an added advantage to academic excellence. This is in line with Talidong [24] who while arguing that teachers need support in device availability and cost management, also noted that there is a bit of concern in the appropriate time allocation for delivery and content development but in all, there is a positive impact on academic excellence.

As a developing country, the impact of the lockdown on the education sector in Nigeria was slightly more pathetic especially for schools in the rural communities. As the pandemic is

revolutionizing digital and online education globally, the challenge remains the digital divide. Pupils and students in rural and undeveloped communities in Nigeria are being left behind as they are not equipped to adapt to the new methods of teaching and learning [25]. According to UNESCO [26], although an estimated 1.725 billion learners have been affected because of school closures, representing about 99.9% of the world's student population as of April 13th, 2020, "almost 40 million learners have been affected by the nationwide school closures in Nigeria, of which over 91 percent are primary and secondary school learners". The pandemic really disrupted the landscape of learning in Nigeria. The already fragile Nigerian education system was devastated and is part of the receiving end [27]. Although transition to the use of smartphones is readily available, it will be difficult for the Nigerian educational sector as a whole to adapt to this transition (changing from face-to-face to e-learning/m-learning). It is expected to struggle for a very long time if no workable model is proposed and adopted. Again, while several private schools have begun to initiate an m-learning system using available ICT means, pupils/students in public schools are expected to suffer most compared to their counterparts in private schools. The problem here is, public schools in Nigeria have no alternative plan for their pupils/students with regards to e-learning/m-learning systems. This means that public schools' pupils/students have suffered most during this pandemic [28].

It is with these backdrops that we set out in this study to examine the new normal in teaching and learning because of the pandemic and explore an alternative or a more advanced and all-inclusive approach to education delivery during any lockdown occurrence. The objective of this study is to design a holistic smartphone driven education delivery framework that would work for both pandemic and post-pandemic periods while taking into consideration the solutions to some of the challenges identified in the literature.

2. Materials and Methods

Generally, in response to the challenges of continuing education during the lockdown, Talidong [24] recommended the Emergency Remote Teaching (ERT) approach as a way out of the challenge. ERT involves means at which teaching and learning activities are delivered without physical contact. It predominantly involves the use of smartphones and laptops while using readily available and convenient delivery platforms such as WeChat, Zoom, Ding Talk, Tencent Room, and others. It was also noted that most teachers are comfortable using this method of teaching of which they believe would be a resultant success in academic excellence. In the same vein, Bozkurt and Sharma [29] affirmed the usefulness of the ERT approach because it incorporates empathy and care into regular online teaching and in turn offers a better solution for students' complete concentration during the lockdown.

Before the ERT, the traditional education delivery approach is invoked. It is a two-way agent system where the instructor and the student are the two principal actors. As shown in Figure 1, the instructor delivers teaching (through instruction and/or lab demonstration materials) and assesses the student's performance. The student on the other hand interacts with the instructor as well as submits all assessments directly to the instructor. These all take place in a controlled physical environment such as a classroom and/or laboratory.
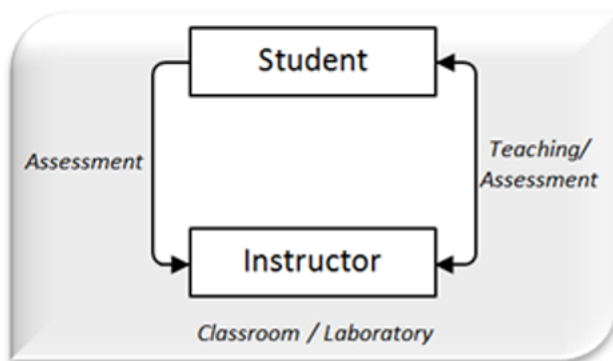
Figure 1: Traditional Educational Delivery Model

The emergence of the nationwide lockdown due to the COVID-19 pandemic necessitated the exploration of alternative approaches to generally deliver education to both pupils and students across the nation. As expected in the ERT approach, the availability of smartphones and the internet technology were the first resources to be exploited. The adoption of these resources gave rise to a generalized smartphone education delivery model as depicted in Figure 2.
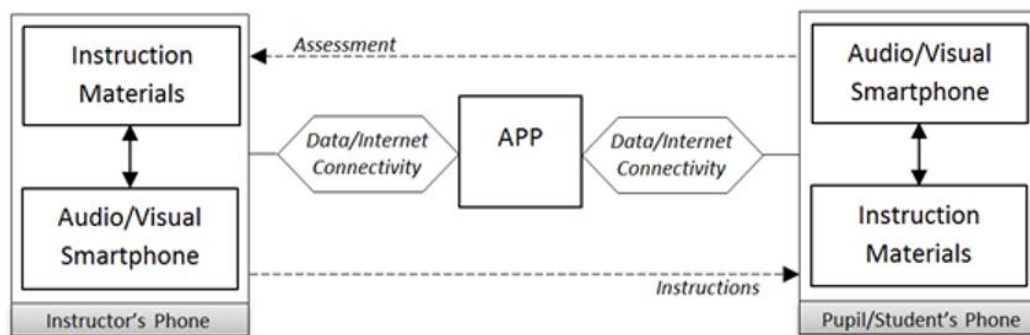

Figure 2: Generalized smartphone education delivery model

The availability of internet facilities and smartphone technologies helps greatly in the delivery of the lessons to pupils in the primary schools and the students in secondary schools. The teachers would record their lesson series using the audio/video facilities on their smartphones and upload them onto a closed WhatsApp/Telegram group which have the parents/guardians of the students/pupils as members of the group. The parents/guardians would download the materials alongside any photo/graphic illustrations and pass them onto their children/wards. They will listen to the lessons, perform any experiment(s), do required assignment(s), and submit directly to the teacher who will in turn grade them appropriately. It is interesting to note that most private schools in Nigeria had used this model to cover a large part of the school's curriculum while the COVID-19 lockdown lasts. As good as this practice is it has its challenges. First, parents are made to serve as home teachers or lesson

supervisors amidst their regular duties. Secondly, parents who are not literate enough or internet-compliant fail to participate in this practice thereby short-changing their wards. Thirdly, the lack of constant power supply across Nigeria contributes adversely to this practice as parents who cannot provide alternative power supply to keep their phones fully charged within the periods are short-changed as well. Technically, some of the limitations of this model include:

a) The parents and/or pupils are using the smartphone screen alone to view the lessons thereby posing a screen resolution challenge as some of the SmartScreen may not display the lessons appropriately due to its size.

b) Constant exposure to the phone screen poses a health challenge to the eye

c) The emergency situation of the model puts the parents in a whole new environment which requires a certain literacy level which definitely most parents lack.

d) The pupils are required to write notes from the SmartScreen which puts them in a situation to learn the operations of the smartphone thereby creating additional requirements for them to access their lessons.

3. Results/Discussion

To mitigate some of the challenges and technical limitations above, we proposed an enhanced smartphone education delivery model (SED-M) with the following architecture depicted in Figure 3:
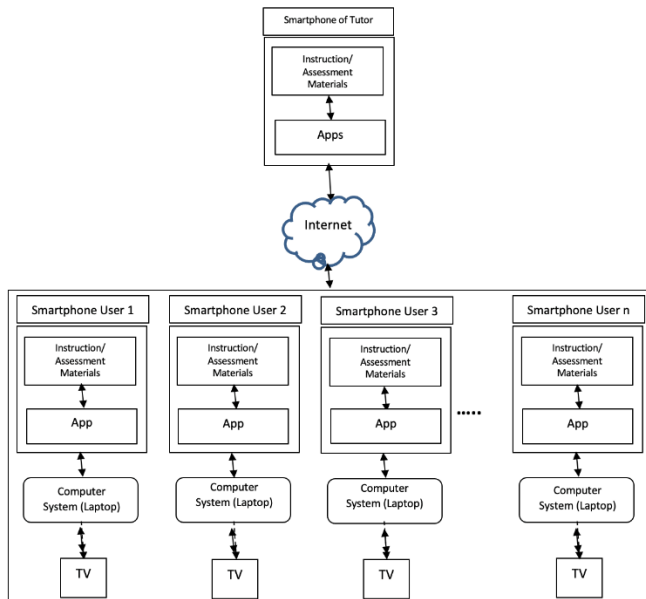

Figure 3: Enhanced Architecture of Smartphone Education Delivery Model

This architecture is a modified or enhanced version of the existing architecture discussed in section 2. An enabled HDMI laptop and TV have been added to the architecture. The modification is motivated based on two reasons, flexibility, and size of the target audience which the existing architecture does not provide. This design is also a trade-off to cost.

The advantages of this enhanced design are:

1. It gives the user the option to make use of his/her laptop while he/she can still receive calls from his/her phone without interruption to the ongoing lecture.

2. It allows the user to make use of the keyboard of the laptop, thus it makes communication via typing faster for the user.

3. It allows group class/lecture as the users have the option of viewing the teacher either on their laptop screen or on the television.

4. It increases good viewership. Users can see their tutor on a large screen boldly especially during a voice call via the WhatsApp or Telegram application.

5. The connection between the App and the laptop is web based via a URL e.g. https://web.whatsapp.com and https://desktop.telegram.org/

It is now all-inclusive as both parents/pupils and secondary schools/university students can find satisfaction in using the model. In the tertiary education sector, the use of the model is modified to involve the lecturers directly. They are actively using internet enabled smartphones to advance research through a regular webinar series organized by their various professional bodies. In Nigeria, this new webinar practice has been very impactful as participants span across professionals in different locations across the country and beyond. Using this model, individual lecturers participate in some international webinar series and take specialized courses in different open courseware and academic search engines which provide free resources within the period. The use of internet apps like GoToMeeting, Jitsi App, Zoom App, etc. is employed. Prominent among these webinars include the monthly meetings of the Nigeria Computer Society and the Association of Medical Doctors in Nigeria. Again, education stakeholders in Nigeria like the Joint Admissions and Matriculation Board and the Nigerian Universities Commission had been using the model during the lockdown to host most of their meetings in the pursuit to streamline education and research within the period. Comparing our model with that of Stotz and Lee [30] which designed an interactive evidence-based smartphone eLearning program for low-income earners, the delivery method of providing education via a smartphone included factors such as length of a lesson, contextual learning opportunities, pragmatic logistics of interactive approaches, and involvement of the key players in the industry. This ensures that the contents are fully integrated to enhance academic excellence.

4. Conclusion

This work had discussed various uses of smartphones and the internet applications for teaching and learning. It has shown that it is possible to have an effective lesson/lecture delivery using smartphones. Although not without challenges, the fact remains that the use

of smartphone and internet facilities for lesson delivery during the pandemic achieved good results. The enhanced model proposed in this work may be very useful both during a lockdown situation and post pandemic. The model is efficient, easy to use and promises to ensure knowledge retention due to the affinity of the student to the device. Since the importance of the role of the teacher in an online learning environment cannot be overstressed, we recommend that schoolteachers should be trained in digital skill acquisition to enhance successful implementation of the model in developing countries.

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