NIGERIA'S DIGITAL DIVIDE AND THE PROMISE OF OFFLINE INTERNET FOR REMOTE LEARNING FOR POST-COVID19 SUSTAINABILITY

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Abstract

The digital divide exerts negative effects on online learning in Nigeria as students from rural communities and low-income students are the most educationally disadvantaged by the Covid19 pandemic. Affordability of connectivity in Nigeria was the biggest obstacle facing students in Nigeria during the Covid19 pandemic even after several interventions in the past to bridge the digital divide. Offline internet is shown to hold much promise for bridging the digital divide for remote learning in Nigeria with its sensitive features like requiring no internet to function, commands strict focus on relevant learning and is suitable for all cadres of learning. The benefits of offline internet include enabling slow learning, mastery and reflection by the user, takes away the burden of recurring internet connectivity costs, ensures Use Your Own Device (UYOD) by the users, eliciting and consolidating digital literacy skills by the user and enabling personalized instruction through the user paced nature of the learning experience and providing high quality digital resources for learning. Exemplars of offline Internet in Nigeria include Ulesson, Utiva, Mavis Talking Pen and Book, Ubuntu Hub, Roducate Mass, Stanlab Nigeria etc Prospective users of offline internet for remote learning in Nigeria include Street kids, IDPs, Refugees, Prisoners, Itinerant fishermen, Nomadic herdsmen, Out-of-school learners, adult learners, School dropouts, Rural dwellers etc. Recommendations include e-learning content providers should manufacture offline internet equivalents of their Massive Open Online Courses so as to significantly address the challenges of low-resource contexts and emergencies that would usually prevent individuals benefiting from relevant courses, Policymakers should formulate and monitor the provision of offline internet equivalents for MOOCs, distance learning institutions, conventional schools so that disadvantaged learners can benefit from quality instructional resources too.

Keywords: Digital Divide, Offline Internet, Covid-19, Remote Learning, SDG4.

Introduction

Digital divide is the gap between those who have access to information and communication technology (ICT) resources and those who do not have, it is the disparity between those with relevant ICT skills and those who do not have, it also typifies the difference between those who own ICT devices and those who don't own and the gap between those with internet connection and those who do not have internet connection. All of these differences in access to ICT resources can be singly or collectively referred to as digital divide especially viewing their negative effects on digital remote learning in Nigeria. The digital divide poses a serious challenge to achieving the targets of sustainable development goal four as it creates inequity of access to online instructional resources for the marginalized especially the poor, rural dwellers, refugees, IDPs etc

Dele-Ajayi and Taddese (2020) state that Nigeria is the 30th largest economy in the world by GDP volume and the most populous country in Africa with over 190 million residents. The country has an annual population growth rate of 2.6% and a youthful population below the age of 15 that makes up 46% of the country's population. Nigeria is a lower-middle-income country where poverty remains a significant challenge, with 50% of citizens living below the poverty line, and high inequalities in income and opportunities.At the household level, mobile phones (88%) and radios (61%) are the most prevalent technologies. In 2019, 54% of adult males were mobile internet users compared to 38% of adult females. Ownership of computers is very low, both in urban (13.4%) and rural areas (2.5%). Approximately 65% of primary and junior secondary schools lack access to electricity. Only 39% of rural households are connected to the national power grid compared to 83% of urban households (Dele-Ajayi and Taddese, 2020).

Affordability is a correlate of the digital divide. It basically refers to the ease with which an individual can purchase computers and peripherals, mobile devices, internet subscription data and other instructional resources that can be used by a learner to enable personalized remote learning comfortably. Allu-Kangkum (2021) reported from a survey on possible challenges associated with online learning during the Covid19 lockdown in Nigeria that inability to afford buying a computer was a barrier to online learning (Olayemi, Adamu, and Olayemi2021, Nwasor 2019, Adamu and Bala 2021, Onyema 2019, Nwamaka 2019 & Apena 2019).

Availability as a correlate of the digital divide refers to the presence of relevant electronic learning content, computers and mobile devices, internet access and adjacent infrastructure like electricity and good road networks. Ofuyatan, Opaluwa, & Adeola (2014) noted that ICT infrastructure is lacking in Nigerian Universities or in private universities (Yarhere, Obuzor & Fomsi 2020, Onyema 2019). Nnadozie, Aniebo & Chukwueke (2017) in a study on availability of e-resources and accessibility of e-services in academic and special libraries in Abia State, Nigeria reported that a challenge to the use of e-resources and e-services in both MOUAU and NRCRI libraries is inadequate ICT facilities. Itegboje, Adedokun & Olusanya (2015) in a Survey of Opinion of Marginalized College Students about Online University Education stated that a factor against the practicability of online education in Nigeria is the state of internet infrastructure.

Accessibility, another correlate of the digital divide is the measure of digital literacy of an individual, language literacy of an individual, steady internet connectivity and level of compliance of computer and mobile devices that can collectively or singly make or mar the smoothness of a personalized remote learning effort. Ofuyatan, Opaluwa, & Adeola (2014) opined that Nigeria faces the challenge of thin bandwidth. The researchers reported that bandwidth is the scarcest ICT resource in Nigerian Universities. Internet connectivity is usually available in most tertiary institutions in Nigeria, but in most cases the bandwidth

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subscribed to (which determines speed of access) is too small to support any meaningful academic activity during peak periods. Ofuyatan, Opaluwa, & Adeola (2014) also noted that Nigeria lacks quality broadband network which aids ICT (Nwasor 2019, Nwamaka 2019, Reju, &Jita 2020, Onyema 2019). Olayemi, Adamu, and Olayemi (2021) in research on Perception and Readiness of Students' Towards Online Learning in Nigeria during Covid-19 Pandemic reported that inaccessibility to online library resources was a challenge. Consequently, introducing online learning without adequately addressing the perceived challenge can have long damaging impact on the students, as they would likely presume that this mode is a poor substitute to face-to-face learning (Apena2019).

Offline Internet is that specially designed computer system that stores up information in very large quantities for learning in low-resource regions and/or emergencies, either by direct retrieval of information from a storage device, a WiFi-enabled seeder sharing its resources with leech-computers or a gadget that periodically updates its local information contents whenever it goes online. We are in the age of device storewidth and no longer is internet bandwidth thus the amount of relevant information a non-human device can store up offline is more important than internet speed which is not available in most parts of the global south and emergencies. The researcher thinks the sensitive features of offline internet, hold promise for bridging the digital divide in an emergency or low-resource environment such as Nigeria especially with regard to digital remote learning for the post Covid19 era.

Statement of Problem

The digital divide poses a very serious barrier to learners benefiting from online learning in Nigeria. Several efforts have been deployed by government such as collaboration between agencies and technology corporations like Google, Microsoft and Intel. There was also the Virtual Library Initiative by the Nigerian Universities Commission which is another digital project aimed at bringing electronic information to Nigerian Universities. Nigerian universities Network (NUNET) is also a project initiative of NUC (Nkanu and Okon, 2010).

More so, there was also an effort by a public private partnership in Nigeria to boost ICT adoption called computer for all and the Universal Service Provision Fund (USPF) which was established by the Federal Government of Nigeria to facilitate the achievement of national policy goals for universal access and universal service to information and communication technologies (ICTs) in rural, un-served and under-served areas in Nigeria. However, all of these efforts do not seem to have had significant effect on ameliorating the digital divide in Nigeria especially as regards digital remote learning.

The sustainable development goal four stipulates inclusive and equitable quality education and lifelong learning for all irrespective of their challenges, gender, socio-economic status or location. However, Damani (2021) reports that student from rural communities in Nigeria (49.1%) were the most educationally disadvantaged by the Covid-19 pandemic and also low-income students (25.3%). Affordability of connectivity (25.8%) in Nigeria was reported to be the biggest obstacle facing students in Nigeria during the Covid-19 pandemic. Azubuike, Adegboye & Quadri (2021) reported that students who were learning remotely were asked about the challenges they faced learning online during the pandemic, 38% of the student respondents reported that the main challenge with learning online was affordability of phone credit and internet data. 28% reported that access to digital devices was the main challenge they faced, while 24% reported that electricity was the main challenge with learning online, 8% reported that access to the internet was the main challenge and only 2% reported other issues were responsible for their remote learning challenges. Azubuike, Adegboye & Quadri (2021). Students were asked what resources they needed in order to learn the way they wanted to while at home. Students attending government schools are more likely to report that they needed digital tools to access

remote learning during the pandemic. 53% reported that they needed internet enabled mobile phones, 55% needed access to the internet and 51% reported that they needed laptops and only 9% reported the needed nothing.

Could the sensitive features of offline internet, hold promise for bridging the digital divide in an emergency or low-resource environment such as Nigeria especially with regard to digital remote learning in the post-Covid19 era?

Purpose of Study
1.   To x-ray the correlates of digital divide as relates to remote learning in the post-Covid19 Nigeria.
2.   To study some exemplars and prospects of offline internet for digital remote learning in post-Covid19 Nigeria.
3.   To assess digital divide as a challenge to the achievement of SDG4 targets post-Covid19 Nigeria.
4.   To recommend sensitive solutions to the issue of digital divide as it relates to remote learning in post-Covid19 Nigeria.

Research Questions
1.   What are the correlates of digital divide as related to digital remote learning in post-Covid19 Nigeria?
2.   What are the exemplars and prospects of offline internet for digital remote learning in post-Covid19 Nigeria?
3.   Is the digital divide a significant challenge to the achievement of SDG4 targets in post-Covid19 Nigeria?
4.   How can the issue of digital divide be addressed for equitable digital remote learning post-Covid19 Nigeria?

Literature Review

Affordability and Online Learning in Nigeria
Allu-Kangkum (2021) reported from a survey on possible challenges associated with online learning during the Covid19 lockdown in Nigeria that inability to afford buying a computer was a barrier to online learning (Apena, 2019).

Nwamaka (2019) In surveying the opinions of respondents regarding the hindrances on the availability, accessibility and utilization of instructional technologies in National Open University Nigeria, revealed insufficient finance to buy the needed technological infrastructures as hindrance to availability, accessibility and utilization of instructional technologies.

Adamu and Bala, (2021) in an assessment of lecturers and students' preparedness, readiness and challenges for online education amidst covid-19 pandemic in Abubakar Tafawa Balewa University Bauchi revealed that since moving to online education is new to the students, there is the fear of cost therefore the student will face the problem of adapting to the new trend of moving to online education and they will also be faced with the problem of adapting to the use of virtual classes instead of meeting face to face.

Olayemi, Adamu, and Olayemi (2021) in research on Perception and Readiness of Students' Towards Online Learning in Nigeria during Covid-19 Pandemic reported that there are lots of challenges affecting learning in Nigerian universities. From the outcome of the findings; a perceived challenge that could hinder online learning was identified as high cost of data. Consequently, introducing online learning without adequately addressing the perceived challenge can have long damaging impact on the students, as they would likely presume that this mode is a poor substitute to face-to-face learning.

Ezekoka&Anum (2018) in a study on use of blended learning in Nigerian educational system: opportunities, benefits and challenges reported that devices are becoming more expensive.

Nwasor (2019) in a study on globalization of learning through pedagogic technologies for hospitalized learners in Nigeria reported that cost of data and affordability of compliant devices constrain the use of pedagogic technologies for globalizing learning for the benefit of hospitalized students (Onyema 2019).

Availability and Online Learning in Nigeria

Ofuyatan, Opaluwa, &Adeola (2014) noted that ICT infrastructure is lacking in Nigerian Universities or in private universities where these ICT resources have been purchased are locked up for accreditation purposes (Onyema 2019).

Yarhere, Obuzor & Fomsi (2020) reported that availability of internet may enhance the use of online learning platforms in Nigeria for undergraduate and post graduate medical education. Amesi & Yellowe, (2018) reported that the major issue confronting Rivers State Universities is non availability of information and communication technology gadgets and if these gadgets are available, they are not effectively utilized for the purposes of teaching and learning. It is the views of the researchers that information and communication technology gadgets ought to be made available for it to be utilized effectively.

Olayemi, Adamu, and Olayemi (2021) in research on Perception and Readiness of Students' Towards Online Learning in Nigeria during Covid-19 Pandemic reported that there are lots of challenges affecting learning in Nigerian universities. From the outcome of the findings; the perceived challenge that could hinder online learning was identified as inaccessibility to online library resources. Consequently, introducing online learning without adequately addressing the perceived challenge can have long damaging impact on the students, as they would likely presume that this mode is a poor substitute to face-to-face learning.

Nwasor (2019) in a study on globalization of learning through pedagogic technologies for hospitalized learners in Nigeria reported that poor connectivity constrains the use of pedagogic technologies for globalizing learning for the benefit of hospitalized students.

Accessibility and Online Learning in Nigeria

Ofuyatan, Opaluwa, & Adeola (2014)opined that Nigeria faces the challenge of thin bandwidth. The researchers reported that bandwidth is the scarcest ICT resource in Nigerian Universities. Internet connectivity is usually available in most tertiary institutions in Nigeria, but in most cases the bandwidth subscribed to (which determines speed of access) is too small to support any meaningful academic activity during peak periods. They also noted that Nigeria lacks quality broadband network which aids ICT (Nwamaka 2019,Apena2019,Onyema 2019).

Allu-Kangkum (2021) reported from a survey on possible challenges associated with online learning during the Covid19 lockdown in Nigeria that lack of compatible phones to connect to online learning platforms was a barrier to online learning. Ezeala & Chimeremeze (2018) in research on implementation of blended distance education programmes in rivers state reported that lack of mobile accessibility of distance learning websites from any location are part of technological challenges on implementation of distance education in Rivers State (Olayemi, Adamu, & Olayemi 2021 & Reju, & Jita 2020).

Jegede, Adeleke, Jegede, & Ayanlade (2015) reported difficulty in powering a preloaded instructional mobile device due to non-constant supply of electricity, the researchers noted that uptil today Nigeria is still battling with generation of sufficient electric power(Onyema2019, Apena2019, Olayemi, Adamu, and Olayemi 2021).Yarhere, Obuzor & Fomsi (2020) reported that constant electric energy supply may enhance the use of online learning platforms in Nigeria for undergraduate and post graduate medical education.

Nwamaka (2019) in surveying the opinions of respondents regarding the hindrances on the availability, accessibility and utilization of instructional technologies in National Open University Nigeria, noted that some students expressed frustration with technological learning and requested for training on computer literacy before using the technological tools (Chigbu and Dim 2012,Adelabu, Adu & Adjogri 2014, Nwasor 2019,Olayemi, Adamu, and Olayemi 2021).Ezekoka & Anum (2018) in a study on use of blended learning in Nigerian educational system: opportunities, benefits and challenges reported that teachers are not offered

professional development as access to ICT training opportunities remains outstanding issues for some educators in the Nigeria system.

Features of Offline Internet

❖ **Requires no internet:** Offline Internet takes away the recurring cost of purchasing internet data which may not be affordable especially in low middle-income nations, emergencies and off grid regions thus making digital remote learning possible anytime without internet connection!

Solar powered means: Most Offline Internet interventions like Jara Emergency Unit and Solar Spell make use of solar energy since electricity may be unavailable or erratic in Low middle income nations and emergencies lest source of electric power becoming a barrier to digital remote learning through Offline Internet (Hosman, Walsh, Comisso & Sidman 2020).

❖ **Strict focus on relevant learning:** Offline Internet interventions enhance strict focus on digital remote learning, having removed all the barriers to computer aided instruction without internet connection anywhere on the earth.

❖ **Suitable for all cadres of learning:** Offline Internet is usable by any interested learner despite their level of education. It can be used by learners in primary, secondary, tertiary levels of education or even for vocational or language courses.

Benefits of Offline Internet for Remote Learning

❖ **Cognitive:** Offline Internet enables slow learning, mastery and reflection by the user.

❖ **Economic:** Offline Internet takes away the burden of recurring internet connectivity costs. Offline internet is cost effective, cost efficient and ensures economy of finances and time.

❖ **Technological:** Offline Internet ensures Use Your Own Device (UYOD) by the users. It elicits and consolidates digital literacy skills by the user and enables personalized instruction through the user paced nature of the learning experience.

❖ **Quality:** Offline Internet provides high quality digital resources for remote learning.

Exemplars of Offline Internet for Remote Learning in Nigeria

Most Nigerian Educational Technology companies have engineered their digital remote learning products to fit the Offline internet model. This is mainly due to the high cost of internet data, unavailability of internet service in some areas and epileptic internet service. The following are notable examples of offline internet for personalized digital remote learning in Nigeria.

Ulesson: The Ulesson SD card contains video lessons and quizzes and a dongle (an OTG device that plugs into the charging port of a smartphone or tablet and enables learners to read content from the SD card). Together, these two items enable users to watch the pre-recorded video lessons offline without worrying about expensive data streaming costs. However, the package requires that internet data is kept on so as to enable an authentication process that consumes only 0.1MB of data. This is to ensure that the SD card is being used on the account it is intended to and that the contents are not being pirated. Available subjects include senior secondary school English, Mathematics, Physics, Chemistry, & Biology and Junior Secondary School English, Mathematics, Basic Science, Business Studies, & Basic Technology.

Mavis Talking Pen and Book: the Mavis Talking Book consists of a digital pen (Mavis Pen) and a specially printed book (Mavis Book). When the pen touches text or pictures in the book, it reads out the corresponding audio, including interactive games, quizzes,

multi-language translations, etc. They are talking books for literacy, numeracy, health and other subjects – English with Phonics, Mathematics, Rhymes, Languages, etc

Ubuntu Hub: Promises to give offline access to online education in a near real-time manner. Because there is an increasing number of educational technology solutions that help people learn online in Africa. However, the number of people that have access to broadband in rural communities is still low.

Roducate Mass: is a hybridized offline Internet for indigent students who may not have access to the internet. It is an offline model preloaded on a device for the lowest end device with the functionality required. The entire curriculum from primary through secondary and several university courses are preloaded already which means the student has and owns access for life. Curriculum Updates are done remotely once the phone is plugged in and data activated just for the duration of the update. Roducate Mass caters to different learning styles such as lecture notes for avid readers, podcasts for auditory learners, and tutorial videos for visual learners.

Stanlab Nigeria: is a hybridized offline 3D virtual lab application that allows students to control simulations of practical classroom chemistry experiments. The virtual lab (usually used in the classroom) is being integrated into a web app which will allow teachers to remotely manage a roster of students: assigning laboratory is a hybridized offline 3D virtual lab application that allows students to control simulations of practical classroom chemistry experiments. The virtual lab (usually used in the classroom) is being integrated into a web app which will allow teachers to remotely manage a roster of students: assigning lab practicals and assessing their performance. Additionally, parents and caretakers are notified of assignments as well as real-time progress report of their students via their dashboard.

Prospects of Offline Internet for Remote Learning in Nigeria

Offline internet is the best model of electronic learning for instructional delivery and assessment in a low-resource environment like Nigeria where the poverty rate, high cost of internet data, unavailability of internet service etc collectively make online learning an expensive practice. The following segments of the Nigerian society will find offline internet not just relevant but also a sensitive educational technological solution that takes into consideration the factors that militate against online learning in Nigeria.

Street kids: Street kids will find Offline internet a friendly school that they can always access anytime, anywhere for knowledge, skills and values education.

Internally Displaced Persons (IDPs): will find offline internet a strategic means of continuing the acquisition of relevant skills and knowledge despite squatting!

Refugees: will find offline internet a versatile means of continuing learning, acquisition of relevant skills for employability and foreign language learning!

Prisoners: will find offline internet a veritable resource for acquiring marketable skills and meaningful knowledge even in confinement.

Itinerant fishermen: will find offline internet an educative resource that stays with them on the go even when in offgrid areas!

Nomadic herdsmen: will find offline internet an educative resource that stays with them on the go even when in offgrid areas!

Out-of-school learners: will find offline internet a meaningful school for digital remote learning.

Adult learners: will find offline internet a quiet means of learning without drawing attention from people

Women and Girls: will find offline internet a tool for skills acquisition for economic emancipation.

School-dropouts: will find offline internet an affordable means of schooling without visiting the fore walls of a classroom

Rural dwellers: will find offline internet an educational resource that doesn't require internet connection.

Recommendations

❖ Electronic Learning providers have to manufacture offline internet equivalents of their online MOOCs so as to significantly address the challenges of low-resource contexts and emergencies that would usually prevent individuals from benefiting from relevant instruction or courses.

❖ Policy makers have to formulate and monitor the provision of offline internet equivalents for MOOCs, distance learning institutions, conventional schools. So that marginalized/disadvantaged learners can benefit from quality instructional resources too.

❖ Governments have to monitor the provision of offline internet equivalents for MOOCs, distance learning institutions, conventional schools. So that marginalized/disadvantaged learners can benefit from quality instructional resources too.

❖ Distance learning providers must factor in the provision of offline internet equivalents for all their courses so that all their learners and many more who were excluded can find their programmes not just accessible but inclusive.

❖ NGOs have a task of popularizing and distributing offline internet interventions that contain relevant skills

and education for the rural dwellers, IDPs, refugees, the disabled, women prisoners etc. so that inclusive and equitable quality education can be ensured meaningfully.

Conclusion

The digital divide correlates like affordability, availability; accessibility and awareness have been shown to negatively affect digital remote learning in Nigeria. The features and benefits of offline internet have been presented in the light of digital remote learning. Some examples of Offline Internet in Nigeria were also mentioned, segments of the Nigerian populace that will benefit from Offline Internet were also seen and recommendations for the advocacy, adoption and use of Offline Internet were also stated. In a nutshell, Offline Internet is shown as a sensitive solution to the challenge of the digital divide especially as it affects digital remote learning in post-Covid19 Nigeria.

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