Imperatives of Paradigm Shift in Current Pedagogical Strategies in Nigerian Public Universities

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Abstract  This paper is an exploratory research that focuses on the extent of preparedness by Nigerian Public Universities (NPUs) to cope with the challenges imposed by the Covid 19 pandemic. NPUs are characterized by traditional pedagogical approaches in academic engagements with students. The advent of Covid 19 requires a change from traditional strategy to Information Communication and Technology (ICT) mediated pedagogical approach to remove constraints imposed by compliance with Covid 19 protocols, namely social distancing, self – isolation and total lock down. Attempt to mitigate the ravaging effect of COVID 19 pandemic, led to the closure of universities in Nigeria (both private and public). This poses serious challenges to NPUs in that, while private universities activated their virtual learning environment for academic engagement with students during the lockdown, NPUs were incapacitated and are yet to be opened. The paper therefore examined the concept of virtual learning, the influence of ICT revolution on pedagogical strategies, the readiness of NPUs for virtual learning as well as constraints to virtual learning in NPUs. Some of the observable challenges facing virtual learning in NPUs include: poor ICT Policy, low internet penetration, high cost of access to the internet as well as attitudinal problems of students and lecturers towards ICT. Based on the problems highlighted, the following recommendations were made: formulation of an enduring ICT policy and its implementation by the Federal Government, adequate funding of NUPs, massive deployment of ICT infrastructure for virtual learning, reduced cost of internet services, provision of WiFi on the campuses, training programmes for lecturers and students on proficiency in ICT skills and improved access to internet facilities by lecturers and students in NPUs.

Keywords: public universities, private universities, ICT, pedagogical strategies, Covid 19

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1. Introduction

The statistics published by UNESCO on March 25, 2020 revealed that COVID-19 pandemic has disrupted schooling for more than 87% of the world’s student population, leading to closure of schools in 165 countries. This equates to 1,524,648,768 students, or 87.1% of the world’s student population. In order to mitigate the ravaging effects of COVID-19 pandemic, global reactions have been simultaneous on strategies for survival. These strategies include social distancing, self-isolation and total lockdown which reduce physical contact among the citizens to the barest minimum. These measures pose serious challenges to all educational institutions that rely mostly on traditional (face-to-face) pedagogical relationships.

In Nigeria, as part of the damage control of corona virus, the Honourable Minister of Education directed all educational institutions in the country to close down immediately. On April 3, 2020, the Federal Government directed all vice chancellors, provosts and rectors on how to reopen using virtual learning after two weeks of closure. Unsure of how soon the COVID-19 pandemic will end, the Minister directed all tertiary institutions to activate learning environment to enable students continue their studies through digital device. He observed that COVID 19 has changed everybody and as such lecturers should device alternative ways to keep the system and academic activities going through the creation of virtual learning environment.

This directive is premised on the appropriateness of technology in enhancing teaching and learning processes, particularly during the scourge. Globally, pedagogical relationship in the educational system is facing a lot of transformation due to the influence of Information Communication and Technology (ICT). For instance, Maphalala and Adigun [1] remarked that the implication of technology in higher education is obvious in this present time of COVID-19, when physical/social distancing has become the ‘new normal’ and communication and interpersonal relationships are fostered through digital platforms or online media. Clearly not many nations, developed or developing have any plan...
for e-learning as back-up when things go wrong with the traditional (face-to-face) mode of engagement with students. For many, online education is perceived only an alternative, a second chance in a bi-modal system of learning. In most Nigerian Public Universities (NPUs) online education is completely alien to both lecturers and learners.

COVID-19 pandemic has posed serious challenge to NPUs when viewed against the directive to migrate from NUPs’ conventional teaching methods to virtual learning. It is observed that while private universities in Nigeria engaged their students through virtual learning during the lockdown, students in all NPUs were denied any form of interaction. On account of the realities lecturers and students in NPUs find themselves during the lockdown, and their reflections of being unable to engage virtually, one can reasonably conclude that NPUs were ill prepared to cope with challenges of COVID-19 pandemic. The inability of NPUs’ to engage students in teaching and learning activities during lockdown occasioned by COVID-19 pandemic is therefore a source of concern. This could be an indication of lack of suitable technology and requisite knowledge by lecturers and students for virtual learning.

The purpose of this paper therefore, is to examine the concept of virtual learning, the influence of ICT on pedagogical process; assess the readiness of NPUs for virtual learning and highlight factors that constraint virtual learning in NPUs.

2. Concept of Virtual Learning

According to Schlosser and Simonson [2] virtual learning is learning that can functionally and effectively occur in the absence of traditional classroom environments. Van Beek [3] indicated that virtual learning comes in several forms, namely; Computer-Based, Internet-Based, Remote Teacher Online, Blended Learning and Facilitated Virtual Learning. Similar forms of virtual learning are sometimes grouped into broader categories: i) Online Learning: This is any form of instruction that takes place over the Internet. It includes Internet-based instruction; remote teacher online instruction; and blended learning and facilitated virtual learning that involves these two virtual learning methods. It excludes computer-based learning. ii) Full-Time Online: This is online learning with no regular face-to-face instruction or facilitation. It is Internet-based and remote teacher online learning only, though it may include some occasional interaction with human teachers and facilitators.

According to Fofayan and Fofayan [4] e-learning applications and processes include web-based learning, computer based learning, virtual classrooms and digital collaboration. Racheva [5] observes that virtual learning combines e-learning; web-based learning; distance learning and blended learning. In addition, the major advantage is that virtual learning overcomes many drawbacks of the physical environment such as time, facilities and environment as well as the capacity to bring new pedagogical techniques into traditional forms of education and makes learning more personalized and convenient.

The application of ICT in the teaching and learning process, otherwise known as e-learning, is described as an expanded digitalized, multimedia online learning environment that supports conventional face-to-face teaching and learning, [6]. According to Maphalala and Adigun [1], through e-learning, course content and knowledge sharing is made possible among individuals or groups of learners and their instructors irrespective of their location or distance from one another. In other words, e-learning has the potential to address inequalities and provide a more conducive educational environment. According to Mahmud, Ndoni and Omodara [7], ICT has become part and parcel of education and brought about changes in the technological era all over the world. One single thread running through various classifications of virtual learning is the role of ICT in instructional delivery. It then follows that without ICT, virtual leaning is impossible.

According to Adu [8], ICT is the convergence of computer systems with telecommunication network to acquire, process, store retrieve and transmit data and information which then encompasses information storage tools such as computer Disc, Read-only Memory (CD-ROM), magnetic tapes, computer files, data bases, and network internet-based tools and technologies. The Learning Management System (LMS) is becoming increasingly popular as a platform that provides opportunities for online interaction with students, with centralized information about the students’ progress. LMS is a software application for the administration, documentation, tracking, reporting, automation and delivery of educational courses, training programmes or learning and development programmes. According to Mahabeer and Pirthpepal, [9], the LMS has become the e-learning platform used by Higher Education Institutions (HEIs).

The foregoing has been an attempt to clarify certain terminologies that are common in the application of ICT to pedagogical relationships. The next section of this paper will examine how ICT has transformed pedagogical relationships in educational institutions.

3. Influence of ICT Revolution on Pedagogical Strategies

Various scholars have defined ICT in different manners. Teo and Beng Lee, [10] defined ICT usage as the utilization of the internet along with computer networks, World Wide Web, email and search engines used in the production and sharing of information. Nwafor [11] described the various components of ICT as including but not limited to audio, camera, e-mail, facsimile (Fax), internet, intranet, main frame computer, minicomputer, microcomputer, photography, teleconferencing, videos, websites word processing computers among others. According to Garba and Alademirin [12] the knowledge components of ICT known as ICT-litarcy has become part of the basic labour requirement in knowledge driven societies; and a necessary foundation for higher education and professional development. According to Obayan [13] ICT has increasingly become a foundation of modern societies and economies. She added further that there is
tendency that people without access to ICT are denied the option to participate in new ICT-based jobs, e-government, ICT-improved health care, and ICT-enhanced education and other activities that are connected with technology.

The ICT has been of tremendous influence in enhancing pedagogical strategies in the developed countries. The pedagogical practice has become more innovative and flexible as the teacher is no more seen as a custodian of knowledge and can switch method of instruction delivery in order to make it student-centered. Pelz [14] indicated that one of the principles of online pedagogy is centered on the fact that the instructor must give way to students-led learning in an online course due to the distance between the instructor and the student.

Again the use of ICT has enabled increased students engagement with online tools. The ICT especially the Internet has become a necessity to a large portion of the world population today as well as the best, largest and most useful encyclopaedia of information [15]. Adu and Galloway [16] opined that ICTs have been used in education for many purposes such as for memory retention, skill acquisition, understanding of the subject matter, independent study, and motivation. It can as well be used to promote the use of modern methods of teaching which includes among others cooperative learning, peer group dramatization through play and problem solving.

Agabi, Agbor and Olulobe [17] opined that global efforts at proactively creating knowledge society through ICT include components of computer hardware and software, network connectivity and several other devices that are essential to knowledge management. Apagu and Wakili [18] opined that adoption of ICT by teachers will enhance effective teaching, due to its enhancement of good course organization, effective classroom management, self-study, collaborative learning, tax oriented activities, and effective communication between the actors of teaching-learning process and research activities.

Nwezeh [19] observed that ICTs have introduced new methods of teaching and conducting research and have been brought into education facilities for online learning, teaching and research collaboration. Through e-learning course content and knowledge sharing is made possible among individuals or groups of learners and their instructors, irrespective of their location or distance from one another [19]. According to Onasanya, Shehu, Oduwaiye and Shehu [20], the impact of advancement in computer and internet technology is felt in all spheres of human endeavour particularly in the area of socio economic and to some extent the education industry. Introduction of ICT in education plays a role in shifting responsibility for learning from teacher to student and does not however remove the need for classroom leadership nor does it invalidate related traditional teacher skills and practices [21].

Hannshek and Wessmann [22] opined that ICT is an existing and widely deployed technology that can be mobilized to step up the pace and scale of transformation in teaching and learning process in higher education. While science and technology has revolutionized the whole world, the use of ICT in education has certainly influenced and enhanced teaching and learning processes, [23]. Lopez [24] remarked that ICT has provided innovative opportunities for teaching, learning, research and administration in higher education.

One aspect of technology that comes in handy is the social media. Williams and Adesope [25] observed that social media in education are used to foster learning by allowing social interaction, active participation and engagement of students in classroom discussion. Ojokheta and Onimisi [26] opined that it is universally known that social media have become an integral part of public discourse and communication in the contemporary society. Sutherland, Davis, Terton and Visse [27] remarked that a study conducted across 15 countries identified students in higher education as being responsible for increasing the use of mobile computing devices such as tablets and smartphones, with 67% attributing their academic success to the use of modern technologies. Clement [28] observed that in 2019, an estimated 2.95 billion people were using social media worldwide, a number projected to increase to almost 3.43 billion in 2023.

The foregoing is a clear indication that ICT would continue to play a predominant role in teaching-learning process. This implies that it is imperative for educational institutions to embrace modern technology in order to be relevant in the 21st Century knowledge economy. Additionally, there is the urgent need for NPUs to leverage on ICT to cope with challenges of COVID-19 pandemic.

The prospect of compliance by NPUs with the directive on deployment of virtual learning for interaction is dependent on a number of factors. For instance, it would be interesting to know whether these institutions have the resources for virtual learning. These institutions will require a Learning Management System (LMS) that enables them to deliver and track educational system in virtual space. The lecturers and students might not be adequately equipped for the demand of LMS. For instance, the behavioural intentions, attitudes and perceptions are essential factors among academics that influence their adoption and use of e-learning platforms for academic instruction [29]. This implies that both the academics in NPUs must have the prerequisite skills in terms of training for the use of LMS coupled with technical support that is essential for their competency in content development, management and e-facilitation.

The extent of readiness by NPUs to engage in virtual learning in order to overcome the challenges imposed by COVID-19 pandemic will be the focus of discussion in the next section.

4. Virtual Learning Readiness of NPUs

The suspension of operations of schools in reaction to the scourge has exposed the negligence on the part of government in their success on e-learning. education infrastructure, displaced persons as well as access to free and compulsory qualitative basic education and host of other educational facilities [30]. Nigeria has the highest number of learners affected by the country-wide lockdown that became operational in Nigeria on the midnight of Monday, 20 March 2020 and has resulted to over 30 million learners in the country being temporarily out of school, [31].
The COVID-19 pandemic is one of the numerous pandemics that has threatened human life and outbreak of another virus is not avoidable. The reality is that only educational institutions that have access to modern technology will be able to survive in another outbreak. According to Kekic and Miladinovic [32] past research on outbreaks suggest that such practices like physical and social distancing during outbreaks tend to continue even after the outbreak. The implication of this is that the learners, teachers as well as school managers would still be living in fears of the virus which would invariably prevent learners from interacting with one another in the school [33]. The extent of readiness by NPUs for virtual learning is therefore a source of concern. At present the utilisation ICT by NPUs for teaching and learning process is limited to blended learning. Allen and Seaman [34] defined a blended learning course as having between 30% and 80% of the course delivered online while they considered an online course as having at least 80% of the course delivered online.

The National Open University of Nigeria (NOUN) is the only public university in Nigeria in which the academic calendar does not suffer much dislocation occasioned by the closure of schools in Nigeria. This is because as a dedicated distance learning university, emphasis has been placed on the use of ICT for facilitation with students across different geo-political zones in the country. The University hosts the Africa Centre of Excellence on Technology Enhanced Learning (ACETEL) which is a World Bank sponsored Education Management System. Despite its robust ICT facility when compared with other NPUs, the mode of engagement with students at the NOUN falls under blended learning. This is due to occasional face-to-face engagements with students at various study centres across geo-political zones of Nigeria.

The success of virtual learning in NPUs hinges on attitudinal change of academics. The implementation, usage, management and sustenance of e-learning approaches to education and learning in Higher Education Institutions (HEIs) depend largely on the academics, [1]. They will need to learn new skills to teach students how to search for and use information from the internet and other safety issues, [35]. According to Garba and Alademirin [12] the transformation of the educational system through the application of ICT to a large extent depends on teacher’s ability, effectiveness and competence in the use of ICT equipment for personal and educational purposes. Before introducing e-learning, institutions are expected to get prepared with adequate environmental, technological and other facilities, [36].

Although before the COVID-19 pandemic, ICT was a compulsory requirement for all seeking employment as academics in all institutions of higher learning in Nigeria. For instance, Garba and Alademirin [12] observed that the revised National Policy on Education incorporated the integration of ICT in education. In addition, the policy makes it compulsory for academic staff in all higher institutions to integrate ICT in their pedagogical practices. Yusuf [37] indicated that the government consideration for ICT integration in Nigerian educational practices is to empower and strengthen the competence of the education industry towards meeting up with those responsibilities in the National Policy on Education.

Compliance with ICT facilities is part of accreditation requirements, as indicated in the National Universities Commission (NUC) Basic Minimum Academic Standard Documents (BMAS). However, it is doubtful if most NPUs can scale this accreditation hurdle on ICT readiness under a transparent process. This is based on allegations that during accreditation, most Federal universities are treated with kid gloves by the NUC saddled with the oversight function since both the NUC and Federal public universities are Federal institutions.

Experience has shown that once NPUs libraries are equipped with state of the art ICT facilities, it is often taken for granted that these universities are ICT compliant during accreditation. There are NUPs where faculties cannot boast of a single computer unit while lecturers procure individual laptops through personal loans obtained from Cooperative and Thrift Societies. In rare cases where Wifi is available, the signal is so weak. This situation speaks volume about the extent of preparedness of NPUs for virtual learning particularly in this COVID-19 pandemic era. This implies that a wide gap still exists between the formulation of ICT policy and its implementation in Nigeria.

During the lockdown private universities were able to teach, conduct examinations, moderate students’ projects and graduate their students through virtual learning. However, NPUs were unable to deploy virtual learning for teaching and learning process even before the lockdown.

The ability of private universities to activate their ICT platform for teaching and learning process during the period has been attributed to stringent licensing criteria by the NUC. In addition, ability to charge economic fees boosts their financial status. Unlike NUPs where tuition ranges from less than $270 to $540 per session, tuition in private universities including faith based universities is between $1,400 and $8,400. In addition, the low enrolment figure in private universities when compared with public universities put private universities at an advantage since there is less demand on their ICT requirement. The ability of private universities for engagement with students through virtual learning is captured by Olanipekun [38]. He observed that while Ajayi Crowther University and other private universities in the country kept engaging their students during the lockdown period, NPUs were shut down as a result of lack of logistics and effective ICT platforms to continue teaching.

Nwagwu [36] traced the history of e-learning in Nigerian universities to 1995 when the National Universities Commission (NUC) initiated the Nigerian Universities Network (NUNet) with a view to enabling the universities expand the reach of their training activities, update and widen their teaching, research and overall development using ICT. However, ICT facilities in most Nigeria universities can be said to be grossly inadequate as evident in some research findings. While some university communities in some countries enjoy free or inexpensive internet access, students and faculty/staff in NPUs must pay for time spent accessing the internet, whether at a cybercafé or in the library. Maphalala and Adigun [1] observed that South Africa has access to the benefit presented by technologies in the 21st Century. In a study conducted by Folayan and Folayan [4] it was
revealed that students in UK universities have access to computers when needed and that UK universities have WiFi available all over their campus for personal computers and computers in laboratories and library also have internet facilities. They added further that what some Nigerian universities such as the Obafemi Awolowo University have are an e-portal that does not provide for collaboration or even class materials. Nwagwu [36] in a study conducted on e-learning readiness at the University of Ibadan with lecturers as study samples reported that the lecturers did not support that their institutions and government provide enough training opportunity required to prepare students and their lecturers for good e-learning experience. In addition, they also strongly disagreed that the ICT equipment that could drive e-learning was available. However, they had no problem with content readiness of the University since they were the creator. Even though this study was conducted in the premier university in Nigeria his findings could be taken as a reflection of the situation in most NPUs.

Research ICT Africa (RIA) is an ICT and regulation research network based in South Africa. The RIA Nigeria ICT Survey of 2012 found that only 3.4% of households, or 747,025, have a fixed internet connection, and that 62% of internet users go online primarily via their mobile phone. The organisation also reported that 58.1% of Nigerian web traffic was via mobile handset and other mobile devices. According to Odufuwa [39] the poor penetration of fixed household internet is directly linked to absence of the fixed lines over which internet access products are typically delivered; low penetration of computers and inadequate power supply.

The results of the demand-side RIA Household and Individual ICT Access and Usage Survey for 2012 show that majority of households in Nigeria continue to be excluded from the full range of communication services. Radio (65%) and TV (53%) have the greatest penetration at household level in Nigeria, and fixed telephony (0.3%) and dedicated household internet (3.4%) are the least accessed ICT tools. Arising from this low penetration of dedicated household internet, Odufuwa [39] opined that low level of personal computer diffusion and fixed lines have created a scenario whereby the mobile handset is presently the principal device for accessing the internet and mobile internet is usually an individual access method rather than a shared household access method. RIA found that 62% of internet users go online primarily with personal mobile phones. Commercial internet locations (cyber cafes) are the second most popular (45%) means, followed by shared desktop computers, laptops or other mobile devices including tablets.

In 2015, the Networked Research Index (NRI) assessed the indicator policies and institutions that facilitate and enable a country to fully influence Information Technology for improved competitiveness and knowledge integration. The outcome of the assessment indicated that Nigeria dropped seven places to rank 119th out of 143 countries surveyed while that of 2013 was 113th out of 144 countries assessed [40]. The World Economic Forum (WEF) has ranked Nigeria 119th out of 139 economies in the overall ranking of its Global Information Technology Report (GITR) for 2016. A comparative analysis of three years NRI for selected countries in sub-Saharan Africa and the west revealed that among the sub-Saharan African countries, Nigeria was ranked 119th coming behind The Gambia, Ghana Senegal and South Africa.

Olulube et al [40] observed that the overall results of the NRI indicated that given the existing IT penetration rate, evidence may suggest that it may take African countries and indeed Nigeria over 100 years to catch up with the west to improve knowledge management. In 2018, Research ICT Africa (RIA) Survey in Nigeria demonstrates that a significant portion of Nigerians (71%) do not use the internet. In addition, among countries surveyed, Nigeria ranks second in internet penetration, behind South Africa, though the penetration level in Nigeria is still low at 29%, not much more than half that of South Africa. The main reasons for not having a working internet connection in households is that it is viewed as not necessary, the cost of equipment to connect is too high or household members do not know how to use it [41].

The digital divide is not only observed among individuals but also across countries. A number of African countries are still below the critical mass of 20% of the population required for the country to benefit from the network effect associated with improved information flows, productivity gains and economic growth [41]. Figure 1 shows that Tanzania and Rwanda have less than 20% internet penetration. Nigeria is above the critical mass threshold and ranked second behind South Africa which has internet penetration of 49.72%.

| Series 1 |
| --- |
| Rwanda |
| Mozambique |
| Tanzania |
| Kenya |
| Ghana |
| Nigeria |
| South Africa |

**Figure 1.** Internet penetration among surveyed countries (Source: RIA After Access Survey, 2017)

As ICT continues to dominate intellectual discourse in the 21st century, Nigerian universities need transformation in their traditional role of knowledge dissemination. This is corroborated by Tremblay, Lalancette and Roseveare [42] who opined that notwithstanding the advances in information technology (IT), higher education in developing economies are still faced with multifaceted challenges in their academic programming and reaching the goals of supporting the development of knowledge societies. Ifinedo [43] opined that it is pertinent to note
that the revolution taking place in higher education is not widespread and there is the need to strengthen ICT penetrations to reach a larger percentage of students, faculty and non-faculty in our institutions of higher learning.

In a comparative analysis study conducted by Folayan and Folayan [4] on existing e-learning tools between five universities in Britain with five universities in Nigeria, findings from their studies reveal ICT readiness of Nigerian universities. While all the five universities selected in Britain had 100% access to computer and internet, the five Nigerian universities selected for the study had the following scores: Afe Babalola University Ado Ekiti (90% access to computer and 90% access to the internet); Ekiti State University (35% access to computer, 10% access to the internet); Obafemi Awolowo University (60% access to computer, 50% access to the internet); Ahmadu Bello University (50% access to computer, 30% access to the internet), LAUTECH (50% access to computer and 20% access to the internet). This outcome of this study is illustrated in Figure 2 and Figure 3.

It is important to note the influence of ownership on observed disparities in access of students to computers and internet in these institutions as revealed in Figure 3. For instance, Afe Babalola University Ado Ekiti is privately owned with low student intake but high tuition fee while the rest are public universities owned by either Federal or state governments. As mentioned earlier in this article, the large students’ population coupled with meager tuition fees denied the NPUs access to necessary fund for procurement of ICT facilities for virtual learning.
As at July 2019, Cable Magazine ranked Nigeria’s download speed at 176th among 207 countries measured globally. This is 24 places down from its 152nd position in 2018 and 81 places from its 95th position in the 2017 rankings. The Report added further that Nigeria has an average download speed of 1.5Mbps, that is, a deep from 1.86Mbps recorded in 2018. Situating this figure in context, it means then that it will take more than seven hours to download a five gigabyte HD file on the average. This is several hours behind the fastest broadband speed of 85.2Mbps of Taiwan where it takes just eight minutes to download the same file, (The Nation, 2020). This scenario indicates the pedestrian status of NPUs in the use of virtual learning for students’ engagement both before and during COVID-19 pandemic era. This is therefore, a threat to Nigeria’s vision of university education to among other objectives have a vibrant and robust university system with high level of techno-literacy.

In view of the directive from the government to universities to activate virtual learning to engage their students during the lockdown, the reality is that NPUs lack necessary facilities to comply with this request. This is partly responsible for the inability of NPUs to reopen since they were closed down in March 21st, 2020. The closure of NPUs in reaction to COVID-19 pandemic clearly indicates that there are institutional and systemic factors that hinder their reopening

5. Constraints to Virtual learning in Nigerian Universities

The ability of Nigerian universities to provide a learning environment that is conducive with necessary infrastructure such as uninterrupted power supply; ICT driven facilities and research equipment are some of the factors mitigating the use of virtual learning by NPUs. Folayan and Folayan [4] succinctly put the state of ICT facilities in Nigerian tertiary institutions thus: it is obvious from available data that the penetration and use of electronic tools in Nigerian tertiary education is still very low and in some cases near non-existent. In most tertiary institutions in the country, the fact that ICT facilities and computers are not available is worrisome.

Government as proprietor of public universities influences development and growth of education through their policy. The most important area is that of funding. The precarious funding situation of NPUs has been a recurring issue. The Academic Staff Union of Universities (ASUU) often claims that their agitations are centered largely on funding and revitalization of NPUs. While private universities are free to dictate their tuition, NPUs are restricted. In fact, tuition is free in Federal universities. The free tuition policy in Federal Universities, without adequate funding has denied them access to major revenue required for the development of ICT infrastructure. Table 1 shows the share of education on the national budget from 2009-2018. The figures reveal that government has consistently failed to meet the United Nations Educational Scientific and Cultural Organisation (UNESCO) minimum standard of 26%.

| Year | Total National Budget | Allocation to Education | % Share to Education sector |
|------|-----------------------|------------------------|-----------------------------|
| 2009 | 3,049,000,000,000     | 221,019,000,000        | 7.25                        |
| 2010 | 5,160,000,000,000     | 249,090,000,000        | 4.83                        |
| 2011 | 4,972,000,000,000     | 306,030,000,000        | 6.16                        |
| 2012 | 4,877,000,000,000     | 400,015,000,000        | 8.20                        |
| 2013 | 4,987,000,000,000     | 426,053,000,000        | 8.55                        |
| 2014 | 4,962,000,000,000     | 493,000,000,000        | 9.94                        |
| 2015 | 5,068,000,000,000     | 392,200,000,000        | 7.74                        |
| 2016 | 6,061,000,000,000     | 369,600,000,000        | 6.10                        |
| 2017 | 7,444,000,000,000     | 550,000,000,000        | 7.38                        |
| 2018 | 8,612,000,000,000     | 605,800,000,000        | 7.03                        |

Source: Gambo and Fasanmi [44].

Gillwald et al, [41] identified other challenges facing the ICT industry in Nigeria that could continue to jeopardise the realization of national policy objectives as:

- The long delays in processing right of way permit as well as their arbitrary costing models have resulted in the prohibitively high cost of leasing transmission infrastructure.
- Damage to existing fibre infrastructure as a result of cable theft; road works and other operations.
- The lack of reliable, clean electricity supply over the national grid;
- Constrained investment in the industry; and
- The limited existing backbone infrastructure inhibits further expansion of broadband.

Agabi et al [17] opined that government policies and the political and regulatory environment must show commitment to bring the benefits of ICTs to our knowledge institutions. Africa and indeed Nigeria need to prioritise ICT usage, knowledge, skills and development if it has to benefit from new knowledge economy and the competence needed to stimulate national development. Osagwu [45] observed that Nigeria is far from being near the digital age if credible and trustworthy policy measures are not immediately put in place, because IT services and products are changing by the day. Kehinde and Muyiwa [46] remarked that the major problem in the wheel of progress with regards to the adoption and implementation of ICT policy in Nigeria is the government’s indifference towards ICT policy. The transformational changes that are meant to facilitate utilisation of ICT equipment in pedagogical practices in Nigerian universities require vibrant policies of Government which could resolve other matters. Unfortunately, such policies are yet to be implemented in Nigeria.

Infrastructural deficit is identified as one major barrier to the integration of ICT into instructional delivery in NPUs. ICT infrastructure consists essentially of a set of components that are the foundation of an ICT service such as typical physical components (computer and networking hardware and facilities) but also various software and network components. Adeosun [47] showed that lack of ICT resources and poor infrastructure prevents full implementation of ICT in Nigerian tertiary institutions. The RIA Nigerian ICT survey described bandwidth...
situation in Nigeria as paradoxical. It reported that since 2010 there has been a massive increase in wholesale submarine bandwidth capacity via landings at the country’s coastal city of Lagos. However, terrestrial domestic networks to carry these links inland are in low supply resulting in minimal impact on retail pricing levels for internet access.

Odufunwa [39] remarked that poor penetration of dedicated household connections across Africa are primarily due to the absence of fixed telephone lines over which household internet access products are typically delivered, the substitution of fixed telephones with mobiles, the low penetration of computers and inadequate power supply. Nwazeh [19] identified absence of basic office gadgets and technologies like computers, printers, faxing machines, photocopiers, binders and projectors not to talk of internet in most tertiary institutions in Nigeria. Adekunmi, Ajala and Iyoro [48] reported high cost of browsing, slow internet speed, and power outage as some of the problems confronting undergraduate students at Olabisi Onabanjo University, Ago Iwoye in the use of internet. The foregoing indicates that lack of access to basic ICT equipment, low internet connectivity and computers and the inadequacies in the use of educational software constrained efficient deployment of ICT for virtual learning in NPUs.

The success of a desirable transformation to digital environment to a large extent depends on teachers’ efficiency and competence in the utilisation of ICT for personal and educational purposes. Nwagwu [36] opined that lecturers play very critical roles in the design and management of e-learning programmes; they are the facilitators and teachers of students; they negotiate and intermediate between agencies of government and communities among others. Thus it is expected that lecturers must exhibit high degree of computer literacy in the deployment of ICT for pedagogical relationships with their students.

It is therefore expected that effective usage of ICT must be preceded by positive mental disposition. Various studies have been conducted on lecturers’ attitude to usage of ICT. Migliorino and Maiden [49] identified the combination of positive attitude about ICT use and ICT skills as accepted precursors for effective use of ICT. Olumorin [50] reported that lecturers have positive attitude towards computer, but computers were not used for instructional purposes. Seo [51] reported that lecturer’s attitude was a factor in fostering ICT adoption in education. The speed at which technology is evolving could also make it difficult for lecturers to make informed decisions regarding which devices to use. This demands frequent update in the knowledge and skills of lecturers on ICT through regular training. Training could also pose serious challenge in view of paucity of fund. Ajegbelen [52] reported that many lecturers in Nigerian tertiary institutions have never used computers and are terribly shy when confronted with this new technology and terminologies relating to ICT. On the part of students, various studies tend to confirm that students generally display positive attitude towards ICT usage particularly for academic purposes. Ani [53] reported that undergraduate students extensively use the internet, but majority relied on commercial internet services and cybercafés due to poor internet services in the university.

Skilled manpower is also required for the maintenance of ICT equipment. Nwagwu [36] reported availability of limited expertise because there are few technical staff to maintain the operations system. Teoh and Hoe [54] reported that lack of, and inadequately trained personnel as challenge to the use of ICT in most Nigerian higher institutions. Maphalala and Adigun [1] state that academics in the Higher Education Institutions (HEIs) from Africa are plagued by systemic challenges and have limited skills required for the implementation and integration of e-learning. Furthermore, there is deficit in e-learning policies in many of the African HEIs, and a lack of technical and administrative support for the academics for the implementation and use of e-learning facilities.

6. Conclusion and Recommendations

It is inferred from the discussion in this paper that outbreak of COVID-19 pandemic has exposed lack of capacity for virtual learning by NPUs. It is observed that activation of virtual learning by NPUs as directed by the Government is not feasible and at best a political gimmick. This is premised on observed indicators that constrain virtual learning in NPUs. Unlike some universities in Britain and private universities in Nigeria, NPUs are constrained by systemic and institutional variables on deployment of virtual learning. Consequent upon these challenges, NPUs have remained closed since March 20, 2020 due to COVID 19 pandemic. This is because traditional pedagogical (face-to-face) relationships make compliance with COVID 19 protocols impossible. In order for NPUs to remain relevant in the 21st knowledge economy, a paradigm shift in their traditional pedagogical strategies is inevitable. Based on the foregoing, the following recommendations are made:

- Government should put in place enduring policies that facilitate Internet penetration in the Country.
- There should be an improvement in relevant ICT infrastructure all over the country.
- Service providers must be given adequate incentives to reduce charges on access to internet.
- Adequate provision of ICT facilities in NPUs for easy access to internet.
- Academic staff must be provided with relevant tools that facilitate access to computer and internet services.
- Provision of free internet facilities for students and academic staff on the campus.
- Training and retraining programmes for staff who will in turn train the students.
- Computer science department in each of the public universities must be encouraged to develop software packages that are affordable in the country.

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