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Technoeducation and its Relevance in Enhancing Access to Higher  
Education in the Post Covid 19 Era in Nigeria



## **Technoduction and its Relevance in Enhancing Access to Higher Education in the Post Covid 19 Era in Nigeria**

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### **Opinion Paper**

#### **Abstract**

*With the advent of Covid-19, the educational system in Nigeria was thrown into comatose as education at all levels was shutdown to curtail the spread of the virus. The closure lasted for a period of time while disrupting the academic activities across the country. Though, the Federal Government directed all tertiary institutions to switched to virtual teaching and learning as alternative form of learning for the achievement of educational programmes, the transition was slow due to the unpreparedness of Nigerian education system among other factors. To this end, this opinion paper proposes technoduction model which incorporates various technological innovations for enhancing access to higher education in Nigeria. Also, it x-rays the challenges constraining technoduction in expanding access to higher education in post Covid era.*

**Keywords:** *Technology, Innovations, Technological Innovations, technoduction, Access, Nigerian Higher Education, Covid-19, E-learning, Zoom.*

### **1. INTRODUCTION**

Globally, education is recognized as the instruments for the promotion of economic development. It is the bedrock of both human and economic development. Education enhances human emancipation through knowledge acquirement. Also, the society is transformed through educated citizenry (Amaonye, 2021). While development is closely related to economic growth, education is associated with human resource as the building blocks for human development which has a formative effect on the mind and character and accelerates the development of knowledge, skills and attitude (Oyedeji, 2015), of the citizenry. Education in Nigeria has basically three levels: basic, senior secondary and tertiary but emphasis is laid on higher education.

Higher education is received after the completion of secondary education. Unachukwu and Okorji cited in Amaonye (2021), stated that higher education is an educational establishment to which access is available for people who have completed secondary education and in which the course

of study lasts for not less than two years, but more generally from three to six year. University education in Nigeria has continued to play pivotal role in training and development of human capacity in particular and manpower in generally. It is a very important citadel of learning which is relevant to the society. It focuses on manpower training in varieties of courses for the development of the society.

More so, education fosters technological advancement, socio-economic prosperity, gender equality, peace and sustainable development. This is the reason many countries have invested heavily in the development of university education for the progress of their nations. These huge investments on university education is premised on the fact that higher education is a critical component of human development. It is also advocated that through higher education, highly skilled personnel with the capacity and analytical skills that drive local economies are produced. When these educated individuals are produced through education, they support civil societies, lead effective governments and make critical decisions that affect the entire society. In Nigeria, the Federal Republic of Nigeria (2013) accentuated that university/higher education is an “instrument par excellence for effecting national development. This underscores the importance of education in fostering national development. In other words, education is the only guaranteed avenue for national development (Amaonye, 2021). Its importance cannot be overemphasized.

## **2. IMPACT OF COVID ON THE EDUCATIONAL SYSTEM IN NIGERIA**

However, in 2019, Covid 19 broke out in Wuhan, China and unsettled the global education system including Nigeria. Anyaogu and Onuoha (2021) posited that the pandemic exposed the weakness in teaching and learning in Nigerian schools because the typical teaching paradigm failed. In addition, the pandemic resulted in the closure of schools as children at all levels of education returned home. The situation brought all academic activities to an end as well as disrupted the academic calendars across the country. This corroborates UNESCO (2020), that the Covid 19 pandemic is a typical example of times when traditional teaching methods could not work in schools and the measure of social distancing did not allow the teachers and students to interact physically. Amaonye (2021) noted that when the education sector was shut down temporarily in compliance to Covid 19 safety measures, the students and pupils remained redundant at home without any form of education, the personnel/lecturers in the institutions of learning suffered academic atrophy, while the facilities were exposed to deterioration. The students were idly kept at home without any form of learning.

In agreement, Izuagba, Chukwudebelu and Ogbonnaya (2021) asserted that the pandemic affected the mode of teaching and learning in Nigerian schools as students were expected to move from the physical classroom to online mode of teaching and learning as substitute. This was validated by the pronouncement of the federal government of Nigeria for switchover to virtual teaching and learning. It could not have been possible instantly since the traditional mode of face to face learning which involves classroom interaction between the teachers and the learners was only obtainable prior to the outbreak of the pandemic. The effects of the situation exasperated the inadequacies and unpreparedness in the Nigerian educational space. It has led to increased illiteracy, shortage of manpower, low productivity, increased level poverty, inaccessibility of education among others. It is against this backdrop that this paper proposes the adoption of technoduction in enhancing

access to higher education in Nigeria and analyses the possible challenges that could hinder its full usability.

### **3. ACCESS TO HIGHER EDUCATION IN NIGERIA**

Access to higher education entails the unhindered right and opportunity to enroll, attend and complete postsecondary school education so as to obtain work-oriented knowledge, skills, and abilities needed for individual and societal development (Okeke, 2009; Aluede, Idogho, and Imonikhe, 2012). Thus, implying that at any stage an individual is unable to enroll in an educational institution, not being able to attend classes as expected, unable to complete the duration of study, unable to transit to the next educational level or lack the opportunity to attain his/her desired goals in education, then such a person can be said to lack access to education.

It is no doubting the fact that at the early stages of university development in Nigeria, there were adequate classrooms, offices, hostel accommodation, and large auditoriums for university wide activities. The campuses were student-friendly. In fact, the blue print for establishment of new universities indicated that the universities were planned to have large campuses, grandiose buildings and expensive municipal facilities. But with a radical increase in student enrolment that were not matched with corresponding facilities and funding, the existing facilities became overstretched and ill maintained. They can no longer support the programmes of the university. In spite of the growing enrolment of students, there is yet no strong political will to correspondingly increase the necessary facilities (FME, 2003; Ogbodo, 2011; Ebuara, Edet, & Okpa, 2020).

Annually, millions of Nigerian students apply for spaces in Nigerian universities. These spaces are overly limited. This corroborated Okojie cited in Ebuara et. al (2020) mentioned that over one million candidates scramble for just over 200,000 spaces available annually for admission into the universities. Further, the authors stated that the number of candidates who sat for the Unified Tertiary Matriculations Examination (UTME) into tertiary institutions for public and private universities in 2019 was about 1.99 million while the available spaces for admission were 750,000. Of this number about 1.240 million were denied admission, not on the basis of qualification but due to lack of space. They will be left with no other choice than repeat the recurring circle in the coming year. It was reported that a total of 1,017,977 candidates applied for admission in 2019/2020, but only 612,557 candidates were admitted, which represented an admission rate of 44. %, leaving 545,420 candidates unadmitted (Ebuara *et. al*, 2020). The trend has remained relatively the same in the country. This has continued to pose a huge problem in accessing higher education and the situation is likely to worsen in the post era of the pandemic.

### **4. PROBLEM OF ACCESS TO HIGHER EDUCATION IN NIGERIA**

Access to higher education in Nigeria has been faced with lots of challenges particularly in the Covid and post Covid 19 eras. These challenges include:

**4.1 Infrastructural decay:** Many buildings in the universities are poorly maintained. Laboratories, workshops, among others are either not functional or are left to wear out physically.



**Poor library facilities:** This is another challenge hindering access to higher education. Library facilities are essential aspects of learning. It is the reservoir of knowledge as well as intellectual depot of educational institution. Given its importance, when the library facilities are either inadequately provided or poorly maintained, it poses a great challenge to the availability and provision of learning resources to higher education.

**4.2 Unequal distribution of educational institutions:** Since provision of educational institutions are not evenly distributed, there may not be educational institutions in some rural areas and people residing in those areas may be hindered in accessing education. Often, available ones may be far or not within the reach of the locals. This situation may lead to deprivation of access to education among others.

**4.3 Policy on carrying capacity:** The policy on carrying capacity initiated by the National University Commission (NUC) has pegged the number of students that can be admitted by each university in Nigeria every year. Carrying capacity remains one of the major challenges to access to universities in Nigeria. The term carrying or absorption capacity refers to the maximum number of students that the institution can conveniently sustain for quality education based on human and material resources available. Carrying capacity is indicated by how well enrolment of the university matches available human and material resources (NUC, 2005; Akpotu & Akpochafo, 2009; Ebuara et. al, 2020). The carrying capacity means that students are admitted based on the facilities available. These facilities include adequate lecture rooms, well-stocked libraries, good staff/student ratio, accommodation, etc.

Carrying capacity of universities in Nigeria is not high enough and that is very disturbing. There are candidates who want university education but are denied access because of the low carrying capacity. Admission is not meant to go beyond the number of cubicles available – course by course. This has obviously reduced considerably in recent years the admission into Nigerian universities (Aluede, Idogho, and Imonikhe, 2012; Ebuara et al, 2020). In the face of inadequate and obsolete infrastructures and equipment, poor library facilities, inadequate academic staff in number and quality, low level of funding, unstable university calendar, particularly in unionized federal and state universities, most universities still go beyond the carrying capacity allotted to them (Ebuara et. al 2020) particularly between 2018-2020. However, emphasis is placed on access to higher education.

**Table 1: Number of Universities indicating Applicants and Carrying Capacity from 2010-2021.**

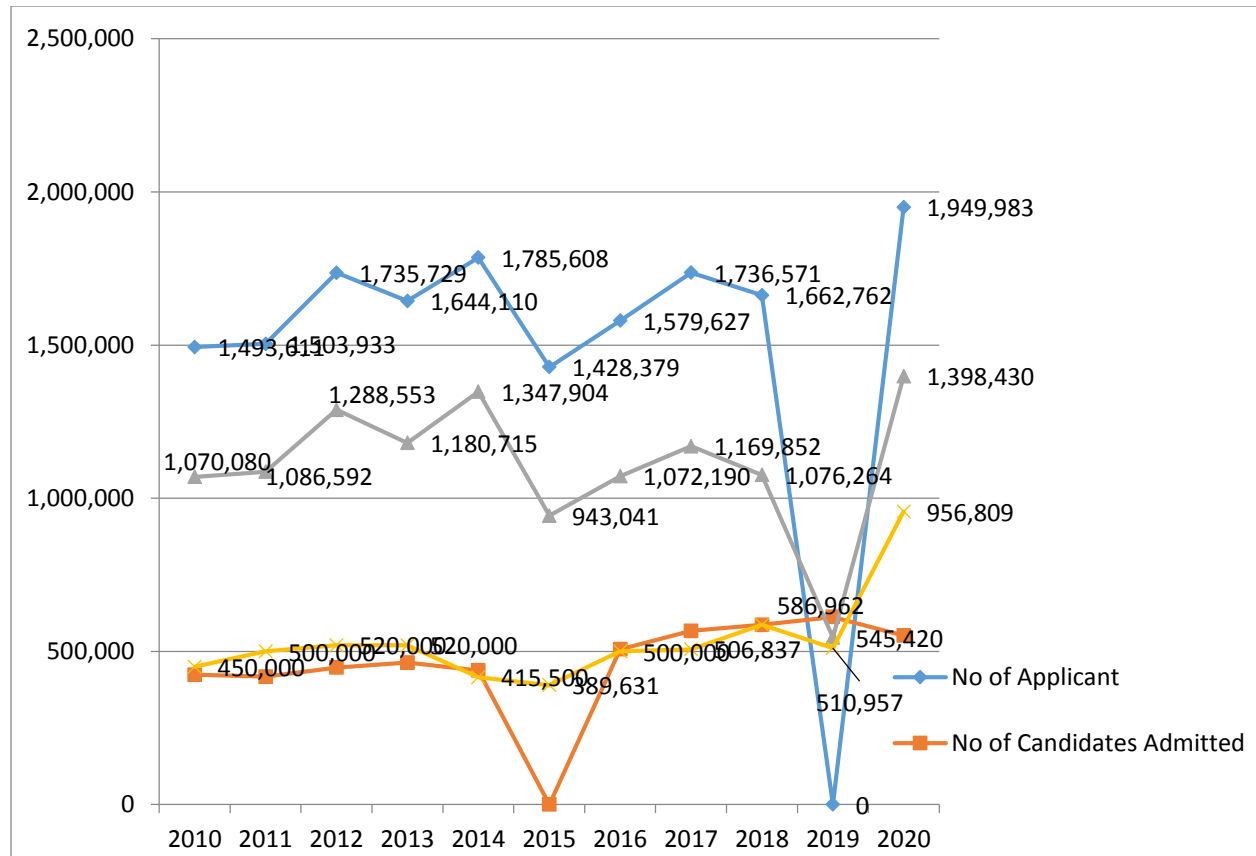
Year	No. of University (Cumulative)	No of Applicant	No of Candidates Admitted	No of Candidates not Admitted	Carrying Capacity	% of Capacity Applicant	% of Candidates Admitted
2010/11	112	1,493,611	423,531	1,070,080	450,000	30.13	28.4
2011/12	117	1,503,933	417,341	1,086,592	500,000	33.25	27.7
2012/13	128	1,735,729	447,176	1,288,553	520,000	29.96	25.8
2013/14	128	1,644,110	463,395	1,180,715	520,000	31.63	28.2
2014/15	139	1,785,608	437,704	1,347,904	415,500	23.27	24.5
2015/16	151	1,428,379	485,338	943,041	389,631	27.28	34.0
2016/17	152	1,579,627	506,837	1,072,190	500,000	31.6	32.1
2017/18	164	1,736,571	566,716	1,169,852	506,837	29.18	32.6
2018/19	169	1,662,762	586,498	1,076,264	586,962	35.30	35.3
2019/20	171	1,157,977	612,557	545,420	510,957	44.12	52.9
2020/21	171	1,949,983	551,553	1,398,430	956,809	49.07	28.3

**Source :** NUC, (2020), Ebuara et al, (2020), Ajikobi. (2017), Factsheet: Nigeria's Matriculation Results between 2010-2016.

Table 1 showed the number of applications for admission into Nigerian higher education from 2010/2011 to 2020/2021 academic year in the 171 private and public universities in Nigeria. The table revealed that most universities in Nigeria exceeded the allotted admission quota but the point of emphasis lies on the number of applications versus number of candidates admitted. It is very imperative to point out that within a period of 10 years, the percentage of candidates admitted in higher education in Nigeria was highest in 2019/2020 with 52.9%. It is even worrisome that the figure has dropped drastically in 2020/2021 academic year with 28.3% which is abysmal. This showed that number of students being denied access to higher education continues to increase. The reason for the drastic decrease in admission may not be unconnected with Covid 19 which crippled physical activities in Nigerian higher education system. This has showed that the Nigerian higher education system has consistently deprived a huge number of candidates from accessing higher

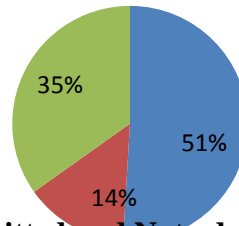
education over a decade. This trend poses a great danger for the future of Nigerian educational system as well as the economy if not tactfully checked.

**Table 2**



**Figure 1**

■ No of Applicant  
■ No of Candidates Admitted



**Percentage of Application, Admitted and Not admitted students in Nigerian tertiary education**

**4.4 Inadequate infrastructural facilities:** In Nigeria, many universities lack sufficient infrastructural facilities to cater for the needs of the students for teaching and learning process. Due to insufficient halls, there are persistent clashes in lecture schedules resulting in lecturers/students scrabbling for available spaces for lectures. In the assertion of Azubuike and Nwosu, (2017), lecture halls meant for 50 students are utilized by 150 students. These conditions cannot give good result for proper teaching/ learning. More so, students do not have easy access to internet to browse for research and the facilities needed for proper instruction are lacking. Often, teaching and learning are undertaken under unconducive spaces such as outdoor settings, under tree shades, and in small offices. For instance, in the table above, it was observed that universities in Nigeria admitted candidates more that stipulated in the admission quota. This explained why most of our universities are over-crowded and lack facilities for students to the extent that some students sit outside lecture halls and some on the windows in order to receive lectures (Ebuara, et al 2020).

It has become increasingly urgent to deal with the challenge of inaccessibility which has been worsened by the pandemic in education sector in Nigeria by switching from traditional mode of face-to-face learning to a more improved digital mode of learning by adopting innovative measures which will enable the educational institutions navigate through the post pandemic era and beyond. Instances abound on the where countries adopted innovative measures in term of crisis. For instance, University of Camerino adopted online learning when earthquake ripped off their infrastructure and made face-face interaction impossible. Also, university of Canterbury adopted it in 2011 when faced with earthquake ( Cojocariu, et all, 2014; Todorova & Bjorn-Andersen, 2011). Covid pandemic is a crisis that has unsettled the educational system, therefore requires innovative technological solution. This is buttressed by the assertion of Liquor and Winkler, (2020) that innovative solutions by institutions can only help deal with the pandemic and whatever that solution preferred, must incorporate internet-based products and tools as alternative for face-to-face classes (Basilaia et al, 2020). This implied that the technological transition or switchover seemed the only possible alternative to overcome and at the same enhance access to higher education particularly in Nigeria.



## 5. TECHNODUCATION AS A WAY OUT OF INACCESSIBILITY TO HIGHER EDUCATION IN NIGERIA

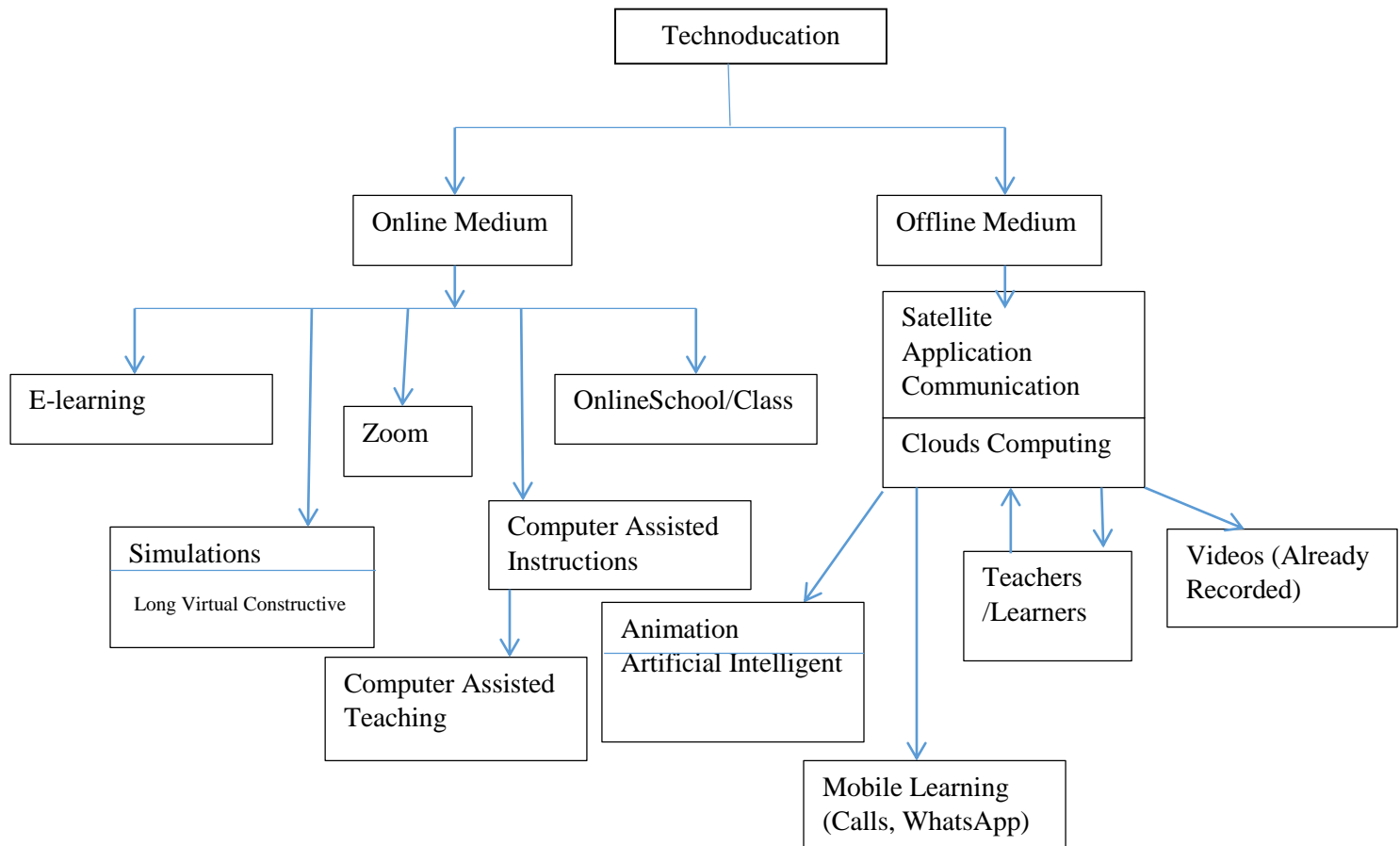
Technoducation is coined from technology and education. Technoducation refers to technological resources that are available and which can be deployed in field of education to improve learning and particularly increase and enhance access to learning resources and education in general.

Figure 2 shows the components of technoducation which can be seen as the technological and innovative tools that are capable of influencing educational outcome positively, enhancing access to educational resources and transforming education from traditional mode to digital mode. These technologies can be classified into two mediums: online and offline.

**Online medium:** these are mediums that involve interaction with one another or among people in real time situation. It requires connectivity to the internet while learning takes places. In other words, learning can take place when learners are connected to the learning environment through the internet. Examples include e-learning, zoom, computer assisted instruction, online school/classroom, simulation.

**Offline medium:** are those mediums that do not require the learner and teacher to be connected to the internet before teaching and learning can take place. In this case, the teaching has taken place. The learner is required to access the learning resources. The learning or studying is not supported by the internet in real time. Learning takes place after the instructional materials have been downloaded in the learner's preferred format. Examples include satellite application communication, cloud computing, animations/artificial intelligence, mobile learning, recorded videos (Amaonye, 2021).

**Figure 2**



**Technoduction Model (Amaonye, 2021).**

### 5.1 The Online Medium

The online medium is made up online/e-learning, zoom, computer assisted instruction, computer assisted teaching, and animation/artificial intelligence.

**5.1.1 Online/E-learning:** this is a veritable teaching and learning tool. It refers to instructional environments which is supported by the internet. It provides access to instructional materials, facilitates learning and interaction among teachers and learners within and beyond school. This is tantum with Mbahan and Rumun (2017) who posited that e-learning system provides opportunities for collaboration, co-creation, learning and interaction, thus contributing to improved teaching and learning. Others include calls/video, cloud computing, zoom, satellite application communication, and simulation/games. Njoku, Onyejiji and Njoku (2021), asserted that though various tertiary institutions have adopted online registration, use of e-libraries and extensive use of the internet by both students and lecturers in their academics, in payment of school fees among others, it could become an antidote in providing effective solutions to educational problems that would have been difficult, if not impossible to solve through human natural efforts. Like other e-platforms already in use for various purposes, institutions can create online

educational resource community where students visit and access learning resources deposited by their lecturers. The resource community will contain the modules, contents, questions and answer segment as well as feedback. The learning resources must be updated periodically and in line with courses as obtained in the institutions. This will not only increase access to learning but reduces physical contacts as there are new Covid 19 variant discoveries.

**5.1.2 Zoom:** this is simply a video conferencing that let people communication one on one. It is enabled by cloud. It has audio, video and collaboration as its features. It has communication tools that connect persons. In education system, zoom is already being used in conducting orientation, inaugural lectures, meetings and other functions, but zoom is yet to be deployed in teaching and learning process. It can be used to deliver lectures to the students as it has limitless number of participants. If the Nigerian education system acted shiftily during the pandemic, the academic activities would have progressed unhinged all things been equal. However, developed nations have leveraged in conducting live online classes, web-conferencing, webinars, video chats, and live meetings. As most of the schools, colleges, universities, companies are closed due to lockdowns/curfews and most of the people are working from home, this app has helped in keeping people connected via video conferencing. This application is trending on Google play store amidst the ongoing crisis. People are practicing social distancing so this application gave them a sigh of relief. Zoom also allows conducting business meetings (Dhawan, 2020). Zoom can be used in enhancing access to higher education as those who may be limited by distance and high transportation cost to and fro to the institutions of higher learning to attend classes, will conveniently attend and participate in classes in the comfort of their homes, work places and offices. Thus, eliminating incidence of absenteeism.

**5.1.3 Simulations/Games:** Simulations are representation of reality, an imitation of reality. It could take differing styles- either virtual or live. A simulator is a device that may use any combination of sound, sight, motion and smell to make you feel that you are experiencing an actual situation. Some video games are good examples of low-end simulators. Lectures can be prepared in sound, sight and motion and delivered to the students via various forms and platforms such as WhatsApp, Facebook, and other social media in classroom simulation. In other words, lectures can be simulated and delivered to the learners.

**5.1.4 The Computer Assisted Instruction (CAI)/Computer Based Teaching:** This involves the use of computer. Computer assisted instruction (CAI) is an innovative measure to the process of teaching learning. It refers to any instruction or materials presented using the computer. It can be used in distance learning and provides easy access to learning facilities to learners. CAI can be successfully incorporated into teaching and learning process to enhance accessibility of education. Institution of higher learning can set up computerized lecture halls with internet connectivity and facilities which will facilitate learning and make learning resources readily available for the learners in a conducive and comfortable learning environment.

**5.1.5 Computer Assisted Teaching.** This is the transferring of instructional content and activities to students via computers. Computers serve as tools and assist in completing teaching process. They support and complement the system of education. It must be stated that computer assisted teaching cannot entirely take the place of teachers, rather can be used by the teachers to improve learning. The learning resources stored in the computers can be readily accessible by the learners. While the learners access the resources, read and await further discussions and clarification with

the teacher. This can improve and enhance the learning processes tremendously. With availability of technoducation, there will be effective and efficient interface between the teachers and the learners.

### **5.2.1 Offline Medium**

The offline medium comprises satellite application (cloud computing), animation or Artificial Intelligence, mobile learnings (calls and WhatsApp), Teacher and Learner; and recorded video.

**5.2.2 Satellite Application Communication (SAC):** Satellite communication is the method of transporting information from one place to another using a communication satellite in orbit around the Earth. Watching the English Premier League every weekend with your friends would have been impossible without this. A communication satellite is an artificial satellite that transmits the signal via a transporter by creating a channel between the transmitter and the receiver located at different locations on the earth. Telephone, radio, television, internet, and military applications use satellite communications (byjus.com, 2021). Higher institutions of learning can develop SAC and students can watch/listen to the courses/ lectures delivered to them depending on the time allocation or schedules via television, radio or internet.

**5.2.3 Cloud computing:** this is one of the best technologies that provide information technology services and solve many problems (Zebari, and Yowakib, 2013). Like real clouds which are the collection of water molecules, the term cloud in cloud computing is the collection of networks (Herhalt, and Cochrane, 2012). It is a storage where information is stored like a natural cloud, and retrieved when needed. Cloud can be used in education to boast access to education. For instance, the institution can develop cloud where all courses/ instructional materials and all other useful learning resources are stored so that the students can access them for studying. The information stored in the cloud can be accessible to all students irrespective of location. Example E-Library, among others.

**5.2.4 Animation/Artificial Intelligence (AI):** This is an advanced technology. It involves the processing of knowledge through machine. Animation is a function and a product of artificial intelligence. In agreement, Chen, Che, and Lin, (2020), noted that the introduction, advancements, and proliferation of technology, more particularly, artificial intelligence, has made it easier for instructors to dispense their duties more effectively and efficiently. These technological innovations have also permeated other sectors of the academia, fostering effectiveness and efficiency. Supporting this, Klimova, and Bilyatdinova, (2018) observed that the use of artificial intelligence in education has had a major impact, including improved efficiency, global learning, customized/personalized learning, smarter content, and improved effectiveness and efficiency. This supposes that artificial intelligence can provide an effective medium of teaching since it incorporates both virtual and audio (audio-virtual) tools which facilitate assimilation and retention. Animation/artificial intelligence provides a virtual mechanism which an effective learning environment for both teachers and learners. It can be used as a teaching tool. The virtual effect of AI can improve attentiveness, retentiveness, and intellectual capacity of the learners, while offering teachers free time (Amaonye, 2021).

## **6. CHALLENGES OF TECHNODUCATION IN NIGERIA**

The internalization and applicability of technoducation has the capacity to tremendously enhance access to education at all levels particularly the higher education. Despite the relevance to higher education, it can be marred by challenges.

### **6.1 Inadequate funding:**

Internalizing and applying technoducation is capital intensive and may face financial problem in Nigeria. This is because budgets are constrained due to lack of political will and priority especially in investment in education. This buttress this, Olawunmi and Osakwe cited in Chiemeka-Unogu and Asawo (2021) stated that the primary challenge to emerging technology and innovation in education during covid-19 pandemic is finance. The authors added that these facilities are expensive and not affordable by many universities in Nigeria. To corroborate the above, Amaonye (2021) noted that it requires huge financial investment to obtain the devices and equipment, maintaining the equipment, training the human resources, and developing the online contents. The author stated further that inadequate funding could hinder the deployment of technoducation.

Corroborating the above, Lembani (2019) observed that due to a large proportion of economically disadvantaged people in Nigeria, the cost of a computer or laptop is still very high for an average worker. Only a small number of individuals have access to a personal computer. This situation will continue to undermine the effective use of technoducation, and its internalization in enhancing access to education.

### **6.2 Technical difficulties**

The application of technoducation may face the challenge of lack of technical expertise since require technical expertise both in development and its usage. Also, it requires constant maintenance and upgrade to ensure efficient delivery but when the human and materials components required for its use are not provided, it may result to difficulties. This is buttressed by Fayale et al, (2020) who noted that users could experience or face many technical difficulties that could hinder and slow-down the teaching–learning process, such as internet failure, poor reception of internet signal, unequipped technical personnel among others (Amaonye, 2021).

### **6.3 Fragility of time and location:**

This involves getting all the learners on line at the same time may be impossible coupled with difference in capabilities and confidence levels of learners which may cause some students feel uncomfortable learning online. This may lead to increased frustration and confusion. In addition, Oguoma (2021), observed that private/public school dichotomy, accessibility, internet connectivity, infrastructural decay, unpreparedness, limited expertise and high cost of software could affect e-learning in higher institution and consequently the application of technoducation.

Other constraints include unequal distribution of ICT Infrastructure, digital illiteracy, differences in the accessibility of digital tools, technology cost and obsolescence.



## Conclusion

- In our opinion, technoduction can enhance teaching and learning and enhance access to education generally if incorporated into education system. This is because technoduction will provides access to higher education to everyone including persons with physical disabilities or those who could be affected due to the remoteness of localities especially in the era of pandemic.
- The stakeholders in education, private and non-governmental organization and the government can partner with institutions of learning in providing these technoduction facilities in order to enhance access to higher education in Nigeria. Again, technoduction should be institutionalized in higher education system through policy review of higher education, thereby switching from traditional to digital transformation in learning.
- In addition, if adequate provision of ICT infrastructure and digital tools are provided in the institutions of higher learning it will aid easy adaptability and usability of technoduction in higher education system. However, adequate online proficiency training must be given the students and teachers in the higher institutions of learning.
- Technoduction will considerably reduce the inadequacy of physical facilities such as building. Therefore, private individuals, organization etc., can partner with institutions of higher learning in providing technoduction since it is capital intensive.

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