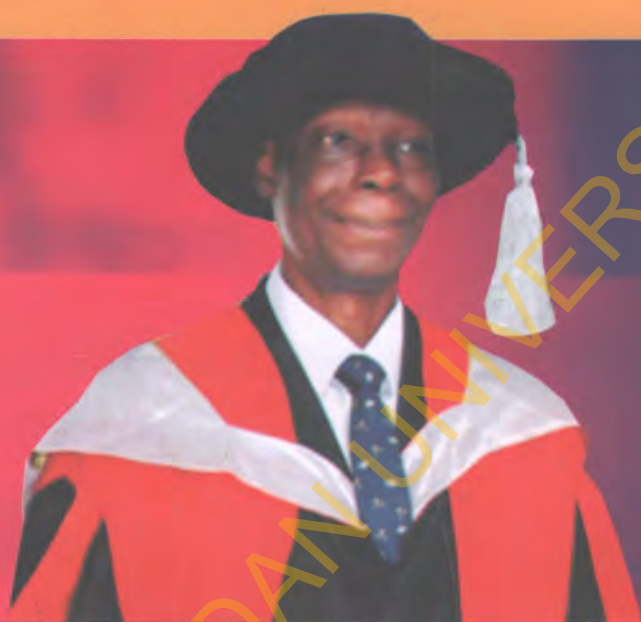


# RESTRUCTURING HIGHER EDUCATION TO MEET GLOBAL CHALLENGES IN THE NEW NORMAL

**A BOOK OF READINGS**



In honour of:

**Professor Adams Otuoze Umoru Onuka**

*Edited by:*

**Benedict Emunemu  
Adesoji Oni**

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## **Chapter 23**

### **Artificial Intelligence, Robotics and Cybernetics in the Emerging Pedagogical Dynamics for Transformational Change in Nigeria Universities**

**Isah, Emmanuel Aileonokhuoya**

#### **Introduction**

There are national dynamics in every country in which case, Nigeria is not left out being a country with a population of nearly two hundred (200) million persons and with educational institutions that span all levels. The education sector involves service delivery to all its recipients. In recent times, recipients of education both in Nigeria and elsewhere have been compelled to adopt new pedagogical principles in the mode of educational services delivery. Pedagogy described simply involves methods of disseminating and inculcating knowledge. The large number of people involved in receiving education makes its dissemination significantly imperative. At the same time, the role of education in nation building makes it impossible for nations to ignore investing in it or to proactively envision its future. Economists of education refer to the foregoing as the demand and supply of education (Babalola, 2003). Heretofore, education in colonial times in Nigeria used to be under the exclusive legislative list of the Federal Government of Nigeria (FGN) but over time, education is now in the concurrent legislative list of the FGN (Federal Republic of Nigeria, 1999). Education is now supplied by the Federal Government of Nigeria, states, Local Government Areas (LGA) Councils and the private sector (FRN, 2013). From the foregoing, it is clear that the number of persons who receive education in Nigeria is large with most of them being in the youthful age bracket.

It can be said without equivocation that the future of Nigeria lies in the hands of the education sector. This paper would not have been necessary if society always remain the way it has been with no changes. With the dynamism in society and recent introductions into society, it is imperative that the owners of education look far into the future so as not to grind education and in essence the nation to a halt due to some inaction today with future consequences. Some of the challenges necessitating this paper include the fact that for many years, insecurity was not part of Nigeria. Insecurity was not much considered in locating or citing schools. Schools were located in isolated areas considered conducive for studies. Since the turn of the century, insecurity has become a major issue to contend with. Isah and Babyemi (2009), Isah and Ishola (2014) identified the Niger Delta Militants, Boko Haram insurgents, herdsman and in recent times, armed Bandits as security challenges to education in Nigeria. In the same studies, attacks on schools, abduction of students and payment of ransom for releases were well discussed. In the area of security challenges, there are occasional attacks on education and education allied institutions through the ISWAP – Islamic States of West Africa Province group, Al-Qaeda, Al-Shabab and their allies that operate within West Africa. There are other challenges as the creation of Internally Displaced Persons Camps (IDP)s with attendant challenges all over the place with few provisions made for the education of youth in these places. The United Nations Children Education Fund (UNICEF, 2018) in its website decried the level of out of school children in Nigeria. The document explained that 20% of the global out of school children reside in



Nigeria thereby show casing the gravity of the educational future for Nigeria if action is not taken to ameliorate the consequences of the current global educational change.

In recent years, in the Southwestern part of Nigeria, school boys and girls were abducted from several schools in Lagos and large sums of money paid as ransom for their release. Other events have taken place in other places different from the celebrated Chibok school girls abduction of 2014 which has not settled till date as well over 100 out of the over 300 girls abducted then that have not been found. The case of a female secondary school student abducted in 2017 is still in the burner by name Leah sharibu who has not been seen till today. Recent events on insecurity in Nigeria include the Kankara (Katstina) state abductions of a large number of school boys by armed bandits, the Niger state school girls' abductions of 2021 as well as the Kaduna School of Forestry students' abductions of 2021 which are yet to abate. There are further incidences of abductions in private higher institutions in Kaduna state till the time of this report being discussed in the national education circles in 2021. There are several others indicating that the incidences are not just declining but rather increasing. Emerging incidences recently in 2021 include the abduction of higher school students in Abia state. The incidences point to the fact that there is need for a proactive approach to solving the problem of educational services delivery. The fore mentioned happenings underscore the significance of this study. The study will be quite useful to stakeholders in the education enterprise that include international organizations, government, students, parents and teachers in the sense that the government will be envisioned through its policy makers to proactively prepare for the future while securing the present. International agencies such as the Red Cross, UNICEF among others will be spared the upsurge in humanitarian assistance arising from these national calamities in Nigeria. Parents' fears on their children and wards will be assuaged due to the uncertainty surrounding security in schools these days that the paper might proffer solution to. Again, the study will be of benefit to students who read under the threat of these fore mentioned activities. The foregoing also applies to teachers.

In recent times, other challenges had reared up in the process of discharging educational services delivery both in Nigeria and globally. While advanced nations overcame their challenge with technology, Nigeria is suffering from the adverse effect that was placed on the educational sector through the outbreak of COVID-19. The Nigerian school system lost a whole session of academic output. Several Federal Government of Nigeria (FGN) owned universities lost the 2019/2020 school session as students were required to stay at home and away from their studies. Also, the FGN schools under context lost time in terms of efficiency and further lost funds in the form of school fees and grants. It is pertinent to note that in the same country, some private universities continued with their teaching, learning and research activities using information and communication technology (ICT). Though this happened in Nigeria, several developed countries who locked down their institutions due to COVID-19 continued in their educational services delivery. The arrival of ICT to the scene is gradually changing the dynamics associated with educational services delivery. Educational services delivery can be described as ways and methods in which educational services are disseminated for example, face to face teaching, visiting of physical libraries, hospitals among other services in the school system.

Previous methods of services delivery especially teaching and learning is the traditional face to face teaching-learning situation. Some researchers in the past had advocated for changes in mode of lesson delivery that includes Ajadi (2012). Ajadi (2012), advocated computer assisted teaching and the use of ICT assisted learning to distant learners. Other researchers advocated computer assisted learning (CAL) as well as blended learning modes. Other researchers had seen the challenges associated with such methods



of teaching-learning particularly in this part of the world. It is worthy to note that Babalola (2010), explained that the factors inhibiting the adoption of ICT induced education in Nigeria were many. The study identified the problem of absence of critical infrastructure especially electricity. It went further to decry the high cost of hardware, absence of software and identified specifically the challenge of low bandwidth. The study opined that adoption of that method of lecture delivery will solve a lot of problems that included, expansion of access to education. However, between 2010 and 2019 when COVID-19 struck, it appears that no concrete effort had been taken by the FGN to ameliorate the hindrances identified. In another study, Emunemu, Isuku and Isah (2014) found that students' who were distant learners had preferences for digital appliances and accessories to get their lectures. When in March 2020, the FGN closed down universities in Nigeria due to the issue of COVID-19, the universities could not manufacture these equipments and could not continue immediately with capacity building on utilization of such equipments. Every attempt to keep the public school system running in Nigeria failed. However, this study is seeking ways through which the Nigerian higher schools system can key into emerging global changes in education especially pedagogical changes and the 21<sup>st</sup> century mode of teaching - ICT.

### **Conceptual Clarifications**

For the purpose of this study, some concepts shall be clarified:

### **Pedagogical Dynamics**

There are so many views, conceptions, perceptions and perspectives to the term pedagogy. A look at the literature reveals the following. Pedagogy is the study of teaching methods, including the aims of education and the ways in which such goals may be achieved. It relies heavily on scientific methods and claims (Peel, 2020). According to Doucet, Netolicky, Timmers, and Tuscano (2020), Pedagogy is viewed from so many ramifications ranging from teacher, learner, methodology, type of school, teacher preparation among others. In the study of Doucet et al (2020), in a paper whose aim is to present the views and missions of pedagogy in the unfolding years after COVID-19 deduced that the vision and mission of an educational type, its goals as well as objectives were key factors in determining teaching contents and style (pedagogy). The work of Doucet et al (2020) pointed to the fact that teaching pedagogy is changing. In the study, the paper concentrated on the distant learner. However, this paper looks at the situation of school learners in Nigeria specifically arising from the current pandemic of COVID-19. It cannot therefore be argued that teaching which includes the teacher, learner and syllabus, culture, politics and economy are fast changing in the global educational terrain. A core question then can be, do these changes affect higher education institutions in Nigeria? According to TES Editorial (2018), pedagogy involves all aspects of teaching – learning inclusive of curriculum, methodology and other aspects involved in facilitating knowledge transfer. The papers went further to include learners, teachers, subject to be method and the social environment in which such pedagogy will or is being implemented. Therefore, pedagogy is broad and in this current dispensation, it is highly necessary that it is defined and understood.

### **Transformational Change**

Change in itself simply means an alteration in an objects present constitution either for the better or otherwise. In the context of this study, change implies altering the patterns in which educational services used to be known due to the existence of yet to be ascertained solutions to current challenges. The challenges in question are health inclined indicating that there is need for a transformation of the current pedagogy in use. The current educational



practices require transformational changes. What is transformational change? According to TES Editorial (2018), transformational change involves the alteration, modification of methods by organizations. In another paper Sugarman (1991) described transformational change as arising from organizational changes which some other authors contextualized as arising from organizational challenges. In an e-book (2021) on meeting the challenges of transformational change, the authors explained that transformational change can be section into four namely; transition, transformational, incremental and transitional. In transition, it involves change impacting on existing ways of doing things which in the theory of management can simply be found in the principle of change. There is the need for flexibility, adaptation and learning under a guided time frame. In the context of transformational, it explains that the change is radical even when the destination is not clear. Under incremental, it explains that the focus must be very clear while transitional will involve replacing the old ways of doing things.

### Artificial Intelligence

According to West (2018), Artificial Intelligence (AI) is generally described as thinking machines since there is not acceptable uniform way of defining it. Sodeke (2020), corroborates the assertion of West (2018) that scientists have found it very difficult defining AI or clarifying it, but agrees that it relates with other aspects of science and technology especially robotics. In the description of Sodeke (2020), AI is a wide ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence... according to West (2018), .. today, AI generally is thought to refer to "machines that respond to stimulation consistent with traditional responses from humans, given the human capacity for contemplation, judgment, and intention. AI features has the potential to move civilization forward in progressive ways. But without adequate safeguards or the incorporation of ethical considerations, the AI utopia can quickly turn into dystopia.

From the foregoing, it is clear that AI has several features, among the features of AI are the following; Intention, Intelligence, Adaptability and Technology. According to the definition attempted by Burns, Laskowski and Tucci (2020), Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision. In essence, AI is good for jobs that require repetitive tasks which could be found very useful in the field of management especially in routine repetitive tasks in educational administration, planning, supervision and teaching.

### Cybernetics

According to the Encyclopedia Britannica (2021), the term *cybernetics* comes from the ancient Greek word *kybernetikos* (good at steering). Again, an American mathematician Norbert Wiener in a book *Cybernetics* published in 1948 explained that the term is derived, via Latin, from the same Greek word that gives rise to *cybernetics*. The date of Wiener's publication is generally accepted as marking the birth of cybernetics as an independent science. Wiener therefore defined cybernetics as "the science of control and communications in the animal and machine." This definition relates cybernetics closely with the theory of automatic control and also with physiology, particularly the physiology of the nervous system. The foregoing has been corroborated by Pangaro (2013). Cybernetics is coined from the term cyberspace that consist of a lot of things. As a field of discipline, scientists seem to agree that it has to do with the possibilities of developing human reasoning in machines. Cybernetics has its specific areas especially history, growth,



prospects and challenges. These are not the focus of this study. The focus is to ensure that beginners and educators get a concise understanding of its concept and why its development should take a central place in the education industry of posterity forever.

## **Robotics**

A great question at this time is what do robotics mean? Sodeke (2020:15) describes Robotics as ... *a reprogrammable, multifunctional manipulator designed to move materials, parts, tools or specialized devices through various programmed motions for the performance of a variety of tasks...* according to the study, one of the earliest purposes of designing robots was to use them for dangerous jobs which could be injurious to humans. In another part of the study, Sodeke (2020:16) further described a robot as ... forced labor... robots are designed to work in any place but they differ from most other machines because of the intelligence aspect programmed into them. The physical design of a robot is that it has the appearance of humans, with motors and sensors all over its body. These motors and sensors in most cases acts as its brain and supply of power thus replicating human and animal behavior.

The description of both the robot, artificial intelligence and cybernetics are very instructive to the desired transformational changes which education currently requires especially in Nigeria. In most other countries of the world especially the advanced world, transformational changes have already commenced and have gone far for example, in the last COVID induced lock down, those nations continued with their school system but here in Africa, educational activities are yet to completely stabilize.

## **Integrating Artificial Intelligence, Robotics and Cybernetics into Educational Services Delivery – Challenges and Issues**

In this section, this paper will be considering arguments for and against the introduction of the concepts mentioned earlier into educational services delivery. Before this time, scholars have been much concerned about integrating other aspects of Information Communication Technology (ICT) into the education enterprise. Babalola (2010) was in favour of that. Also, Isah (2014) and Isah and Ishola (2014) examined reasons and ways of integrating Management Information Systems (MIS) into education especially secondary schools. The trio of Artificial Intelligence (AI), Robotics and Cybernetics are also components of ICT. It is clear from their concepts that apart from their construction and programming, they are very useful and good for programmed repetitive activities. Again, they have elements of human and animal intelligence and have been conceived for jobs considered dangerous for humans. In the light of these, where do these three come into education?

## **Insecurity in the Nation**

The rising wave of insecurity in schools and out of schools as described in Isah and Ishola (2014), corroborated by Dairo (2021), explains the rise in the number of internally displaced persons (IDP)s and their camps scattered all over the nation. In these IDP camps, educational provision especially services delivery is not only considered risky but highly ineffective as there is the fear of attacks and counter attacks. The presence of armed security operatives does not deter attacks by insurgents, terrorists and kidnappers. Since education must be provided, it is advised that the option of information and communication technology (ICT), cybernetics and robotics be explored to avoid having to close down schools indefinitely.



### **Cost**

It is well known that it is the initial cost of the electronic gadgets to integrate electronic teaching and learning that could be costly. Again, cost might be incurred in the preparation of teachers/teaching personnel to adopt electronic or online teaching and learning. Such costs cannot be compared to the cost of purchasing capital equipment especially construction of buildings, furniture among others. Despite the cost associated with these purchases and investments, access to schools is still low (Isah and Oshogwe, 2019; Babalola, 2010). It is envisaged that if online or electronic teaching and learning is adopted, more access to educational facilities and education will be attained. It will also increase Nigeria's literacy level. Again, in recent years, some state governments in southwestern Nigeria, Osun state in particular bought digital electronic tablets for all its secondary school teachers and students but the programme was not sustained probably due to a change in the political administration of the state. This paper opines that increased funding and allocation of funds to education could assist both federal and state schools to adopt electronic teaching.

### **Attitudes**

It is mostly argued from academic circles that in the introduction or movement from introduction to acceptance of technology, the attitudes of different stakeholders is important. With the various challenges facing Nigeria's education, several stakeholders could serve as barriers against the introduction of these technology. In the first instance, some fear loss of jobs if they are unable to cope with the new changes. On the part of government, it will fear cost. In a paper by Ehlersa and Kerschner (2013) that studied the sustainability of attitudes to the teaching of economics using technology, 4 types of attitudes were identified namely, technological optimism, determinism, romanticism and skepticism. The optimist believes that it will eventually come to pass. The determinist is of the opinion that whatever the barriers, more trials will make it attainable. The romanticist is of the opinion that we romance with the situation until we get it through. However the skeptic sees the whole essence as a waste of time and resources. The paper wishes to explain that in the light of the myriads of challenges facing Nigeria today, there is urgent need to introduce artificial intelligence both in the administration of education especially on repetitive tasks and in the area of teaching. It is tasking and challenging but attainable. Recall also that the technology acceptance model also explains the role of attitudes of stakeholders. Such attitudes must not deter our resolve.

### **Arresting Infrastructural Deficit**

The dearth of infrastructure in Nigerian schools is not new. Infrastructure in this context can be divided into two. There are critical national infrastructure as described in Babalola (2010), that includes epileptic supply of electricity that has affected research at all levels of our education bitterly. Till date since 2010 when the issue was raised though it existed before then, much has not changed. In the same paper, it was mentioned that the problem of bandwidth commonly referred to by locals as 'network' has not changed while the issue of cost continues to rise above the level of the common man. Subair and Ashiru (2007), explained that technological education will not be attainable without infrastructure especially vocational education. It is important to Note that Artificial intelligence falls into technology education. The same applies to robotics and cybernetics. It is time that the equipment at these stages begins to form in our schools. In another context, infrastructure can be seen from other angles. There is knowledge infrastructure as described by Argungu-Olende retrieved from [www.oecd.org/sti/inno/35764338.pdf](http://www.oecd.org/sti/inno/35764338.pdf) argues that infrastructure has not got to do with physical buildings and equipment alone. The paper contends that infrastructure has to do with capacity, personnel and other issues in the educational system as provision of equipment in the form of information and communication technology equipment. These are issues which have been well neglected in Nigerian public schools today at any level. The



paper decried the absence of the development of knowledge networks to solve the problems of Africans from the schools. Finally, the paper decried that lack of commitment by African governments to the challenge discussed herein bringing us to the crucial issue which is the funding of education.

### **Funding of Education**

To drive home the problem associated with the funding of education, several researchers have hammered on that at various points in time. This paper will also hammer on it because the situation has not changed and in some cases, it gets worse in Nigeria. The responsibility of financing education lies in the hands of both the Federal Government and the State governments. Federal government allocates financial resources to Federal Government of Nigeria (FGN) schools at all levels while the same applies to the states. In Nigeria, education is on the concurrent legislative list (Federal Republic of Nigeria, 1999; NPE, 2013). The simple meaning is that all tiers of government including the private sector can provide or in essence supply education. However over the years, economist of education in Nigeria have decried the dwindling or epileptic funding especially allocation of funds and resources to Federal Government of Nigeria (FGN) owned institutions at all levels (Adekola, 2019; Abiodun-Oyebanji, 2017; Babalola, 2003) inclusive of so many other. The argument for and against adequate funding has been a brick bat between researchers and the government. On the one hand, government maintains that it is giving adequate funding for the supply of education while economists of education disagree. Babalola (2003) decried the poor state of schools when he argued that most times, what school administrators and planners propose in their budgets is not what is approved for them by supervisory government ministries, Again what is approved is not what is released. Under such, administrators and planners are thrown into uncertainty in planning. The study required that government step up the provision of funding to educational institutions which will help in ameliorating the provision of necessary school infrastructure.

### **Pathway to Introducing Artificial Intelligence, Robotics and Cybernetics to Nigerian Schools**

Transformational change is what Nigerian education needs at a time like this. What type of transformational changes? TES Editorial (2018), Sugarman (1991) and e-books (2021) all agree that transformational change normally occurs in phases. It is established that the first phase which is transitional is already ongoing. The transition phase involves finding solutions to the myriads of problems bedeviling all sectors but in this context education. We are under bound to provide education in very extremely difficult circumstances (peculiar) environments. To address this challenge, previous administrations have gone the whole extent of providing 'almajiri' schools for some children, fishermen children's schools, nomadic schools for nomads who do not have permanent residence. Another challenge is emerging insecurity that has created Ind Persons Camp (IDP). Providing education in these places is not only peculiar but not popular. A core element that could help out of these is the adoption of the Information and Communication Technology platforms (ICT).

It needs to be understood that if the ICTs are adopted, humans will still be responsible for operating the ICTs making such teachers vulnerable to whatever happens to the students. A major way out is to employ the use of Artificial Intelligence equipments especially the deployment of robotics. The use of robotics is not only for the industries. Robotics are good for any job humans can do. As Shodeke (2020) puts it, robotics are good for repetitive tasks hence deploying them to these environments has a lot of advantages. There is cost advantage how? The initial cost of a robotic has to do with its production. Once produced, robots can be programmed to any task that it is commanded to do. It has the



capacity to pass through water and fire without a single hurt. It can be programmed. These same qualities are not in human. Human's will be paid salaries and extreme hazard allowances for working in such dangerous places. This is not the case with robotics. In the light of the foregoing, what should be the action for both policy makers and educational planners at a time like this?

### **Policy Review**

There is a need at this time for a major policy reform. The policy should incorporate into the school system the introduction of robotics. It cannot be argued that the ICT came into the current education system through a policy. The present pedagogical changes have brought transformations into our school system hence robots, cybernetics cannot be over looked. Such a policy will not only create an awareness, it will pave way for implementation.

### **Creation of Clubs in schools for Cyber teaching and Artificial Intelligence**

It will be quite advantageous if the policy could also create the need for cyber clubs in primary and secondary schools. Such clubs will motivate the younger ones into the development of robots and cybers in the future. Though the Robots and Cybers could be manufactured for future use, the initial use of the robots could be great after all. According to Sodeke (2020), the components and the cost of a robotic course are quite enormous. Starting with a club, society or something else could be quite useful. To design a robots takes time both in theory and practice. A situation where we find ourselves in Nigeria and in education today, Robots developed over time can be deployed to fight insurgents as robots don't die. Again, the early development of robots keeps the intelligence and understanding of our youth today active in that direction until we get to perfection.

Another issue is that of the cybers. All over as we well known, cybers are used for the control of animals and humans. Developing these takes time while their deployment varies from one situation to another. With the situations (threats) being faced by teachers in both the advanced and the developing world today, an early take off of these concepts in the form that could enable their production over time should not only be encouraged but well developed.

### **Policy Implications**

After a major overview of the concepts of Artificial intelligence, Robotics and Cybernetics, this paper is drawing the attention of educational policy makers and government functionaries to the fact that with the rapid transformation in the world today, we could start from a little we know, have and can obtain to the big we are yet to see. This could be achieved through policy review today, increased funding and actual beginning of these activities in little ways through sought out personnel in our schools.

### **Conclusion**

This paper overviewed the concepts of artificial intelligence, robotics and cybernetics in theory and related them to the current situation in Nigeria especially the insecurity in schools. The dangers teachers, students and communities are exposed to due to the criminalities of militants, kidnappers etc. Again, the rise in the number of Internally Displaced Person's camp (IDP)s makes it imperative that new methods of providing education specially in peculiar environments be explored. The paper examined some of the challenges this could cause and initiated a pathway to commence the activities of developing these



important scientific long lasting advantageous initiatives both in our schools and communities.

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