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**Ekpa Emmanuel Adujo**  
 Faculty of Science, Biology  
 Unit, Airforce Institute of  
 Technology Kaduna, Nigeria

**Shehu Amina Bature**  
 Faculty of Science, Biology  
 Unit, Airforce Institute of  
 Technology Kaduna, Nigeria

**Oni Elizabeth Kemi**  
 Faculty of Science, Biology  
 Unit, Airforce Institute of  
 Technology Kaduna, Nigeria

**Oluwatosin Comfort  
 Oluwatoyin**  
 Faculty of Science, Biology  
 Unit, Airforce Institute of  
 Technology Kaduna, Nigeria

**Nwakacha Valentine  
 Ikechukwu**  
 Department of Computing and  
 Mathematical Sciences,  
 Greenfield University Kaduna,  
 Nigeria

**Ihesiaba Chinedum Daniel**  
 Department of Computing and  
 Mathematical Sciences,  
 Greenfield University Kaduna,  
 Nigeria

**Corresponding Author:**  
**Ekpa Emmanuel Adujo**  
 Faculty of Science, Biology  
 Unit, Airforce Institute of  
 Technology Kaduna, Nigeria

## Science and technology education: Catalyst for Nigeria's development

**Ekpa Emmanuel Adujo, Shehu Amina Bature, Oni Elizabeth Kemi, Oluwatosin Comfort Oluwatoyin, Nwakacha Valentine Ikechukwu and Ihesiaba Chinedum Daniel**

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### Abstract

A catalyst from biochemical and general scientific perspective refers to anything that accelerate or facilitate the accomplishment of a given process. It is imperative to state that science and technology education is actually a catalyst in the transformation of any nation. In fact, economic indices of development of countries are hinged on the level of their scientific and technological advancement. Democratic developments are not exceptions within this context also. Looking at Nigeria's situation, we could say that our democratic evolution has undergone different metamorphosis over the past two decades. This paper therefore is an attempt to juxtapose the understanding of some vocabulary from pure science background of the authors to explain the democratic journey as a nation so far. The paper will examine the role played by science and technology literacy particularly information and communication technology on the overall transformation of our democratic experience since the beginning of the fourth republic. Furthermore, the paper will briefly examine change the nation has passed through with a view to understanding the impact of communication and information technology as one of the scientific catalyst of our democratic development. The place of social media in youth sensitization and participation, introduction of innovations like card readers in the recent elections, involvement of different election monitoring mechanisms will be discussed too. In conclusion, the paper will make an appraisal of the gains recorded and areas needing improvement.

**Keywords:** Catalyst, democracy, science and technology, education

### Introduction

Nigeria's quest for sovereignty and nationhood has continuously progressed from independence up to this present day. Democracy as an adopted system of governance in Nigeria has had its plethora of challenges. However the last two decades or precisely the birth of the fourth republic has seen a tremendous growth and stability of our political system. Thanks to the impact of science and technology education and literacy level of the populace over these years. It's pertinent before we continue to briefly define some terms in the paper to properly grasp the subject matter. Science according to the concise oxford dictionary is 'the pursuit of systematic and ordered knowledge'. The science teachers association of Nigeria (STAN) in 1988 viewed science as part of human culture and social activity in which we seek to discover and understand the natural world not as we would prefer to imagine it but as it is. Another writer, Adamu (2000) captures it this way, Science refers to some form of organised knowledge on which we can ascribe a set of prescribed esoteric procedure for unravelling its nature. There are still many definitions but for the sake of time and space this paper will not state everything here. Technology like science also has varied and many meanings.

This write up will however use the one given by Buseri (2003). He said technology is the general application of scientific knowledge and processes. In fact he viewed it from three perspectives: as an artefact or article e.g computers, laser beam, abacus etc. As a progress in terms of skills required for solving problems, and as a multidisciplinary approach in design and implementation of systems. Science and technology education can then be looked at as a human activity related to acquisition of systematic knowledge in dealing with social, economic and political challenges.

Education is simply the acquisition of knowledge as such science and technology education could be described as the process of imbibing and inculcating an organised systematic knowledge and its application in different areas of human endeavour (authors definition). The essence of scientific and technological education means different things to different people. While it may be creativity, reliability and objectivity to some, others may take it as revolutionary and revolutionary. Education is a basic social human need and national development might be almost inconceivable without it. Therefore, science and technology education can be said to be a catalyst in achieving socio-economic and political aspiration of any nation.

### **Science and Technology Education: origin and trends**

Efemeni (2002) says the trends in science and education in the last thirty years have revolved around pupil's involvement than just mere set of instructions. Prior to the curriculum reforms in the United States for example, emphasis on science education was on the acquisition of factual knowledge especially in the early part of this century. However in the years following, committees like chemical education material study (CHEM study), committee and others were all constituted at different times to appraise their science and technology curriculum needs. The main goal of these projects was to afford pupils and students the chance to see how a scientist does his work and the products of such ventures following standard scientific methods. Historical records shows that social relevance of science in gaining recognition dates back to the 17<sup>th</sup> century when science and technology made its first significant contributions to navigation, agriculture, industry, and warfare (Butts, 1973). Science and technology education has continued to assist society re-invent and reorganize values, modifies cultures, and progressively makes society better. While science does not directly impose values, it creates conditions which demands for re-interpreting and re-evaluating them.

### **Science and Technology Education as a catalyst**

As stated at the beginning of this paper, science and technology education delivered through an enhanced curriculum is capable of catalysing Nigeria's growth and development in so many ways. In fact, the philosophy of science teaching was to prepare the young ones for useful living and to provide solid foundation for those intending to proceed for post-secondary school education (Mezieobi, 2012). Mention must be made here that the new science curriculum which has been in place in the last ten years is in tandem with current national policy on education. Programmes like the National science quiz competition of the science teachers association of Nigeria has helped in the creation of awareness and promotion of scientific values in the society.

Most subjects offered under the new policy on science and technology education have been structured towards inculcating appropriate skills and competencies so that individuals can contribute to societal growth and development. Learners of various technical crafts become functional members of the society by becoming employers of labour thus reducing the rate of unemployment. All these contribute to the socio economic status of the population and overall national economic growth. Democratic system thrives well on people's participation and cooperation.

Science and technology plays a significant role here. The use of various media like electronic, print and social to reach the electorates has stirred interest especially among the youths to become sensitive about their leaders and leadership. When we fast forward our democratic evolution to the last twenty years, we would see major improvements in the political process of the country. As this paper examines the impact science and technology education has made on our democratic development in subsequent segments, it is imperative to state here that our economic cum industrial stride cannot be complete without making reference to the contributions of this subject matter.

### **Information and Communication Technology as a catalyst in Nigeria's democratic growth**

Science and Technology plays major role in the development of any nation. Our world is characterized by huge investments in research and development towards the advancement of science and technology because of the need to advance and explore new frontiers, possibilities and opportunities. Technological systems and processes are becoming increasingly common and seamlessly embedded in our daily lives to make things easy and fast. Many nations are advancing in the development of technological tools for business, health, communication, entertainment and research among others which is helping to create new jobs, increase their productivity and their national GDP. Technological knowledge is quickly becoming an asset which holds great value in today's economic market because of the significance it holds in the economic growth of a nation through product design, development and use. As such there is need to continuously invest in the acquisition of knowledge in science and technology to foster sustainable economic growth.

The practice of democracy by any nation is key to its enhancement as people are able to live and express themselves freely without being harassed. In Nigeria in particular, democracy since its inception in 1999 has helped immensely to create a new atmosphere where its citizens are largely able to express themselves and be heard on matters which border around their interests (Human Rights Watch, 2019; Wilson and Umar, 2019) <sup>[13, 25]</sup>. It is reasonable to suggest that Nigeria has upward moving democratic system and significant strides have been made which present hope for Nigerians that there are good things to come in the future. Even so, the evolution in the democratic process gives rise to new opportunities which can be explored to add value to the system and provide the satisfaction which many seemingly crave for. In many spheres, for example, electioneering, politicking, public administration and so on, it is reasonable to suggest that whilst there is still some way to go in order to reach the desired milestones, much has been achieved. However, the solutions with links to science and technology if properly implemented can yield quick positive outcomes.

Democratic societies are known to be formed through the process of election (Ayeni and Esan, 2018) <sup>[3]</sup>. Nigeria has been a democratic nation since 1999 following the handover of power from the military to civilian authorities. Since then, election into political offices has been the avenue for putting people in power. The election process has been conducted manually nationwide and the voters' registers, ballot papers and more recently, the Permanent Voters Card (PVC) which works with an electronic card reader have

been the items required to vote as stipulated by the Independent National Electoral Commission (INEC) (INEC, 2019) [14]. The election process is designed such that the voters turn up to their polling units and cast their votes by thumb printing on a ballot paper against the political party of their choice. This is done after the voters have been accredited using their voters registers, PVCs and card reader.

Polling units have hundreds or thousands of voters on the day and as such issues may arise if the voting exercise is not properly organized. There are often cases of long queues and delays either because of the late arrival of election officers and voting items or problems during the accreditation of voters. This has an impact on the collation and release of results to the public in addition to dampening of the overall confidence in the conduct of a free, fair and credible election. The manual casting of votes and onward forwarding of the results to the collation centres have over different elections been marred by cases of electoral malpractices such as ballot box snatching, result tampering from corrupt electoral officials and party thugs disturbance [18]. These have cast doubts among Nigerians as to the credibility of the election results presented.

Furthermore, voters are also required to go to their home districts where they were registered in order to cast their votes. This has drawn a huge level of criticism from many Nigerians and has affected the level of participation in the elections as many people are often affected by migration for different reasons. In such cases, they will simply feel that they have been disenfranchised during the voting exercise when unable to return to their home districts. The February 23<sup>rd</sup> 2019 elections were badly affected after they were postponed that morning, barely few hours to the commencement of the voting exercise. Many people were disgruntled after embarking on long journeys in order to cast their votes in their home districts only to be informed that the elections would no longer hold that day. Many Nigerians widely condemned the outcome and recommended for more proactive steps to be taken before Election Day given that people had to travel from far places just because of the election exercise.

Practical solutions can be adopted to deal with the issue. The computerization of the processes through e-voting has been seen as an important way forward to build trust in the democratic process. This will entail online accreditation and voting from any location using a secure and efficient protocol. Thereafter, there will be electronic transmission of results to the collation centres where there would be specialized software with high level of security to automatically collate results as they come in from different voters. This will help to reduce the risk of compromise which could arise due to pressure from politicians on the election officials to alter results in their favor. This will increase confidence in the election process as Nigerians will believe that their votes have been highly secured and have assurances that their choices will be truly reflected in the results.

Also, a robust database of qualified voters in the country should be available electronically on a central server which can be accessible from any polling unit where computers can be laid out so that wherever a person goes to vote, he/she can vote. In addition, computerized systems which can check manual thumb prints on ballot papers for those who have engaged in multiple thumb printing in connivance

with corrupt electoral officials will help to reduce the issue of duplicate voting. Forensic scanning of finger prints will identify any irregularities since no two people have the same finger print. Once a voter thumb prints in one location, the central processing system will store that particular location and send out an error message if that same thumb print is found in another location. This will spell the end of ballot box snatching, pre-prepared thumb printed ballot papers and any other forms of election malpractice. It will simply result in a one-man, one-vote situation. More so, with a proper national database of all citizens in the country, it will be easy to track and reject attempts from unqualified people to participate in the voting exercise. This would reduce the cases of under-age voting which has been widely reported in the northern part of the country which has tended

In addition to computerization of the election process, there need to be adequate training and engagement of qualified manpower to manage the systems put in place to ensure their optimal performance. Computer network and cyber security professionals should be trained and fully empowered to detect and prevent unlawful election crime over the data transmission mediums. Higher institutions and professional organizations should constructively develop and introduce new curriculum which provide specialized knowledge in these computer-related areas to ensure that these tasks can be handled by competent persons when the systems are deployed. Database experts should be recruited to expand on the design of robust database systems in the country which capture the credentials of all citizens in order to properly detect and reject attempts from unqualified persons to engage in and influence the outcome of elections in the country. These will help to serve as a catalyst for the enhancement of the democratic system in Nigeria with respect to the election process.

Another area which is fast becoming influenced by science and technology in Nigeria is public administration. This is simply because of the need to quickly reach out to share information to people in a timely and organized manner. Social media platforms have gained significant usage in recent times in the public administration domain in this regard as public officials now take to Facebook, WhatsApp, Instagram and Twitter to communicate with their followers and other citizens. These social media platforms have given people an avenue to engage and express their opinions and be heard on several matters. The social media platforms provide a very high level of outreach to citizens as anyone with a mobile phone and data service can subscribe and receive the latest updates in an instant and respond accordingly. The traffic on these social media platforms can have a huge upward spike whenever issues of national interest are discussed e.g. appointment of ministers, election of public officials, security lapses in the country, ethnic controversies and so on. The features available on these platforms enable people to instantly reply to posts from others meaning that dialogues are very easy to instigate from anyone who is anywhere. In fact, without necessarily having a public officer physically present in a location, specific information can be communicated and a conversation initiated with as many people as possible on a given post. This has several benefit in terms of bridging the gaps in communication and makes people to be better educated on public matters. People thus become more active contributors in steering the wheels of democracy in the nation.

Another area where science and technology can be beneficial to Nigeria's democracy is in the fight against corruption. Corruption takes many forms such as bribery, extortion, election fraud, contract fraud, deliberate waste, subsidy abuse, favouritism and legal corruption among others (Page, 2018) [22]. Corruption is seen in many quarters as being endemic in the Nigerian system and the bane of its democratic system (Onodugo, 2016; Enweremadu and Okafor, 2009; Dahida and Akangbe, 2013) [21, 10, 7].

### Conclusion

Nigeria has regularly been ranked among the most corrupt countries in the world by watchdog group Transparency International which provides the corruption index for 180 countries in the world. This has provided a bleak perspective of the nation's democratic gains. As a result, tackling corruption has been the mantra upon which many leaders in Nigeria are elected into public office particularly the incumbent president, Muhammad Buhari, who in 2015 pledged to seriously tackle corruption in Nigeria to restore it to greater heights [23, 11]. This surely requires the use of advanced mechanisms which can seriously restrain people from engaging in such acts. Computer systems when deployed in any organization helps to track the activities of people in different ways and provides a high level of accountability with which decisions are made. Computer systems which leave a trail behind that can be traced can help to reduce the rate of various types of corruption in the country such as theft, bribery, extortion, misappropriation of public funds or property and so on. An example of such systems is the Treasury Single Account (TSA) which was implemented in 2012 under the reign of former president Goodluck Jonathan to control government revenues from different sources to the treasury and managed by the Central Bank of Nigeria (CBN). All agencies under the scheme would forward the details and monies collected from their financial activities to the federal government which is then domiciled into one account and used to run government more effectively. Since the implementation of the TSA, sources indicate that the government has witnessed savings in expenditures and has encouraged that the system be implemented on a wider scale. The TSA has helped to improve government outlook on revenue generation and tackling of corruption which threatens its economic stability by closing loopholes that existed prior to the initiative. Therefore, government has more money at its disposal to carry out projects and other demands for the benefit of its citizens which will in return improve their welfare and participation in the nation's development. In conclusion, we can say that visible progress have been in all facets of the Nigerian democratic journey despite the challenges. All thanks to the catalytic role of Science and Technology education via information and communication technology.

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