

THE CHALLENGES OF ARTIFICIAL INTELLIGENCE (AI) IN ATTAINING QUALITY EDUCATION IN 21ST CENTURY AFRICA

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Abstract

Issues about Artificial Intelligence have taken a centre stage in contemporary society due to the monumental impact of AI on human society. No doubt, the impact of Artificial Intelligence in 21st century society cannot be overemphasized. From economy to information and communication; from technology to security, and virtually every sphere of life has been affected by AI. One area that has witnessed the highest influence of AI is the educational sector. However, many thinkers are curious about the place of AI in the attainment of quality education, especially in Africa and other developing parts of the world. This paper examined the challenges of Artificial Intelligence (AI) in attaining quality education in Africa. Among other things, AI has a high tendency to raise the quality and standard of education in 21st century Africa. However, there are notable fears from some scholars that AI could take the place of teachers in the educational arena, water down the culture of hard work, among other setbacks. This study contends that the AI can be properly managed and channeled towards enhancing quality education in Africa. In the final analysis, it was concluded that if the various challenges surrounding the use of AI in education in 21st century Africa are surmounted, then education would assume a qualitative status.

Keywords: Artificial Intelligence, counterproductively, quality education,

Introduction

The popularity and centrality of Artificial Intelligence (AI) in contemporary society is overwhelming. Modern evolution and developments in Artificial Intelligence (AI) have attracted both academic and public attention to a deeper analysis and efforts at understanding its prospect to transform human societies, its disruptive impact on a range of activities and the challenges that hinder its functionality. In various African countries, it is evident that efforts for quality education have faced multiple constraints. This is why over the years the quality of education has continued to dwindle due to multifaceted factors. Considering the continual dwindling of the educational sector in Africa, it has become pertinent to turn to Artificial Intelligence (AI) as a crucial ally. One would

ordinarily expect that AI holds the potential to help mitigate quality gaps in an otherwise resource-constrained educational environment. This is borne out of the fact that the advent and development of AI has revolutionized many traditional educational models and concepts by enhancing their quality. However, despite the enormous benefits of AI to the development of education, it is feared to be counterproductive in African societies.

This paper makes the argument that despite the apprehensions of AI as counterproductive for quality education in Africa, contemporary education in Africa can no longer be qualitative without being AI competent and compliant. This study suggests that quality education delivery in Africa should be made appropriately AI-driven in order to increase the efficiency and effectiveness of delivery. The study submits that even though AI has a tendency to water down education if not properly harnessed, it is also capable of providing new perspectives for education if properly harnessed. Apart from enhancing greater efficiency, it has the capacity to ease educational delivery across the society.

The Concept of Artificial Intelligence

There is no univocal definition of AI. Rather, many thinkers have defined AI in different ways. The notion of *Intelligence* could be defined as the “ability to learn and perform suitable techniques to solve problems and achieve goals, appropriate to the context in an uncertain, ever-varying world” (Manning, 2020). The phrase '*Artificial Intelligence*' (AI) was coined by emeritus Stanford Professor John McCarthy in 1955. He defined AI as “the science and engineering of making intelligent machines” (Manning, 2020). AI refers to the capacity of machines to perform specific roles and tasks currently performed by humans within the workplace and society in general (Singh, 2019). AI is a collection of information and communication technologies (ICTs) that mimic human intelligence to enable machines to facilitate our jobs better, create greater efficiencies and drive socio-economic growth.

AI generally involves various processes such as autonomous systems, machine learning, supervised learning, deep learning, algorithm, narrow AI and human centered AI.

- **Autonomous systems** are built to separately plan and decide sequences of steps to achieve a specified goal without micro-management.
- **With Machine Learning (ML)**, AI studies how computer agents can improve their perception, knowledge, thinking, or actions based on experience or data. ML draws from computer science, statistics, psychology, neuroscience, economics and control theory (Barnes, 1997).
- **Supervised Learning** involves a computer learning to predict human-given labels, such as bird breed based on labeled bird pictures.
- **Deep Learning** involves the use of huge multi-layer (**usually artificial**) **neural networks** that compute with continuous (real number) representations, a little like the hierarchically organized neurons in human brains (Schwab, 2017).
- **Algorithms** identify the precise steps to take, such as a person writes in a computer program. AI systems contain algorithms, but often just for a few parts like a learning or reward calculation method.
- **Narrow AI** refers to intelligent systems for one particular thing, e.g., for **speech, sight or facial recognition**.
- **Human-Centered Artificial Intelligence** refers to AI that seeks to supplement the abilities of human beings as well as address the societal needs and draw inspiration from human beings. It researches and builds effective partners and tools for people, such as a robot helper and companion for the elderly (Kok et al, 2009).

Furthermore, many commentators attribute the mainstream history of AI technology to the West and East. They do not indicate any link between the history of AI and Africa. However, Adams (2019) avers that such scholars “only attribute the lack of a connection of the history of AI and Africa to the erasure of the relevant African history”. In other words, colonizers and early

European visitors violently erased or truncated the dreams and civilizations on AI from history. However, Ancient African knowledge system narrates the primordial evolution of AI in many African societies. Also, 'binary code' is a coding system using the numerical digits 0 and 1 to represent a letter, digit, or other character in a computer. In simple terms, it is the language of computers. Intriguingly, binary code also serves as the foundation of mainstream Computer Science (including AI research) (Adams, 2019).

The Relevance of AI for Quality Education in Africa

The relevance of AI in the delivery of quality education can never be overemphasized. Some of the areas in which AI is crucial to quality education in Africa include:

i. Creation of an Educational Link to the World

The main driving force for AI investment is to provide better and faster services in order to stay ahead of competition. The competitive strategy for the majority of academic institutions is to provide high quality services to their learners and to establish long term relationships to service partners. AI technology entails processes that make education a web of complicated processes that interplay with each other in various places. Gyaneshwar (2011) avers that “with AI, it has been possible to globalize educational operations”. Now, just about anyone can attain education practically anywhere, from any part of the world. AI technology has made it possible for education to have a wider reach in the world. The best example of this is learning done through the internet. The internet is now a crucial part of any educational encounter, as it enables the learners to engender a worldwide learning system.

ii. Enhancement of Skills and Motivation

AI has the potential to innovate, accelerate, enrich, and deepen skills in both teachers and learners; it has the capacity to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthen teaching and help schools change positively. AI in teaching and learning equally has the capacity of helping students to expand knowledge, experience and increase understanding, especially in areas that require visual, audio, maps, video presentation and so on. This means that using technology in lessons has positive impact on students' achievements (Plant, 2012).

iii. Improving Information Dissemination

The popular saying that information gives power is always factual. As a result of AI, the previous, often primitive, ways of disseminating information could richly be enhanced to a greater extent. With AI, acquiring information has gone electronic whereby one can reach every part of the world to source information from his local point. Elders (as in the African setting), teachers and books are no longer the only sources of information. Educational accessibility is now vast, whereby the most students could be seemingly more informed than their teachers. Thanks to the media (print and electronic) and most acknowledging, the internet (Brynjolfsson and MacAfee, 2014).

iv. Enhancing Educational Administration

AI has the prospect of providing the bedrock on which educational administration and management can be built. Providing a proper field of innovation in academic environments as well as creating development technology with local conditions is an advantage of AI. Apart from this, Attom (2010) points out that there is a significant benefit of technological investment on the growth and efficiency of education. That is why educational environments with large number of administrative applications readily support adoption of technology as a tool for management control, operational control and general administration.

v. A Source of Support and Security to Educational Process

According to Spector (2006), AI enables educational institutions to automate numerous processes, which thereby increases their productivity. This is possible because it enables them to use

fewer resources, thereby enabling them to improve on quality at a low cost and to improve the speed with which institutions can deliver outcomes. In the process, it has become possible to serve more people with less resources. It also makes it easy to store more information while maintaining the integrity of that information. With AI technology, “we are better able to store sensitive and confidential information in a way that makes it less vulnerable to a data breach” (Adewoye and Akanbi, 2012). Equally, information can be retrieved instantly when needed, and it can be analyzed not only to study past trends but also to forecast the future. In turn, this can help with the decision-making process.

vi. *Decreasing Costs and Increasing Utility*

The academic world changed forever when computers were introduced onto the scene. Schools can utilize information technology through the use of computers and different software to run their operations in a smoother fashion. Asma (2014) identifies two main things that have come together to make what is called a “buyer's market” possible. These are the fact that both hardware and software that are needed in creating the necessary software solutions have become more affordable and the fact that more and more entrepreneurs who are also tech-savvy are appearing by the day to make use of these technologies. Thus, the costs of operation are generally reduced while utility level is improved.

Challenges of AI for Quality Education in Africa

The benefits that could accrue from a proper management of AI in education are enormous. Despite the huge benefits of AI for quality education in Africa, there are many barriers that hinder the utilization of AI in African education. The major issues include:

a. *Lack of Improvements with Experience*

Unlike humans, AI does not have the propensity to learn from its own experiences and mistakes. This makes it stagnant without human intervention, especially in the educational sector.

b. *Complacency, laziness and over-dependence*

AI in education has a high tendency to make students lazy and over-indulgent. It dampens the spirit of hard work in education.

c. *Lack of Emotion and creativity*

AI does not have the capacity to apply emotions and creativity in decision-making. When making sensitive decisions, humans inherently consider emotional ramifications and considerations. This is lacking with the application of AI.

d. *Lack of necessary internal skills*

This is a major barrier to the investment in technology, especially in the rural parts of Nigeria. Alam (2012) suggests that, “let your employees be on the same page with each other, using such things as collaboration platforms and social media to keep everyone updated about what is going on in the in the school and where it is headed. That way, they will be in sync with the goals of the school, and their productivity would be significantly improved”. This of course can be made possible with AI and its proper implementation. Here also, there should be a comprehensive effort to institute technological training programs at the various levels of the educational hierarchy. The study of basic technology should also be made compulsory at the basic and second cycle schools to train more students to increase technical trainees and professionals to fill the technology job market (Amankwah-Amoah, 2019). A special loan scheme should be initiated jointly by the government and the various commercial and investment banks to provide easy access to credit facilities that will absorb the initial high investment cost of implementing technology projects in schools.

e. *Cost of Operation*

The costs of purchase and implementation of AI gadgets are too high. Because of the high rate of poverty, many small educational institutions cannot afford the cost of procuring and

sustaining the use of technologies (Prisecaru, 2016). Operating AI is costly. Training large models can be very expensive. Likewise, additional expenses include data storage, electricity, engineering, salaries, and ongoing model updates.

f. Unavailability or lack of Access

Unavailability or lack of access to relevant information and advice on suitable and effective technologies is also one of the major barriers. Alam (2012) confirmed that technology requires acquisition of practical skills which must be properly communicated to the learners. With the changes in global market, office automation and democratization, it is inevitable for individuals to have the ability to access and apply information; such ability should have a root from conscious education. AI tools should be made readily available and accessible to enable Nigeria keep pace with the global changes in her educational system, especially in content and mode of instruction, the younger generation should be geared to grapple with the challenges of technology as well as meeting the national educational goals. With the application of AI technology in education, the learners would be able to recognize what they need to accomplish, determine when and where to obtain the needed information.

g. Poor Government regulation and encouragement

Poor Government regulations and requirements is also a major setback to the use of AI in education. In Nigeria for instance, the frequent ban on media outfits like the twitter, facebook and other social media regulations have often been challenges to the use of AI in educational delivery (Wilner, 2018). The government on its part, can initiate special incentive schemes such as tax holidays, free computers and other technology resources to encourage educational institutions to readily accept to use these resources to improve their teaching-learning activities. This would require extending the networks to remotest areas as well as making legislations concerning technology based on the positive outcomes rather than personal gains. There should be effective training programmes organized by government and non-governmental organizations (NGOs) that would ensure competencies in skills, knowledge of basic technology and proficiency in the school environment generally.

h. Poor communication Infrastructure

Since the advent of telecommunication in Nigeria, the pace of its progress has been slow, and the country has fallen behind most of its neighbors with regard to performance in this sector. “Telecommunication services in Nigeria are underdeveloped and provide one of the lowest rates of telephone ownership per 1,000 inhabitants in the world” (Plumb Lon, 2011). As most of the telephone service uses outdated analogue technology, the quality of telecommunication services is often poor and begging for upgrades. The problems are worsened by delays or nonexistence of telecommunication networks in various parts of the country.

Conclusion

From the discussion, it is obvious that AI has a high tendency to improve the quality of education in Africa. It is inevitable for the smooth running and development of education irrespective of size and complexity. However, it would be foolish to deny, that there are also threats to education delivery brought about by AI technology. Despite the good that AI brings, there are some ugly trends that must also be dealt with. These include over-dependence, malicious activities by individuals and organizations, such as hacking, pornography, and other cybercrimes. Because of this, it is important for educationists to exercise responsibility when using AI to conduct educational delivery. It is worthwhile to contend that due to the rapid development of AI and its huge use in all spheres of our lives, religious education is also influenced by it. This means that AI

needs to be properly harnessed and guided towards enhancing the quality of education in Africa.

Suggestions

It is obvious that the harnessing and use of AI to its maximum potential for educational delivery is a major boost to the development of quality education in Nigeria as in any society. In order to ease the integration of AI into education in Nigeria, the following steps are necessary;

1 Stakeholders in the education sector are encouraged to begin the use of technology on a small scale in order to reduce the fear of cost.

2. Government and relevant agencies should provide enabling environments for the enhancement of AI technology in the country.

3. Proper information and public enlightenment towards the development and use of technology in various levels of education should be put in place.

4. Periodic training and re-training in the form of workshops and sensitization programs on the benefits and use of technology resources in education growth should be organized by stakeholders to create more awareness in order to enhance their preparedness to institute technology programs aimed at improving their educational operations.

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