

INTERACTIVE ARTIFICIAL INTELLIGENCE AS A STRATEGIC COMMUNICATION TOOL FOR ACHIEVING QUALITY EDUCATION GOAL IN NIGERIA: PROSPECTS AND OBSTACLES

BY

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Abstract

This study investigates the potential of interactive artificial intelligence (AI) technologies as a strategic communication tool in enhancing communication strategies for sustainable development goal on quality education (SDG4) in Nigeria. As the country faces pressing sustainability challenges towards achieving the quality education goal, effective communication is crucial in fostering public awareness and driving collective action. Hence, this conceptual effort seeks to explore how interactive AI-driven solutions can facilitate the dissemination of sustainable quality education messages, drive engagement, and promote sustainable education practices among the Nigerian audiences. By reviewing relevant literature and deploying narrative review, the study identifies key opportunities including the ability of interactive AI to enhance personalise educational content for diverse audiences, automate and scale communication efforts, and provide data-driven insights to optimise effective campaign centered on quality education. However, the study also highlights significant challenges, such as data privacy concerns, potential biases in AI algorithms, and the need for technological infrastructure and digital literacy. To address these challenges and maximise opportunities, the study offers policy recommendations such as establishing robust data protection regulations, cross industry partnership among education stakeholders, promoting transparency in AI processes, and investing in digital education and infrastructure. These measures aim to ensure ethical deployment of AI and enhance the effectiveness of AI-driven communication strategies in achieving the quality education of Nigeria.

Keywords: Sustainable Development, Strategic Communication, AI Technology, Quality Education

Introduction

The United Nations Sustainable Development Goals (SDGs) was launched in 2015 to represent a shared promise by every country of the world and serve as a concerted global efforts in achieving sustainable development in all the 17 identified areas by 2030. As we approach this deadline, many countries especially within the developing strata of the world are still struggling in their efforts toward attaining the goals. The goal on quality education under the Education 2030 Framework for Action is the road-map for achieving Sustainable Development Goal (SDG 4) on quality education, which beckon on countries to create national targets and benchmarks to achieve the goal. Despite this effort, education has witnessed slower growth before the COVID-19 pandemic's devastating impacts on education globally, causing a learning inefficiency in four out of five of the 104 countries studied by United Nations Statistics department. (Mukarram, 2020 & United Nations 2015).

The emergence of artificial intelligence (AI) presents enormous impact on different sector providing an opportunity to understand the in-depth potential of AI based on specific industries and sectors requirement. The earliest

discovery on artificial intelligence (AI) was notably witnessed within science fiction and movies, however it has transcend to becoming an integral part of our everyday lives. Artificial intelligence has been differently described over time, but it is widely agreed to involves solving complex cognitive problems associated with human intelligence through machines learning and language, it is believed to be helping people through problems peculiar to society, environment and economy while recognizing problems to create solutions for improved technological deployment, people welfare, and inclusive society (Riyam et al 2023).

Artificial intelligence described as a machine-based system that utilizes input to deduct outputs such as, predictions, content, recommendations and decisions (OECD, 2024), it has the potential to address data gaps and needs related to quality education and other SDGs, while at the same time contributing to their achievement. More specifically, AI can help improve people's well-being, contribute to economic productivity at a global level, increase innovation, and help to respond to key global challenges from health, economy and education to climate change and hunger (OECD, 2023). The potential of artificial intelligence driving sustainable development as viewed by Jeffrey Sachs (2015), is presenting the world an opportunity to usher in a new era of Sustainable Development where nations can collaborate to address peculiar issues such as poverty, education, economic injustice, and environmental degradation. Sachs further proposed a framework for sustainable development based on four pillars across economic development, social development, environmental protection, and good governance, which are all essential and mutually reinforcing. The framework and other scholarly works have identified problems and proposed solutions related to global sustainability goals but none is yet to extensively study the impacts of AI on achieving the Sustainable Development Goal on quality education. AI is a rapidly evolving phenomenon that is still being understood in terms of its effects on sustainable development specifically on SDG4. It is in this light, that this paper seeks to conceptually discuss the potential of Interactive Artificial Intelligence as a Strategic Communication tool for achieving Quality Education goal In Nigeria.

Conceptual Clarification

Understanding Artificial Intelligence

Artificial Intelligence is the activity of making a computer, a computer-controlled robot, or a software think intelligently in the manner of how intelligent humans think. The breakthrough in AI as an invention is accomplished by studying the patterns of how human brain operates, and how humans learn, make decisions, and engage in problem solving tasks, and thereby employing the results as a basis of developing intelligent software and systems. To Srinivasa et al (2021), Artificial Intelligence (AI) operates within the spectrum of computer science that deals with the creation of intelligent computer systems that are capable of perceiving, analyzing, and reacting accordingly to the inputs. There is no denying the fact that humans are considered as the most intelligent and smart species on the earth planet. This consideration have helped human to be in possession of the ability to think, apply logic, do reasoning, understand the complexity, and make decisions on their own. They can also do planning, innovation, and solve problems to a greater extent.

For Pereira, Hadjielias, Christofi, and Vrontis, (2023), artificial intelligence is a branch of computer/mathematical science that focus on the creation of intelligent machines with the potential to perform tasks that requires human intelligence. These machines are created to process information, perceive their environment and also take cue from previous experiences to produce information. The sole purpose of Artificial Intelligence experts is to develop algorithms and models that can replicate and stimulate cognitive functions, such as problem solving (Hussain, 2023). The various submissions above suggests that the central objective of artificial intelligence (AI) experts is to enable machines that can think like humans, in a way that surpasses the human way of thinking (Misselhorn, 2018). The goal of Artificial Intelligence is to empower machines or software with the ability to autonomously collect and process data from their environment in order to make decisions and solve problems, as well as to perform other tasks

where human thought is required (Von Krogh, 2018). AI is increasingly integrated into workflows and industries to enhance task execution and human productivity (Singh, 2018).

Artificial Intelligence (AI) can be deployed to a multitude of sectors in modern society, the integration of AI is presently in almost all sectors. In developed economies, the application of artificial technology is enormous in industries ranging from education, industries, manufacturing, banking, medicine, government, oil services, shipping, transportation, creative organizations, journalism, and other numerous fields. Its roles are also crucial in strategic communication of educational management, education advocacy project design and campaign while providing solutions that guide decision-making within organizations. It is on this premise, that Hintze (2016) conceptualized mainstream AI tools categorized either as machine learning or deep learning, which succeed in executing tasks for quiz game shows with record surpassing human success rate. These technologies are adroit in managing high volumes of data while simplifying processing of complex calculations at remarkable speed. Regardless of all these technological advancements, experts have worked to identify four fundamental artificial intelligence types:

1. Reactive Machines: Reactive machines represent the most basic type of artificial intelligence. The machines lack the capacity to form memories or draw upon past experiences to make current decisions. Classical examples to illustrate this type of technological include Deep Blue, IBM's chess-playing supercomputer, famous for defeating the globally celebrated chess grandmaster, Gary Kasparov in the late 1990s. This form of intelligence allows for direct interaction by the computer to the environment without internal conceptualization. Intelligent machines such as this do not possess adequate realization of the world and also lack customized concepts for certain tasks.

2. Limited Memory Machines: Limited memory machines can store data for a short period of time and can only make use of stored information temporarily. However, they do not optimize data as part of a wider experience utilization. Atypical to these types of technology are machines that can autonomously operate without any form of human assistance, self-driving cars employ limited memory machine technology to monitor the acceleration and navigation decisions of other vehicles. As identified by Ray (2018), these types of machines store motion data about past events which human drivers that may require a longer period to acclimatize.

3. Theory of Mind Machines: It is an established fact that humans possess thoughts, feelings, ability to recall and mental models that define their behavior, a social construct often referred to as "theory of mind" in psychology. The efforts of researchers in the field of computing and artificial intelligence aspire to invent machines that can operate in almost equal similarities as exemplified by human mental models. The theory of mind as a concept signifies an important typology in existing machines and the ones in prognosis. The goal of artificial intelligence researchers is to invent computers and machines with the competence relative to humans, possessing human-liked discerning ability and understanding how human emotions are affected by both external situations and the societal configuration. The social interactions and relationships that take place in human social environment exist on emotional and psychological attributes, and for AI systems and technology to fully operate in human-like, an adaptation of its behavior to reflect the comprehension of human feelings, thoughts, and expectations.

4. Self-Awareness Machines: Typify the proximate level in AI invention where the system created can independently recreate similar representations of themselves within their environment. The idea of self-awareness machines can explicitly be understood through pictorial representation of visuals in SCI-FI movies.

In the emphasis of Ray (2018) stated that AI inventors believed these machines to be the highest level Artificial Intelligence development. Self-aware machines, much like humans have the attribute of self-awareness, understand their identity, innate states, and the competence to know the feelings of others ahead. To achieve this level of original self-awareness will require a deeper understanding of memory, learning, and decision-making based on past experiences. The question regarding the possibility of machines and artificial intelligence tools attaining a level of

self-awareness will remain a philosophical discussion. However, there are proven facts and truths that it exists, even though in the realm of imagination and science fiction, its application is enormous in practical realization.

Theoretical Framework

Diffusion of Innovation theory

Diffusion of innovation is a theory that explores the why, how, and at what rate novel ideas and technology spread through cultures, especially how it operates within the individual, organisation and industry stages. Innovation is viewed by diffusion of innovation theorists as being communicated through specific medium for a period of time within a specific social system (Rogers 1995). Individuals, organisations and social systems are viewed as having different propensity or willingness to try out innovations, thereby subjecting adoption of innovation at a stratified rate by the population normally distributed over time (Rogers 1995). Further efforts at breaking this stratified distribution of adopters into segments leads to the segmentation of individuals, organisations or industries into the following five categories based on adoption of innovation speed; from earliest to latest adopters: innovators, early adopters, early majority, late majority, laggards (Rogers 1995).

The process of adopting innovation varies across individuals, organisations and industries and may appear complex to comprehend. This is as a result of the adoption process generally involving a number of individuals, including both advocates and opponents of the new idea or innovation, with each having a pivotal role to play in the innovation adoption in relation to the decision and attitude of the adopters. The applicability of diffusion of innovation at organisation and industry level as highlighted by Rogers 1995 is premised on the innovativeness of some variables and characteristics such as individual, who are industry leaders in the industry, the attitudes of organization's internal structure, and external characteristics of the organization.

Further exposition into the Individual characteristics described that the attitude of leaders toward change while the internal characteristics regarding organizational structure includes observations according to Rogers (1995) situation whereby: "centralization which is the degree of power concentration and control in a system into the hands of a relatively few individuals" also described "complexity to be the degree of knowledge and expertise to which members of an organization possess"; "formalization is the degree apportioned to rules, procedures, principles, corporate governance which its members must follow"; "interconnectedness is the degree to which the units in a social system are linked by interpersonal networks"; "organizational slack is the degree to which uncommitted resources are available to an organization"; "size is the number of employees of the organization". For external characteristics of organization described the openness of the system to new ideas.

AI as a Strategic Communication Tool in Education

The potential role of AI in communication within education is becoming increasingly relevant, especially in developing countries, where resources are often limited. In this context, the roles of Interactive AI can occur within the below spectrum:

1. Personalize Learning: Adaptive learning AI technologies can deliver tailored and custom educational content according to the learner's level, pace, and style, making learning more effective. AI-driven platforms enable interaction with students in real-time, offering personalized feedback that helps bridge communication gaps between students and their learning environment (Holmes et al., 2019).

2. Automation and Optimized administrative Tasks: AI can enable automation of tasks such as grading, attendance tracking, and administrative communication, as an effective means of reducing the workload on teachers

and allowing them to concentrate more on engaging students directly unhindered. AI-powered chatbots can answer student queries, manage assignments, and offer real-time support, thus enhancing communication within educational systems (Luckin et al., 2016).

3. Facilitate Access to Resources: AI systems can curate educational materials and recommend resources based on individual student needs. This is even crucial in developing economies where access to high-quality learning materials is often limited due to infrastructure issues (Holmes et al., 2019).

4. Enable Data-Driven Decision-Making: AI can analyze student performance and engagement, helping educators make data-driven decisions. This strategic use of data improves communication between students, educators, and policymakers, aiding in the achievement of educational goals (Siemens & Baker, 2012).

Framework for AI as a Tool in Quality Education

According to Luckins 2016, Holmes 2019 and Chen 2020, the role of AI as a tool for achieving the Sustainable Development Goal (SDG) on Quality Education exists in four key dimensions:

- 1. Interactive Learning Systems:** These AI tools, such as learning management systems or intelligent tutoring systems, enable real-time interactions that facilitate deeper learning by providing feedback loops (Chen et al., 2020).
- 2. Natural Language Processing (NLP) and Chatbots:** AI technologies that can understand and respond to human language (NLP) open the door of interactive learning and seamless communication between students, educators and educational platforms. Chatbots tool can address queries and concern student raised by student real-time and assist educators with administrative processes, enhancing interaction within the educational experience (Luckin et al., 2016).
- 3. Predictive Analytics for Early Intervention:** Artificial intelligence can enable a system of immediately identifying struggling students by analyzing engagement, and performance patterns. Predictive interactive AI models can notify educators to provide timely intervention, ensuring that no student is left behind, thereby heralding the education for all initiative (Holmes et al., 2019).
- 4. Collaborative AI and Communication:** AI-driven tools can foster collaboration between students and educators by facilitating effective communication. Students can engage in co-learning real time interaction while virtual teaching assistants and peer-learning platforms can enhance the dynamics of education (Chen et al., 2020).

Obstacles in Implementing AI for Education in Nigeria

- 1. Digital Infrastructure:** Many parts of Nigeria lack the necessary digital infrastructure (e.g., reliable electricity, internet access), which poses a significant barrier to AI deployment (Holmes et al., 2019). Inaccessible and fettered access to electricity and stable internet connectivity is one of the major to the implementation of leveraging artificial intelligence for achieving quality education.
- 2. Data Privacy and Security:** The implementation of artificial intelligence systems in education will require collection of vast amounts of data and the lack of appropriate data management and protection infrasturcture in place may pose barriers ranging from weak data protection measures, and compromising students' privacy (Chen et al., 2020).
- 3. Technical Skills and Training:** Teachers and administrators may grapple with the required skill necessary to effectively utilise the opportunities of AI tools. Training programs are essential to ensure ethical use of AI technologies while overseeing proper integration of AI tools into the educational system (Siemens & Baker, 2012).
- 4. Cultural and Linguistic Barriers:** With over 500 languages spoken in Nigeria, AI systems must be adaptable to the country's linguistic diversity to be inclusive (Luckin et al., 2016).

Prospects of interactive AI in Achieving Quality Education in Nigeria

The prospect and opportunity that artificial intelligence tools possess for the attainment of the sustainable development goal on quality education is enormous. Various scholar with interest in understanding the potential of interactive artificial intelligence enabling the achievement of quality have highlighted the following as the prospect;

1. **Increased Access to Education:** AI enables viable solutions such as online learning platforms, which are especially valuable in Nigeria, where access to physical schools can be limited (Holmes et al., 2019).
2. **Enhanced Learning Outcomes:** Interactive AI tools provide personalized learning experiences, which can improve student engagement and retention of knowledge (Luckin et al., 2016).
3. **Cost Efficiency:** AI-driven systems reduce operational costs by automating many educational processes, freeing up human resources and allowing for more student-centred tasks (Chen et al., 2020).
4. **Bridging the Digital Divide:** purposeful interactive communication efforts tailored to enabling educational tools in locally nuanced contexts through AI will help to address educational disparities, particularly in rural or underserved areas of Nigeria (Holmes et al., 2019).

Conclusion

Conclusively, the exposition of this study identifies the pitfalls and opportunities that abound through the integration of artificial intelligence (AI) into the Nigerian education sector. While deficit in digital infrastructure, data privacy and security are some of the limitations that pose a challenge, the transformative potential of AI to enhance and fast track attaining the SDG goal on quality education is enormous. Ethical deployment of artificial intelligence through development of robust implementation frameworks, the Nigerian education sector can mitigate these various challenges and utilise the abundance opportunities that AI presents. Worthy to note that AI creates avenues for innovation, collaboration, and educational advancement within the industry. Moving forward, concerted efforts to address biases, ensure transparency, and uphold ethical standards are imperative to realizing the full potential of AI in Nigerian journalism, ultimately enriching storytelling and nurturing informed public discourse in the digital era.

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