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Emergent Challenges of Artificial Intelligence against Learners' Cognition and Emotionality in Nigerian Educational Settings

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Abstract

Primarily discussed by the paper are the potential effects of Artificial Intelligence (AI) on learner's cognitive and emotional development. The paper, which is non-empirical, has looked at how AI has created a shift from completely traditional methods of teaching and learning to technologically-based methods whereby electronic devices and software packages perform the job of teaching with fairly similar output as derived through conventional methods by which learning experiences are presented by human teachers. The article has briefly discussed the profound impacts of Artificial Intelligence (AI) on cognition and emotional stability, explaining its tremendous potentials in personalized learning, critical thinking, problem-solving and social and emotional skills development. Also carried by the paper are different scholarly definitions of the concept of Artificial Intelligence, how its different types impact learner's cognitive and emotional development, and the many emergent issues surrounding the emerging technological phenomenon in Nigerian educational settings. The paper has given emphasis on guidance from parents and teachers, and government regulatory measures and sanctions in relation to AI utilization in educational settings so as to achieve the best results possible from the growing technological innovation. The paper has, however, urged educational institutions in Nigeria to deploy appropriate AI tools to assist and ease teaching and learning activities.

Keywords: Artificial Intelligence, cognitive, emotional, learner, development

Introduction

A lot of people around the world somewhat entertain doubts about the potency and potentiality of artificial intelligence technological innovation in its being utilized in supporting learners to develop their cognitive

potentials as well as achieve a positive shift in their emotional wellbeing. Such qualm about the feasibility of artificial intelligence exists because it is no longer strange that learning can take place efficiently through AI systems instead of the traditional methods of instruction. There are various computerized programmes that have the capacity to impact learner's cognitive and emotional development. The United Nations International Children's Emergency Fund [UNICEF] (2018) affirms that artificial intelligence devices are already being used to act as virtual therapists, providing access to mental health support for those who are unable to access and afford traditional therapy, as well as supplement learner's innate intelligence and abilities, allowing them to access information faster and become more effective in their various personal and professional roles.

It is, however, an undeniable fact that over-reliance on AI platforms or tools in learning activities might turn out to be an obstruction to the learner's ability to reason logically and independently and to provide credible solutions to common learning problems affecting them or their instructional environment. As noted by Shanmugasundaram and Tamilarasu (2023), AI tools enable one to obtain quick answers and solutions to a wide range of questions and requests which can be tempting for individuals to rely on exclusively, which can limit an individual's ability to evaluate and analyze information critically and develop their own ideas and opinions.

That is the general view about artificial intelligence invention globally. However, despite all perceived potential drawbacks that may stem from the application of AI tools in educational programmes, there is clear evidence about its positive effects on learning. Pathan and Kanth (2023) opine that AI-powered educational tools can present children with challenging tasks and provide immediate feedback, encouraging them to think about their mistakes and rectify them. Although a relatively new technological innovation, the development of the field of artificial intelligence started in 1956 during a conference in Hanover, New Hampshire in the United States (Mijwel, 2015). The impact of artificial intelligence on learner's learning process encompasses experiences for personalized and automated learning, enhancing teaching methods and generation of feedback (Mallillin, 2024). Artificial intelligence enhances the speed, precision, and effectiveness of human efforts by utilizing complex algorithms and techniques to develop machines or devices that can make decisions on their own, resembling humans (Kumar, 2024).

AI's emergence has definitely caused a significant paradigm shift in educational programmes in many societies around the world; and as Poghosyan (2024) has asserted, many educational institutions have taken advantage of AI groundbreaking technology by incorporating it into their curriculum and teaching methods. Artificial intelligence is not just the creation and presentation of robots to represent humans in certain operations. Artificial intelligence at times involves the use of certain software packages to effect differentiated and individualized learning, grading, tutoring, adaptive learning, grammar check, language learning, and so forth. AI tools are being deployed rapidly in education systems across the globe (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2024). Cognitive traits like social skills, critical thinking, language, and emotional development are most likely to be affected due to the nature in which learners use AI technology (Poghosyan, Mosinyan & Kotolyan, 2024).

There are many other technologies, however, that enable artificial intelligence for learner's cognitive or emotional development. Such include *computer vision* which gives computers the ability to recognize objects and people in images; *natural language processing (NLP)* which enables computers to encode and decode human language; *graphical processing units* that help computers to design graphics and images through mathematical calculations; devices, vehicles or objects built with sensors, software and network connectivity that enable to receive and share data to humans or with each other (Scott, 2024; Betz, 2024).

Artificial Intelligence Defined

Artificial intelligence refers to computer-based operations which are normally performed by humans. Copeland (2024) defines artificial intelligence (AI) as the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. However, according to Investopedia (2024), artificial intelligence (AI) is a technology that allows computers to simulate human intelligence and problem-solving tasks.

Artificial intelligence is not just about robotic technology; any computerized machine may be supported with a device or a software package to enable it to perform tasks typical of a human being. Magapu (2019) wrote that, artificial Intelligence is the making of a machine, a computer, or a software system to think and act as a human. The term artificial intelligence has been described by Russell and Norvig (2016) as machines that mimic human cognitive functions such as learning, understanding, reasoning or problem-solving. McCarthy (as cited in Samba, 2024) describes artificial intelligence as making a machine behave in ways that would be called intelligent if a human were so behaving.

How Different Types of Artificial Intelligence affect Cognition/Learning

Experts and researchers in Communications Technology classify artificial intelligence based on capability and functionality of the technology (Betz, 2024; Mallillin, 2024; Kumar, 2024; Pedamkar, 2024; Sahu, 2021). Most of these types of artificial intelligence are dreams of scientists who believe science can produce machines that are as intelligent as or more intelligent than humans.

AI Types Based on Capability and their Implications

- **Narrow Artificial Intelligence**: Narrow artificial intelligence (ANI) or weak AI describes AI tools designed to carry out specific functions or commands. Narrow AI technologies are developed to have some cognitive capability to recognize and respond independently to specified stimuli. Examples of narrow AI include natural language processing software which is built to recognize and respond to voice instructions, image recognition software, self-driving vehicles, text reading software, etc. All such AI tools are classified as narrow or weak because they cannot function beyond their in-built skills. Narrow AI technology impacts learning a great deal. For instance, voice recognition software may help in recognizing sounds made by learners and in instructing them to carry out certain tasks. However, image recognition software may help in learners' attendance check, in physical screening for examination to avoid students' impersonations, etc. Whilst text reading software may help in teaching pronunciations of words, which is a fast-track to language development.
- **Artificial General Intelligence (AGI)**: Artificial general intelligence (AGI), also known as general AI or strong AI, is a theoretical technology intended to be able to learn, think and carry out different functions like human beings. The goal of designing general AI is for robots to have human intelligence and skills to carry out various tasks typical of human operations. Researches into artificial general intelligence is intended to design robots that can learn new skills, adapt to unexpected situations, diagnose and address clinical problems. If eventually attained, strong AI may be used in tutoring, measurement and evaluation, and so forth.
- **Artificial Superintelligence (ASI)**: Super AI is a mere speculation or a science fiction imagined to function far better than human intelligence in problem-solving, creative innovations. Super AI is imagined to have the ability to develop emotions and desires and carry out intellectual decisions of their own.

AI Types based on Functionality and their Implications

The functionality artificial intelligence involves the application of the technology to process information, respond to stimuli in a given environment. There are four (4) types of artificial intelligence based on functionality.

- **Reactive Machine AI**: Reactive devices work based on current data they are fed with and do not memorize or learn from past experiences. Such machines cannot adapt to situations because they are only programmed to respond to specific inputs with fixed outputs. Reactive AI may be used in learning to support Mathematical operations based on specified formulae, in sketching, plotting of graphs, etc.
- **Limited Memory AI**: Limited memory artificial intelligence stores past data and process it to make predictions or decisions, although they lack long-term memory. Chatbots are an example of limited memory AI; it can retrieve past information in creating responses.
- **Theory of Mind AI**: The development of this artificial intelligence is underway. It is projected such robots will be able to read human emotions, goals, interests and other feelings.
- **Self-aware AI**: This type of artificial intelligence is also being developed. It would have the ability to not only comprehend and respond to human feelings but also have its own consciousness which is similar to human awareness.

Artificial Intelligence versus Learner's Cognition and Emotionality

Studies show that artificial intelligence has the capacity to personalize learning experiences by providing contents that suit the specific cognitive needs of every learner (Pap, 2024). By analyzing learner's behaviour and performance, AI systems can offer personalized feedbacks and suggestions, thereby optimizing the learning process. Through the use of personalization technique, learners can adjust the difficulty levels and presentations of learning tasks according to their unique abilities, interests and goals (Seung, 2024). There exist various AI-powered platforms or programmes that allow learners to practise various tasks or exercises in various subjects according to their abilities, skills, goals and needs. Platforms or software such as Google Translate and Duolingo in no small measure support language development to the learner’s pace and ability.

Various studies have indicated that the employment of artificial intelligence tools in learning can significantly improve learner's academic performance (Mallillin, 2024). AI-enabled tools such as Brainly can offer explanations on different concepts to the learner. This serves as additional tutoring which can improve academic performance. Moreover, utilizing intuitive interfaces and speech-based instructions with artificial intelligence guides the learner on how to work with digital contents, and improves their digital literacy (Borekci & Celik, 2024). With the help of AI, however, children can be exposed to new ways of thinking and innovative solutions. AI technologies can serve as tools for generating ideas and exploring creativity in various fields, from art and music to science and design. AI platforms such as DoodleLens and AI Duet help learners in art and music by recommending to them different modes and styles according to their interests based on the instructions they key in on the software (Poghosyan, Mosinyan & Kotolyan, 2024).

AI applications can also support critical thinking by presenting complex problems and simulations, and guide problem-solving and decision-making. AI-Powered story applications such as Shorebird and AI Dungeon can be used by pupils to generate tales with different plots, characters, themes, and endings. Children's thinking and problem-solving abilities develop as they key in their own ideas to create stories. Additionally, AI empowers individuals to stay updated with the latest advancements in their field and enhance their expertise through continuous learning (Pathan & Kanth, 2023). Moreover, artificial

intelligence tools can keep people meaningfully occupied, thereby preventing the effects of loneliness such as emotional stress, anxiety and depression.

With the growing advancement in artificial intelligence, learners can of course learn through certain software or platforms without having to face human resource persons. AI-powered tools do not bear emotions as humans do; therefore, emotionality effect is entirely nonexistent in AI-enabled teaching-learning process. In traditional teaching process, the teacher may bear anger, worries, anxieties, stress and so forth in relation to the learner's emotions or behaviours during lessons. Such a situation is entirely out of calculation when learning experiences are transmitted by AI machines and software based on the current AI development. Likewise, the learner equally experiences zero emotionality effect while interacting with AI-based peers. The absence of arguments, jealousy, quarrels, disappointments, gossiping and other emotional or social issues while relating with AI classroom peers may strengthen the learner's motivation, concentration and creative potentials.

Emergent Challenges of Artificial Intelligence against Learners' Cognition and Emotionality

Despite all the cognitive, emotional and social benefits that may be derived by Nigerian students/pupils from the application of artificial intelligence, the downsides the technology has on learning are generally numerous.

1. **Decrease in Cognitive Skills**. Inarguably, overreliance on artificial intelligence can lead to a decrease in cognitive skills, including critical thinking and problem-solving abilities, which could be attributed to the fact that artificial intelligence tools often provide learners with prepackaged solutions that limit their abilities to think creatively and critically (Westman as cited in Doulani & Sugathan, 2023).
2. **Limited Creativity**. It is not farfetched to also understand that relying heavily or primarily on artificial intelligence tools to perform intellectual tasks can limit or obstruct learner's own creativity and originality because of their dependence on output offered by software without utilizing their personal natural or conventional skills and cognitive potentials. Learner's skills with regard to critical and creative thinking, language development and emotional development are most likely to be negatively affected by their over-reliance on or excessive utilization of AI learning tools. Limited creativity often leads to plagiarism activities.
3. **Psychological Issues**. Issues such as the effects of artificial intelligence on children's psychological health, depression, anxiety, and the development of social skills are definitely essential factors to consider (UNICEF as cited in Erol & Erol, 2024). Really, the potential risks of cognitive manipulation in relation to the learner should be evaluated (Chou, Murillo, & Ibars, 2017).
4. **Memory Decay**. Studies have indicated how overreliance on artificial intelligence decreases performance in memory recall, which is termed digital dementia. As learners rely on AI devices to create or process information, they are less likely to retrieve or remember it after a long period, which leads to memory loss (Shanmugasundaram & Tamilarasu, 2023).
5. **Social and Emotional Issues**. Excessive utilization of artificial intelligence in educational may negatively affect learner's relationship and collaboration with their human peers and other humans in their learning environment, whilst such relationship and collaboration are essential for developing emotional and social skills which offer the ability to work effectively with others in real-life situations. AI robots or tools observably replaces human relation with machine relation. Instead of having interactions with human teachers, human peers, human neighbours, etc, who possess natural potentials for relationships which are the gateway for cognitive, emotional and social development, a learner relying just on AI ends up somehow locked away from the physical social world,

experiencing loneliness and poor human interactions. A research by Lin and Chen (2024) has revealed that the repetitive nature of AI interactions and the absence of a human touch diminishes emotional connection and motivation among students. Excessive use of AI technology also leads to anxiety and stress, leading to lack of empathy and poor interpersonal relationships (Pap, 2024).

Conclusion

The paper has overviewed what could be described as the impact of artificial intelligence on the cognitive and emotional development of learners in Nigeria. As gradual as the availability of and access to artificial intelligence tools seems to be in Nigeria, and despite the downsides of the growing technology, there is still much to write about as regards the benefits learners can derive therefrom. In view of the fact that the paper supports the deployment and utilization of AI tools in our learning environments, the possible cognitive and emotional drawbacks that might stem from the technology must not be ignored.

Suggestions

Considering both the benefits of AI use in learning activities and the drawbacks from over-reliance on it, the paper proffers the following suggestions for consideration by virtually all stakeholders in Nigerian educational system.

1. Parents and teachers should consistently monitor learning activities done with the support of Artificial Intelligence tools so that learners do not end up abusing the web-based devices or software meant to sssist their learning activities. If there isn't this parental or teachers' monitoring, learners might over-rely on AI-powered tools and become intellectually weak, cognitively redundant and be prone to plagiarism acts.
2. Educational institutions should embrace positive changes turning out from the AI phenomenon. Let the AI potentials be optimally harnessed for better cognitive and emotional development of learners. Artificial Intelligence tools should be deployed to equip both teachers and students/pupils to derive the benefits of the emerging technology.
3. The Nigerian government should put in place appropriate regulatory measures and sanctions on AI utilization in the country. AI platforms and software accessible should be compatible with the laws and value system of nation. Deployment, sale and access to the software or tools should be regulated. Proper sanctions should be mounted upon erring institutions or individuals with regard to deployment or accessibility of AI tools.
4. Curriculum planners at all levels should make new insertions in the country's educational programmes to ensure better utilization of the potentials of Artificial Intelligence for the overall development of education in Nigeria.

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