

TEACHING AND LEARNING WITH ARTIFICIAL INTELLIGENCE, TREND AND ISSUES IN DEVELOPING COUNTRIES.

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Abstract

The integration of artificial intelligence (AI) into teaching and learning processes has emerged as a global trend with significant implications for educational development. However, while AI-driven educational technologies have gained traction in developed nations, developing countries face unique challenges in adopting and leveraging AI to improve educational outcomes. This study explores the trends and issues surrounding teaching and learning with AI in developing countries, focusing on accessibility, infrastructure, training, and cultural diversity, merits and demerits and highlighting the challenges of artificial intelligence in Nigeria, while some applications were also given as a means of showing its ability to enhance the disparities in access to technology and internet connectivity, the shortage of skilled professionals capable of effectively utilizing AI in education, and the importance of addressing cultural and linguistic diversity in AI-driven educational initiatives. By understanding these challenges and trends, policymakers, educators, and stakeholders can develop targeted strategies to harness the transformative potential of AI and promote equitable access to quality education in developing countries.

Keywords: Artificial Intelligence, Teaching Learning, Trend and Issues.

Introduction

Integrating artificial intelligence (AI) into education has emerged as a transformative force with the potential to revolutionize teaching and learning experiences worldwide. However, while developed nations often spearhead advancements in AI-driven educational technologies, developing countries confront a myriad of issues in harnessing its full potential within their educational systems, (Berendi, 2019). Though there are multifaceted obstacles faced in the integration of AI into teaching and learning processes in developing countries, encompassing issues of accessibility, infrastructure, training, and cultural diversity. First and foremost, access to technology remains a fundamental issue. Many developing regions lack the necessary resources to provide teachers and learners with access to AI tools and devices. The digital divide exacerbates existing disparities in educational opportunities, impeding the equitable distribution of AI-driven learning solutions. Without access to essential hardware such as computers, tablets, or smartphones, learners and teachers are unable to engage with AI-powered educational platforms and resources, hindering their ability to benefit from AI-driven

personalized learning experiences. Moreover, unreliable internet connectivity presents a formidable challenge. In remote or rural areas, where infrastructure may be underdeveloped, accessing online AI resources becomes a daunting task. The sporadic availability of internet connectivity disrupts the seamless integration of AI technologies into classrooms, limiting learners' and teachers' ability to utilize online learning platforms, interactive AI tutors, and other AI-driven educational resources effectively, (Jude, 2018). As a result, the potential of AI to enhance educational outcomes is stifled, particularly in regions where internet access is erratic electricity supply or non-existent. Furthermore, there is a critical shortage of skilled professionals capable of effectively leveraging AI for teaching and learning purposes in developing countries. Educators require specialized training and ongoing professional development opportunities to integrate AI tools into their pedagogical practices effectively. However, in many developing countries, such training programs are limited or non-existent, leaving educators ill-equipped to harness the potential of AI in the classroom. As a result, the gap between AI technology adoption and pedagogical expertise widens, impeding the successful implementation of AI-driven educational initiatives.

Additionally, cultural and linguistic diversity present unique challenges in the integration of AI into education. AI applications must be sensitive to the cultural context and language preferences of diverse populations to ensure their relevance and effectiveness. To adapting AI-driven educational content and platforms there must be to accommodate diverse cultural backgrounds is essential for fostering inclusive learning environments and promoting equitable access to educational opportunities, (UNESCO, 2019). Failure to address cultural and linguistic diversity in AI-driven educational initiatives may lead to the marginalization of certain student populations, exacerbating existing educational inequalities. In addressing these issues, a comprehensive approach is required to facilitate the successful integration of AI into teaching and learning processes in developing countries. This approach should prioritize equitable access to technology, infrastructure development, capacity building for educators, and the development of culturally responsive AI solutions. By overcoming these obstacles in developing countries there is need to harness the transformative potential of AI to enhance educational outcomes, empower educators, and ensure that all students have access to quality learning opportunities, regardless of their socio-economic background or geographical location.

The future is indeed here. It has no doubt that Artificial Intelligence in education is gaining popularity among teachers and learners. Educators use AI in the form of EdTech tools to aid them in creating lesson plans or computing students' grades while as for the learners, AI can assist them to accomplish their projects, homework, and even research papers. While we can't deny that Artificial Intelligence in 2024 is becoming a part of our lives now, there are still a couple of trends and issues of AI that need further attention and are still up for discussion. this paper will help to identify each of those trends and issues, and what important role should you be taking on to ensure AI usage for education is still in moderation. Lastly, we will weigh the advantages and disadvantages of AI and decide if teachers should incorporate the usage of AI in learning and teaching strategy, (Michalski, 2015).

Concept of Artificial Intelligence

Artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines in contrast to natural intelligence displayed by humans and other animals (McCorduck, 2004). This implies that machines can be made to perform tasks commonly associated with intelligent beings like humans and animals. It is an area of computer science with the help of digital electronics that emphasizes the creation of intelligent machines that work and react like humans. The term is frequently applied to the project of developing systems endowed with the intellectual processes and characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experiences. Since the development of the digital computer in the 1940s, it has been demonstrated that computers can be programmed to carry out very complex tasks like discovering proofs for mathematical theorems and playing chess with great proficiency. Artificial Intelligence (AI) has been studied for decades and is still one of the most challenging subjects in digital computer. However, it is taking the world by storm, considering the application of its innovative uses across all industry segments. Indeed, the world is decades away from replacing every human intelligence with AI robots. AI technology ranges from machines truly capable of thinking to search algorithms used to solve societal problems. In fact, intelligent robots are slowly and gradually in demand and can be considered as an emerging technology in the field of surgery. Most AI examples that is heard about today from chess-playing computers to self-driving cars rely heavily on deep learning and natural language processing (McGuire, 2006). Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data. The overall research goal of artificial intelligence is to create technology that allows computers and machines to function in an intelligent manner. The general problem of simulating (or creating) intelligence has been broken down into sub-problems. These consist of particular traits or capabilities that researchers expect an intelligent system to display. The traits are learning, reasoning, problem solving, perception, planning and speech recognition. These traits have been described to have received the most attention in AI technology.

The Origin of Artificial Intelligence (AI)

The idea of inanimate objects coming to life as intelligent beings (Artificial Intelligence) has been around for a long time. It began in antiquity with myths, stories and rumors of artificial beings endowed with intelligence or consciousness by master craftsmen. In fact, the ancient Greeks had myths about robots, and Chinese and Egyptian engineers-built automatons. The beginnings of modern Artificial Intelligence (AI) can be traced to classical philosophers' attempts to describe human thinking as a symbolic system. But the field of AI was not formally founded until 1956, when John McCarthy at an academic conference at Dartmouth College in Hanover, New Hampshire where the term: "artificial intelligence" was coined (McGuire, 2006). MIT cognitive scientist Marvin Minsky and others who attended the conference were extremely optimistic about AI's future. Many of them predicted that a machine as intelligent as a human being would exist in no more than a generation and they were given millions of dollars to make this vision come true. Eventually it became obvious that they had grossly underestimated the difficulty of the project. But achieving an artificially

intelligent being was not so simple. After several reports criticizing the progress in AI, In 1973, in response to the criticism from James Lighthill and ongoing pressure from congress; the U.S. and British Governments stopped funding undirected research on artificial intelligence, and the difficult years that followed was later known as an "AI winter" – 1974 to 1980 (Huang, 2006). The field later revived in the 1980s when the British government started funding it again in part to compete with efforts by the Japanese (Yang, 2006). But by the late 80s the investors became disillusioned by the absence of the needed computer power (hardware) and withdrew funding again. The experienced brought about another major winter from 1987 to 1993. But research began to pick up again after that, and in 1997, IBM's Deep Blue became the first computer to beat a chess champion when it defeated Russian grandmaster Garry Kasparov (Lohr, 2016). Investment and interest in AI boomed in the first decades of the 21st century, when machine learning was successfully applied to many problems in academia and industry due to the presence of powerful computer hardware. This was in the form of access to large amounts of data (known as "big data"), faster computers and advanced machine learning techniques which were successfully applied to many problems throughout the world's economy. In fact, McKinsey Global Institute estimated in their famous paper "Big data: The next frontier for innovation, competition, and productivity" that "by 2009, nearly all sectors in the US economy had at least an average of 200 terabytes of stored data". By 2016, the market for AI related products, hardware and software reached more than 8 billion dollars, which raised the interest in AI to reach a "frenzy". The applications of big data began to reach into other fields as well, such as training models in ecology and for various applications in economics (Hampton et al., 2013). Advances in deep learning (particularly deep convolutional neural networks and recurrent neural networks) drove the progress of AI to image, video processing, text analysis, and speech recognition.

Trend of AI in Teaching and learning

In this modern world, integrating AI technology grows rapidly in education. AI is there to assist and make our day-to-day tasks lighter. Onaolapo, *et al*, (2023). Came with some of the following trends in teaching and learning with AI:

Improved Student Engagement and Motivation

The use of AI applications in teaching can enhance the learning experience in many ways such as personalized learning exercises thanks to AI algorithms or instant feedback and communication thanks to AI natural language processing. AI can also be employed to enhance gamified learning which can further make learning enjoyable, engaging, and rewarding. Using AI tools can guide educators to use a more interactive teaching approach which may result in increased engagement and motivation in the class as well as improved learning objectives.

Enhancing Student Performance

Another significant pro of artificial intelligence in education is that it can help enhance student performance with increased feedback. AI-powered systems can evaluate students' progress, provide them with targeted feedback, and identify areas where they need improvement. Moreover, AI can monitor students' behavior patterns, assess their attention

levels, and determine if they need additional assistance in certain subjects, granular areas, or specific skills. Instant, AI-powered feedback to enhance learning experiences which can be expected to push students' abilities to new heights.

Cost-Effective Learning

Using AI in Education can also reduce the cost of education from an educational institution's perspective, and quite significantly if used to its potential. AI can automate a number of tasks assigned to administration, teachers, IT, and more. For example, AI can take on daily tasks such as grading, scheduling, data management, and even tutoring. With AI in education, educational institutions can save on budget by cutting down resources required to operate efficiently, thereby increasing cost-effectiveness.

Continuous Evaluation and Improvement in the long run

Last on our issues of AI list is continuous evaluation and improvement. AI-powered EdTech tools can easily collect, analyze, and provide report data to teachers on student learning outcomes and behavior patterns. By using predictive analytics, AI can provide educators with valuable insights from predicting future performance, providing personalized interventions, early identification of at-risk students, and refining instructional strategies, (Goralski and Tan, 2019). This useful information can enable educators to have a more in-depth evaluation in understanding their student's strengths and weaknesses in the classroom. In addition, teachers can have the chance to take their teaching strategies to the next level and give the best learning experiences to their students.

Learning Trends

AI allows smart learning as developing countries students can have personalized learning by asking it questions and answers and instructions will be given in their areas of interests. With the aid of AI, homework and classes could be customized based on student's aptitudes, needs and interests, while their overall performance in the assessments could be analyzed to determine relevant resources to help students understand the assigned tasks. AI will play a vital role of a personalized learning resource allocator for students, thereby helping teachers focus more on facilitation, while technology handles the intricacies of teaching and learning assessment and resource distributions. Apart from allowing students to learn at their own pace, there might be diverse learning options, some of which may also tackle learning disabilities. The use of AI such as Tutoring Software, robots and humanoids has shown benefits in enhancing the learning experience of students with Autistic Spectrum Disorder (ASD). Similarly, Immersive Reader is an AI service which enhances reading and comprehension through text decoding solutions for students with learning differences such as dyslexia⁹. AI could also reinforce student learning by combining technology interface with face-to-face interaction as blended learning. Before the advent of AI and other modern instructional technologies, learning in educational institutions was predominantly based on physical interaction between teachers and learners.

Though this traditional model was effective in educating limited number of students at a given time, constraints such as geographical barriers, limited space and time difference must

be resolved to get the best experience out of such learning exercise. Application of AI tools could remove barriers associated with conventional learning methods and recreate unique classroom experience for reinforced learning activities, (Nayebare, 2019). Blended learning is richer for many reasons, for instance in allowing for diversity in learning pathways and reinforcing learning sessions. Blended learning combines the online delivery of educational content with the best features of classroom interaction and live instruction in such a way as to personalize learning, allow thoughtful reflection, and differentiate instruction from student to student across a diverse group of learners. Additionally, AI provides a means to build a learning community.

According to Fagbola and Thakur (2019), AI applications that allow participant interaction create a platform to build relationships that could enhance learning, for instance study groups across different educational systems. With the aid of AI, participants in educational programmes could engage in group discussions, share resources and collaborate on ideas to advance their knowledge on different topics. AI support online collaborative learning discussions among learners by using academically productive talk moves. AI applications could also assist developing countries learners to monitor conversations in many groups using recording devices and link them with more experienced colleagues, thus fostering peer mentoring within the learning community.

Teaching Trends

AI will give flexibility to teachers in developing countries educational institutions. Depending on the specific technology, using AI could reduce the burden of attending classrooms, marking papers and other tasks, enhancing the overall teaching experience and quality. The use of AI could assist teachers in identifying the learning needs and abilities of individual students and developing appropriate measures to respond to such needs. Also, teacher-facing AI systems are used to support the teacher and reduce workload by automating tasks such as administration, assessment, feedback, and plagiarism detection. AI could also provide additional support for teachers in analyzing students' data, predicting their academic achievements and proffering solutions to address their learning challenges, (Buttice, 2019). Importantly, AI helps educators have greater insight as to how students are progressing. That means they could adjust their approach, supporting students' individual needs. Furthermore, the use of AI could provide developing countries teachers with adequate information on unique attributes of individual students which could influence their career paths. Again, developing countries teachers could also leverage AI capabilities to build learning communities with their colleagues. Furthermore, AI could foster the development of smart content and platforms for professional development of teachers. Peers and mentors may emerge from such communities, invariably boosting teaching experience and quality including AI mentors for learners, further development of for educators through virtual global conferences.

Issues in Teaching and Learning With AI Policy

There is far-reaching policy change which developing countries would need to address to successfully incorporate AI in teaching and learning. A comprehensive policy framework, much of which would require overhaul of current policies and creation of new ones, is a

prerequisite for fostering participation by industry players and for achieving a sustainable environment where the application of AI of education will thrive. Besaw and Filitiz (2020) suggest that delivering the promise of positive AI will require good systems of governance, which constitute part of the policy framework. In expressing the need for appropriate AI policies for education, educators must see AI as instrumental to their institution's competitiveness, yet most institutions still lack a formal data strategy to advance AI. Even though, most African countries have ICT policies that are being implemented effectively, there is still a dearth of AI policies in developing countries. Overall, compared to Europe, Canada, the U.S., and China, there is no well-documented strategy for AI in developing countries, (Kumar, 2018). While we can learn from other regions, we cannot import policies that may not fit the context of developing countries societies. Thus, relevant policies which will create clear directions on the application of AI for education in line with the peculiarities of the countries need to be developed. Robinson, (2018) also states some of these issues that developing Countries may encountered in adapting AI into teaching and learning:

Limited of Accessibility

There are many benefits AI has to offer, the permanent integration of artificial intelligence into teaching and learning will lead to limitations for some students. In developed countries, issues like a smartphone, other forms of gadgets, and internet connections that help aid the activities of artificial intelligence are easily accessible. However, for students from developing countries or countries suffering serious crises, this certainly isn't the case. Socio-economic status and geographical location can serve as a limitation in the adoption of artificial intelligence in education. Berendt, (2019)

Inadequate Teachers Preparedness

The integration of AI into the educational system will mean that teachers will need to be adequately trained and well-prepared for the purpose to be actualized. However, this will not be as easy as it seems; some demands will have to be met. Also, unifying the system means it will have to be adopted globally. Consequently, the educational systems of many countries will not be able to accommodate this development.

Issues of Ethics

Another important issue that will be encountered in adopting AI in the educational system is the issue that concerns ethics and transparency in data collection and use. The integration of artificial intelligence in education raises ethical concerns as AI relies on data to function effectively. Issues like personal data concentration, data privacy and ownership, confidentiality, transparency, and ethics a lot of work still has to be done.

learners Inability to Explore and Attain Their Full Potential

Learners become overly dependent on artificial intelligence, it would limit their abilities of critical thinking skills and cognitive abilities. learners will become very dependent on machines. This will hinder them from learning what it means to multitask or push themselves to be creative. This therefore limits their ability to attain their full potential and explore their abilities as their assignments will now be made easier through the use of artificial intelligence.

Cost of Implementation

The maintenance of technological devices can be very expensive. The implication of integrating AI into the educational system means that the education budget of the country will rise. The expenditure on schools will also be on the high side. Countries that cannot adapt to the innovation will end up lagging.

Addiction Technological Facilitates

Again, the adoption of artificial intelligence in the educational system will in turn foster technology addiction among learners and even teachers. learners and teachers will now have to use smartphones, iPads, or laptops for educational activities rather than pen, paper, or books. This will lead to increased screen time and a possible addiction to technological devices.

Infrastructure and Connectivity

One of the most obvious issues of implementing e-learning in developing countries is the lack of adequate infrastructure and connectivity. Many learners and teachers do not have access to reliable and affordable electricity, internet, devices, and software that are essential for e-learning. Power outages, low bandwidth, high costs, and limited coverage can disrupt or prevent e-learning activities and reduce their effectiveness and quality. To overcome this issues, e-learning initiatives need to consider the local context and adapt to the available resources and infrastructure. For example, they can use offline or low-bandwidth solutions, such as mobile apps, SMS, radio, or TV, that can reach more learners and provide them with relevant and engaging content.

Teacher's Job Security

AI are threats to teachers' job security. This is not happening yet, but it is a concern that the advancement and adoption of AI could impact the need for certain job roles in education. The way AI continues to automate more aspects of the education process, there may be fewer demands for human educators, which could lead to both improved productivity and potential job loss.

Dehumanized Learning Experience

One of the biggest issues of AI in teaching and learning is that it can dehumanize the learning experience. With AI algorithms generating content and deciding the pacing of the lessons, learners may miss out on the nuanced approach that a human teacher can offer. Additionally, AI algorithms can perpetuate bias, meaning that they may fail to provide an inclusive and diverse curriculum that is tailored to the needs of every learner. IDRSC, (2020)

Cost Implementation for Teachers

Another issue of AI in teaching and learning is that it can be costly to implement for teachers. Not all schools and educational institutions have a dedicated budget for investing in AI tools and technologies. Plus, the cost of mass-implementing AI into schools may be too great at this time. If the teacher will be the one to shoulder the cost, it can be expensive, and challenging to maintain.

Technology Dependence

As schools become increasingly reliant on AI-powered solutions, there is a risk that teachers and learners may become too reliant on technology. In the long run, this dependence could result in the neglect of important traditional teaching methods and the development of critical thinking and problem-solving skills and affection.

The Roles of Teachers

Artificial intelligence is playing an increasingly significant role in transforming how students learn and how teachers instruct. However, as with any innovation, there are both pros and cons of AI when incorporating it into the classroom and when there are too many challenges happening in the class, this is where human intervention is set to come in.

Conclusion

AI holds the potential to revolutionize teaching and learning in developing countries by eradicating issues associated with conventional educational methods. The application of AI in teaching and learning has come to stay, and Africa will likely leverage AI to achieve its educational goals, including enhanced knowledge acquisition in the classroom settings and at home. However, AI successes have been observed with some perceived risks, disruptive tendencies, and negative impacts²⁴. These risks could undermine the benefits of AI for education in Africa and threatened the development of the Africa nascent AI industry, if not monitored properly. Currently, there are local initiatives which could transform the AI landscape in Africa through the development of exciting talents and world-class AI solutions capable of meeting the needs of the continent in the nearest future. A robust collaboration among AI startups, researchers, policy makers, industry players, educational institutions and government agencies is required to realize the full benefits of AI for education in Africa. Invariably, AI has the capability to enrich teaching and learning experience in Africa, thus fostering the achievement of the Sustainable Development Goal 4. AI, like every other technology, is a tool which effectiveness hinges on the way it is used, and the type of data inputted into it. Before Africa can lead its AI transformation, the region needs to formulate a comprehensive continental blueprint to guide its AI strategy by involving key Pan-African institutions, academia, and the private and public sectors in its conception²⁵. Strict compliance to ethical use of AI for teaching and learning activities is also expedient. Furthermore, transparency and integrity in the use of personal data for AI systems must be ensured. Finally, relevant policies should be formulated to curtail excesses arising from the use of AI for education in Africa. In conclusion, while it is agreeable that there are benefits that artificial intelligence has to offer, it is not to say that challenges do not exist. However, whilst the technology is still a work in progress, the players in the education sector should be open-minded to embrace the changes.

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