



Adopting Artificial Intelligence (AI) in Education: Challenges & Possibilities

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The paper examined the Adoption of Artificial Intelligence in Education: Challenges and Possibilities. It is a known fact that, the current technological explosion affecting all facets of human endeavor does not exempted the education sector, hence, owing to this reality, different forms of technologies are currently in used in order to improve on the pedagogical or operational skills of both teachers and students with the hope of bringing improvement in teaching and learning process. Therefore, the adoption of emerging technology such as Artificial Intelligent (AI) in education system becomes imperative. Interestingly to note was that, AI has been in the education technology space for a while, but its adoption has been greatly slow. However, during the COVID-19 pandemic, virtual learning forced the industry to shift and the technology helps streamline the student education process by offering access to suitable courses, bettering communication among students with their tutors thereby bridging the gaps of learning shortage occasioned by the pandemics. It was in line with this development that, this review paper discussed the sub-field of Artificial Intelligence applications and these were: Machine learning; Speech recognition; Expert system; Natural language processing; Robotics; Vision and planning. Moreso, the paper explained Artificial Intelligence and its application in education owing to its significance to educational

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development in this 21st Century. It further highlighted the broad classifications of Artificial Intelligence for Educational Adoption and these are: Students focus, Teacher's focus and Institutional focus. Additionally, Educational advantages of its adoption are identified and they include: It makes it possible for easy collaborations between the teachers and the students in or outside the classroom setting and It has the capability of providing real-time data and algorithm of any kinds depending on the request of the user. Major challenges which include Difficulties in using AI in an enable classroom to address the digital divide and avoid exacerbating existing inequalities that already in existence and Lack of adequate infrastructure, such as reliable internet connectivity, electricity, and devices, that are essential for the delivery and use of AI-based educational solutions. Lastly, Conclusion are made as regard the discussed around the adoption of AI in education.

Keywords: Adoption; artificial intelligent; education; challenges; possibility.

1. INTRODUCTION

"In education sector, currently, Artificial Intelligent (AI) is finding relevance as one of the emerging technologies which bring about effectiveness in teaching-learning process. This owns to the fact that, AI is refers to as science and as well engineering of making an intelligent machines for human used and it possess the ability to think, reach, and which surpass ordinary human-level of intelligence This therefore means the fast development of technology and social media have both brought about substantial changes to the ways in which humans communicate with each other and the effectiveness of social networks is largely dependent on the processing of the enormous amounts of data that are collected, these networks are looking not only for the most recent advancements in artificial intelligence but also for other related technologies to develop a more advanced forms for their usage in the near future. Hence, Artificial intelligence are continually changing the manner in which people communicate, and the repercussions of this transformation are greater than what contemporary civilization is able to comprehend and contemplate". (Kayid, 2020)

"Therefore, Artificial Intelligence (AI) tools have now become an important part of modern networking technologies and this is because of its ability to automate tasks on real time, optimize network performance, and enhance network security system at all time. Artificial Intelligence (AI) can be seen as the science and as well engineering which concerned itself with the computational understanding of intelligent behavior which led itself to the creation of intelligent machines, which the process involved an heterogeneous set of gadgets, tools, techniques and algorithms, which also including neural networks, genetic algorithms, symbolic AI,

and deep learning. These were the major areas witnessing exponential growth and making significant impacts in diverse areas in such field of education, health care, space, robotics, and of course military hegemony. Similarly, with the increasing amount of data, ubiquitous connectivity, high-performance computing, and various algorithms were all present in the AI tools. AI in no distance future would add a new level of efficiency and sophistication to future technologies adoption in education and other sectors as well. The ultimate goals of AI field are to produce fully autonomous intelligent agents that will interact with their environments and find out optimal behaviors, improve over time through trial and error applications synonymous with human beings" (Kayid, 2020)

"Conceptually, the word intelligence means different things to people but it largely depends on one's perception and area of applications which could means mental abilities such as logic, reasoning, problem solving, and planning and as well recognize problems and solve the problems. These identified characteristics becomes expedient due to the fact that; AI is a branch of Computer Science that is concerned with building systems capable of performing tasks that typically require human intelligence. In this respect, research that develops technologies that can do things that would require intelligence same can be done by humans. Hence, it's seen as a machine-based system that can gives a set of human-defined objectives, make predictions, recommendations, or decisions that influence real or virtual environments. All AI technological systems interact with each other and acts on an immediate environment, either directly or indirectly. Often, they appear to operate autonomously, and can adapt their behaviour by learning about the context". (Oladipupo, 2023: & UNICEF, 2021).

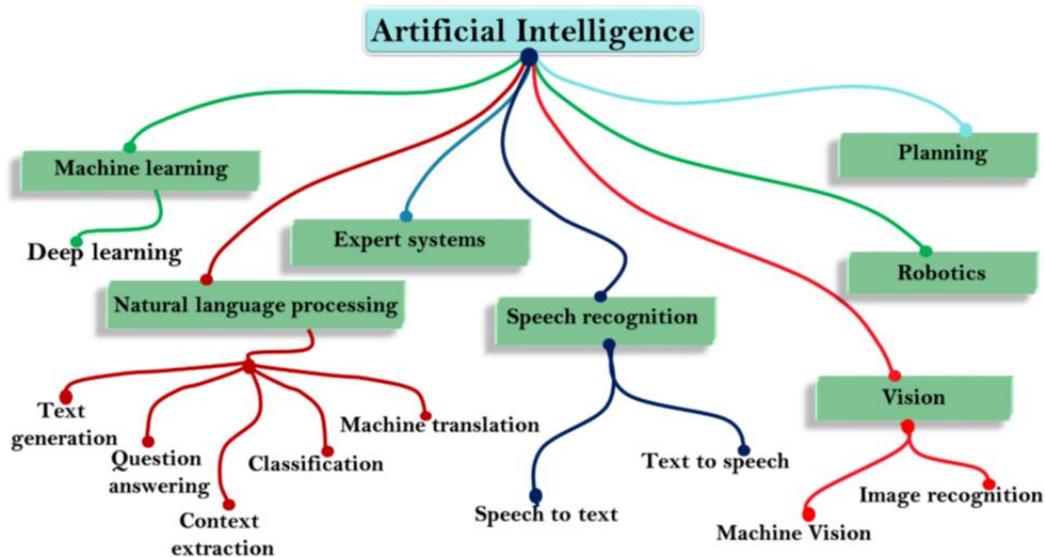


Fig. 1. The role of artificial intelligence in future technology

Source: (Kayid, A. 2020)

2. SUB-FIELD OF ARTIFICIAL INTELLIGENCE APPLICATIONS

“These sub-field branches of Artificial Intelligent pre-supposes that (AI) not in a distance future will overtaking the functional activities of human being or even surpass them in all bureaucratic organization which education is inclusive. This fact can currently be traced to the recent success of AI has captured in the imagination of both the scientific community and the public domain. An example of this is autonomous cars providing the ability to make intelligent decisions on maneuvers in variable, real-traffic road conditions. Another example could be that of Alpha Go and Alpha Zero developed by Google DeepMind, to play the board game Go, and becoming the first machine to beat a professional player around the globe. This has led to both the excitement and fear in many that most likely AI will surpass humans in most of the fields. For instance, in education recently, AI becomes more prevalent in educational settings, thereby, protecting student privacy which is of utmost importance. This is because, AI-enabled systems to collect and process vast amounts of data, including personal information and learning data from educational engagement”. (Kayid,2020),

3. ARTIFICIAL INTELLIGENCE AND APPLICATION IN EDUCATION

“In the recent time, Artificial intelligent (AI) has become one of the most discussed topics in the

educational sector because of its significance to educational development in this 21st Century. Artificial intelligence (AI) in education is a significant technology which could helps education in a number of ways and these include personalized learning which is one of the most important area of education that has used artificial intelligence. In its used as personalized learning, AI helps students find the best course material in their area of specialization for study and academic activity which based on one needs and interests as regards learning process. It was further revealed that, Artificial intelligence replaced the old-fashioned classroom study with a more personalized and student-centered approach. It was equally used to monitor overall performance of students by identifying the strength and weakness of a learner. Similarly, it can rank learners based on their performance and give real-time suggestions to improve the overall performance of their studies. Additionally, it was noted that, Artificial intelligence help to keep track, report and monitor the performance of different types of learners in different educational pursuit”. (AlFarsi, Tawafak, EIDow, Malik, Jabbar, and Sideiri, 2021; Burrack, Thompson, 2021).

More significantly, the major intention of Artificial Intelligent in Education is to establish AI-powered systems such as virtual pedagogical agents, meaning, AI robots and intelligent systems will allow for flexibility, ensuring smooth engaging of

students and bringing about personalized learning as well as to automate daily tasks of teaching for example feedback and assessment [1-4]. It has been established that, AI has been extensively used in education in different forms such as computer programs, humanoid robots, web-based chat-bots, and online platforms. Similarly, Chen et al. (2022) indicate “the usefulness of AI in education and it include its used in the form of intelligent tutoring systems for special education, natural language processing, educational robots, performance prediction, discourse analysis, teaching evaluation, learner emotion detection and personalized learning”. “Furthermore, educational applications and uses of AI in the classroom setting could be possible with AI-based learning app, In a Socratic perspective, which allows students to ask questions in the form of voice or picture input. The app then harnesses algorithms to search for relevant answers on the web, helping students to grasp underlying concepts. It also allows students to effectively break down their lessons into smaller bite-sized fragments for micro teaching-learning process and any other learning content in given subject areas” (AlFarsi, Tawafak, EIDow, Malik, Jabbar, and Sideiri, 2021; Burrack, Thompson, 2021)

4. BROAD CLASSIFICATIONS OF ARTIFICIAL INTELLIGENCE FOR EDUCATIONAL ADOPTION

Artificial Intelligence Tools that are applicable in education can be classified into a typology of three distinct but yet they can be overlapping with one another when it comes to their application for educational purposes. According to (Holmes and Tuomi2022) enlisted the following:

- i. **Student Focused:** The students focus AI intelligent tutoring system (ITS) have some sub-components that are AI-assisted Apps, such as: Mathematics, text-to-speech, language learning; AI-Assisted Simulations which include: Games-based learning, VR, AR; AI to Support Learners with Disabilities; Automatic Essay Writing (AEW); Chat-bots; Automatic Formative Assessment (AFA); Learning Network Orchestrators; Dialogue-based Tutoring Systems (DBTS); Exploratory Learning Environments (ELE) & AI-assisted Lifelong Learning Assistant among others

- ii. **Teacher Focused:** The second typology has to do with Teachers’ Focus AI and their applicability in education and these include the following: Plagiarism detection; Smart Curation of Learning Materials; Classroom Monitoring; Automatic Summative Assessment; AI Teaching Assistant which including assessment assistant and classroom orchestration
- iii. **Institution Focused Artificial Intelligent:** These are the types that comes under institutional support which would go a long way to makes administrations and other related institution engagements easy and well accomplished. These include the following: Admissions process such as student selection; Course-planning, Scheduling, Timetabling; School Security; Identifying Students at risk and e-Proctoring. [5,6-9].

5. EDUCATIONAL ADVANTAGES OF ADOPTING ARTIFICIAL INTELLIGENCE IN EDUCATION

There are numerous advantages of adopting Artificial Intelligence in educational process. However, it is important to note that, rapid technological developments which became inevitably bring about its justifications for adopting AI in educational sector. By this extension however, the following are some of the educational advantages for adopting AI:

- i. Artificial Intelligence (AI) enhances the personalization of student learning programs and courses and it promotes tutoring by helping students improve their weak spots and sharpen their skills
- ii. It ensures quick responses between teachers and students, and enhances universal twenty-four hours learning access.
- iii. It makes it possible for easy collaborations between the teachers and the students in or outside the classroom setting
- iv. Have the capability of providing real-time data algorithm of any kinds depending on the request of the user
- v. Through AI providing personalized learning experiences, it leads to automating assessment and feedback thereby offering on-demand support, and expanding access to quality education.

6. CHALLENGES IN THE ADOPTION OF AI IN EDUCATION

Scholars, through research have established that, Artificial Intelligence (AI) has the potential to address some of the major challenges facing our educational institutions today which can be reduced to a minimal and thereby bringing about innovate teaching and learning practices, and to accelerate progress towards achieving SDG-Goals in Nigeria if properly implemented [10-13]. Based on these assumptions, the identified are some of the likely challenges: in the adoption of AI

- i. AI technologies adoption in the classroom setting can lead to the challenge of ensuring equitable access for all students.
- ii. Difficulties in using AI in an enable classroom to address the digital divide and avoid exacerbating existing inequalities that already in existence
- iii. Lack of adequate infrastructure, such as reliable internet connectivity, electricity, and devices, that are essential for the delivery and use of AI-based educational solutions.
- iv. Lack of relevant data and content, such as local languages, curricula, and cultural contexts, that are needed to train and customize AI models for the specific learning needs
- v. Inadequate of needed skills and awareness, among both learners and educators, on how to effectively use and evaluate AI-based educational solutions, as well as how to protect their privacy and security in the digital environment.
- vi. Absence of regulatory frameworks, that can support the development, deployment, and governance of AI in education.

7. MEASURES TO MITIGATES CHALLENGES OF AI ADOPTION IN EDUCATION

Despite an immense challenge around the adoption and using of AI tools in education as an innovative paradigm shift in the 21st Century technological breakthrough, in education, the following are some of the mitigating factors which if adhere to would bring about effectiveness in its adoption. Such mitigating factors can include the following:

- i. There are the needs for schools and educational institutions to provide adequate resources and infrastructure to

support AI integration, particularly in underprivileged communities.

- ii. Ensuring affordability of internet access, and technological support to ensure that all students have equal opportunities to benefit from AI in education.
- iii. Ensuring educational institutions establishes robust data protection policies which should including obtaining informed consent from students and their parents or guardians, and implementing secure data storage and transmission protocols.
- iv. To ensuring compliance with relevant data protection laws, such as the General Data Protection Regulation (GDPR), which is critical in protecting students' personal information and maintain trust in AI-powered educational systems.
- v. Ensuring the promoting of transparency and accountability for fair and equitable AI usage in the classroom or beyond. This includes disclosing the factors considered in decision-making processes, such as grading or personalized recommendations.
- vi. Ensuring the developing and deploying low-cost, low-bandwidth, and offline AI solutions that can work in resource-constrained settings and reach remote and marginalized learners where ever they are.
- vii. Needs to provides Teacher Training Programs in order to acquire new digital skills to effectively use AI in a pedagogical and meaningful ways

8. CONCLUSION

In conclusion, it is important to note that, Artificial Intelligence (AI) in education can be seen as a right step in the right direction and this so because, its adoption in education sound more promising and have the capability to shape the entire educational sector if properly adopted. The current paradigm shift has the potential to revolutionize learning and teaching, paving the way for a more equitable and effective educational system. AI has uniqueness advantage of ensuring learners learn within their pace through its medium of personalized learning experiences, automating of assessment and feedback process on what the students learnt. Given this capability, AI would continue to advance and within shortest possible time would become an inevitable technologies critical for educators, administrators, and policymakers to embrace whole-heartedly and integrate them into the educational landscape in its fullest deployment.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Dolhansky B, et al. The Deep fake Detection Challenge (DFDC) Preview Dataset. arXiv: 1910.08854 [cs.CV]; 2019.
2. Janel Ann R, Ed.D. Integrating AI into Education: Possibilities and Challenges; 2021.
3. Prabhs U. The role of ai in the development of next-generation networking systems; 2023. Available: <https://www.researchgate.net/publication/371124447>
4. UNESCO. Digital learning & transformation of education artificial intelligence in education; 2023. Available: <https://www.unesco.org/en/digital-education/artificial-intelligence>
5. Amir K. The role of Artificial Intelligence in future technology; 2020. Available: <https://www.researchgate.net/publication/342106972>
6. Russell S, et al. Artificial Intelligence: A Modern Approach. 3rd ed. Prentice Hall; 2010.
7. Chen D, et al. Autonomous Driving using Safe Reinforcement Learning by Incorporating a Regret-based Human Lane-Changing Decision Model. arXiv: 1910.04803 [cs.RO]; 2019.
8. Ferdowsi A, et al. Robust Deep Reinforcement Learning for Security and Safety in Autonomous Vehicle Systems". In: 2018 21st International Conference on Intelligent Transportation Systems (ITSC); 2018. Available: <http://dx.org/10.1109/ITSC.2018.8569635>. DOI: 10.1109/itsc.2018.8569635.
9. Palanisamy P. Multi-Agent connected autonomous driving using deep reinforcement learning. .arXiv: 1911.04175 [cs.LG].Palanisamy; 2019.
10. Baker RS, Inventado PS. Educational data mining and learning analytics. Handbook of educational psychology; 2014;2: 775–794.
11. Blikstein P. Artificial Intelligence in Education: The importance of asking the right questions. International Journal of Artificial Intelligence in Education. 2018;28 (1):30–33. DOI: 10.1007/s40593–018–0161–7
12. Blikstein P. Artificial intelligence in education: Promises and Ethical Challenges. Science, 2020;369(6505): 650–652.
13. Broughton M, et al. Tensor Flow Quantum: A Software Framework for Quantum Machine Learning. arXiv: 2003.02989 [quant-ph]; 2020.

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