HARNESSING THE POTENTIALS OF ARTIFICIAL INTELLIGENCE IN THE ATTAINMENT OF QUALITY EDUCATION

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Abstract

The paper has examined the potentials of incorporating Artificial Intelligence (AI) in improving the quality of education. The primary objective is to investigate how AI technologies might improve the overall quality and efficacy of teaching, leading to enhanced learning outcomes in education. The study employs a retrospective research approach, analyzing past data to gain insights into the development and impact of AI in teaching and Learning. The research design involved a comprehensive collection and analysis of secondary data from educational databases, government papers, academic journals, and other relevant repositories. Results from the study highlight the significance of AI in improving education. Further findings of the study indicates that artificial intelligence promote the innovative development of teaching resources and teaching environment, teaching and learning methods, the development of school teaching management and teaching evaluation, and promote the reform of subject structure and educational content with a view to encouraging the application of artificial intelligence in promoting the transformation of teaching and learning. The study recommends the integration of AI into the national curriculum, adequate funding and resources, ongoing professional development for teachers, and a

strategic curriculum development that fosters a blended learning environment.

Keywords: Artificial intelligence and quality education.

Introduction

As artificial intelligence (AI) is increasingly becoming a part of our daily lives, the government and schools are paying more and more attention to the development of artificial intelligence in education (Malik, Tayal, and Vij 2019). Artificial intelligence technology has not only promoted changes in schools' teaching methods, learning methods, campus environment, and curriculum, but the entire education industry is also undergoing changes through AI (Karsenti 2019). From basic education to higher education and adult education, schools are increasingly transforming with AI technology. These systems can help people learn better and achieve their learning goals (Hinojo-Lucena, Aznar-Díaz, and Cáceres-Reche, M. P., & Romero-Rodríguez 2019).

Artificial intelligence technology is believed to play an important role in promoting the reformation of teaching and learning in schools. It will bring new intelligent teaching tools to schools, form new teaching and learning modes, and promote innovation in teaching evaluation methods and teaching management methods. Educators should actively change their way of thinking, explore new forms of combinations between artificial intelligence and teaching, promote the deep integration of technology and teaching, and the innovative development of education and teaching (Guo and Xiao 2019). The reformation of education and teaching in schools will break the time and space restrictions in traditional education, thus form a superhighway of information, promote fair processes in education, and make education and teaching more interesting and reasonable (Zhang, Zhang, and Li 2019). Students are able to develop according to their own potential, whereas teachers' repetitive workload will be replaced by artificial intelligence systems, and the campus environment will become more intelligent (Fu 2019).

Artificial intellect is an innovative technical framework that encompasses the creation of computer systems with the ability to execute

activities that usually need human intellect (Aina,Gbenga-Epebinu, Olofinbiyi, Ogidan, and Ayedun 2023). These activities involve problem-solving, acquiring knowledge, comprehending language, and seeing visual information. AI has become increasingly prominent in recent years, bringing about a revolutionary transformation in the methods by which jobs are completed in numerous businesses. Within the realm of education, artificial intelligence offers a multitude of possibilities to augment the learning process. Intelligent systems provide the ability to adjust to the specific requirements of each learner, deliver tailored learning experiences, and provide immediate feedback (Aina et al., 2023). AI applications in education encompass adaptive learning platforms, intelligent tutoring systems, and virtual simulations. Through the use of artificial intelligence, educators have the ability to construct dynamic and interactive learning environments that accommodate the various learning styles and capabilities of students.

The convergence of AI and scientific education presents significant opportunities for tackling the obstacles encountered by the Nigerian educational system. The use of AI tools and technology in education has the potential to fundamentally transform the methods of teaching and learning, hence enhancing accessibility, engagement, and effectiveness of education. This concept paper seeks to examine the potentials of artificial intelligence (AI) in in improving the quality of education.

The Concept of Artificial Intelligence

Artificial intelligence (AI) is a concept that has been in use since 1956, when it was first coined at a workshop at Dartmouth College, it was defined then as a machine's ability to perform a task that would have previously required human intelligence such as self-driving cars, robots, ChatGPT or other AI chatbots, and artificially created images, (Diaz, 2023). Artificial Intelligence is a method of making a computer, a computer-controlled robot, or a software think intelligently like the human mind (Duggal, 2023). It leverages on computers and machines to mimic the problem-solving and decision-making capabilities of the human mind. Artificial Intelligence (AI) according to Nwakunor (2021), is the computer-controlled robots that think intelligently like human beings. These robots are

controlled electronically with the aid of the computer by mimicking the competences of the human mind. Liu (2016) viewed AI as intelligent machines or intelligent systems that simulate human intelligence activities and extend the science of human intelligence.

To UNICEF AI refers to machine-based systems that can, given a set of human-defined objectives, make predictions, recommendations, or decisions that influence real or virtual environments. AI systems interact with us and act on our environment, either directly or indirectly. Often, they appear to operate autonomously, and can adapt their behavior by learning about the context. (UNICEF 2021: 16) This definition has potentials for several reasons. First, it does not depend on data, although it does accommodate data-driven AI techniques such as artificial neural networks and deep learning; second, it therefore also includes rule-based or symbolic AI and any new paradigm of AI that might emerge in future years; and third, it highlights that AI systems necessarily depend on human objectives and sometimes "appear to operate autonomously", rather than assuming that they do operate autonomously, which is key given the critical role of humans at all stages of the AI development pipeline (Holmes and Porayska-Pomsta 2022).

Artificial intelligence is therefore an emerging technology and the simulation of human intelligence by machine capable of understanding, reasoning, learning, and applying knowledge to function, act and mimic the problem-solving and decision-making capabilities of the human mind to solve problem.

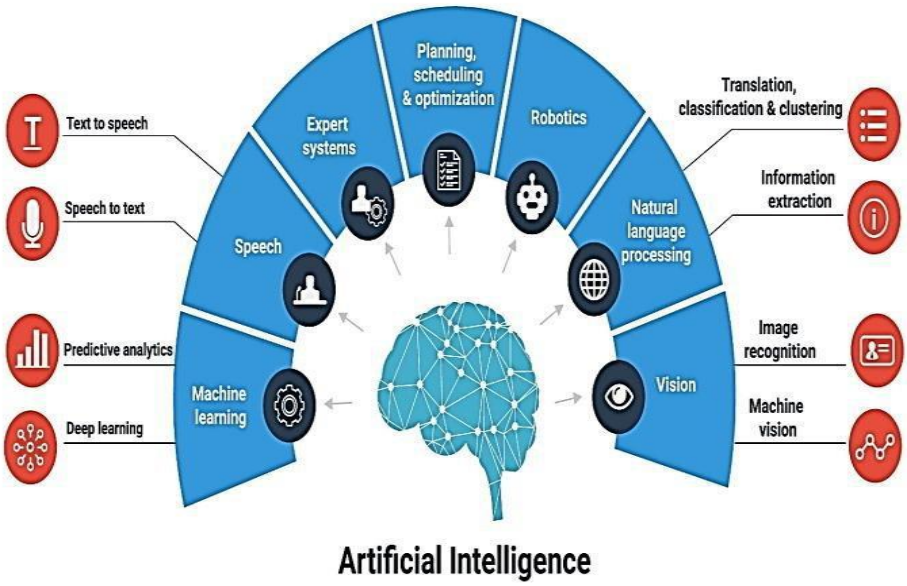

Fig: Pictorial Diagram of AI Components (**Source:** Vijayakumar & Sheshadri, 2019).

The above diagramme shows the various sub-areas of Artificial Intelligence which include: expert systems, natural language processing, pattern recognition and robotics, aim to simulate human intelligence with computers (Vijayakumar&Sheshadri, 2019).

Education

The term education as a concept is quite elusive and not easy to define. The complexity of the discipline is necessitated by the functions education has to perform in society as one of its institution. For the purpose of this paper, we shall therefore have a look at few definitions of education. From the etymological point of view, the word 'education'' is derived from two latin words "educere" which means "to lead out" and "educare" which means 'to bring up''. This means that education bring out skills in someone and build them up. Okoorosaye-Orubite (2019) defined education as a social creation, designed to meet the specific needs of the society at any particular point in time. Its form, content, methodology and clientele are determined by the society. Clark cited in Vikoo (2016) aptly describe education as an interaction between a teacher and a student under the teachers responsibility

in order to bring about the expected change in the student's behaviour. Tete and Obitor (2020) also noted that educational system of any society is a more or less elaborate mechanism design by society to instill in individuals certain skills or attitude that are judge to be useful and desirable in that society. In a related development, Adelowo (2010) conceptualised education as an enterprise which sets out to instill values, attitude and skills in members of the society. This was aptly supported by Pauley and Buseri (2019), that see education as a socializing agent that equips all its beneficiaries with the necessary tools such as knowledge, skills, attitude, cultural values, language and social skills to enable them conform to the desires/demand of their society.

This paper sees education whether formal or informal, is the recognised method whereby a person acquire most of his ideas, beliefs and attitude: in short his knowledge, skill and manners necessary, not only to combat the hazards and problem of life and to secure the needs of but also to fit into the company of his fellow human beings. The above definition shows that education equipped the individual in all ramifications.

The Use of Artificial Intelligence in Education

The use of artificial intelligence continues to grow in the education sector. It is becoming increasingly clear to all that it offers many exciting possibilities for the learning outcomes of pupils/students and already promises important help in achieving modern educational goals. We will briefly examine some potential benefits that AI offers to students and teachers.

According to Mureșan (2023) AI brings benefits and opportunities to education by facilitating personalization of learning, providing instant feedback and improving efficiency in the assessment process. Thus, artificial intelligence can be integrated into online learning platforms, allowing content and activities to be customized according to the needs and knowledge level of each student. Learning management systems can use artificial intelligence to provide personalized recommendations, automatic feedback and monitor student progress. Thus, pupils and students can access relevant materials and resources according to their individual needs. Virtual

reality can also help students encourage collaboration and teamwork, and tools like social media can be used to connect students with their peers and instructors.

Furthermore, AI can be used to create tutorials and interactive virtual assistants, systems that can answer students' questions, provide additional explanations, and guide students in real-time through the learning process. Thus, through tutorials and virtual assistance students can benefit from additional support and learn at an individualized pace receiving real-time guidance to support the learning process (Mahendra 2023).

If we talk about *the verification part of learning*, AI can automate many time-consuming administrative tasks in teaching and learning. It could be grading assignments, providing feedback on student work, or even detecting plagiarism. Artificial intelligence algorithms can be trained to recognize patterns and evaluate student responses in various subjects. As Oana. (2021) observes this allows teachers to receive quick and detailed feedback on student performance, provide personalized interventions based on each student's individual needs, and even save time and resources.

One of the key aspects of the influence of artificial intelligence in education is the ability *to adapt the learning process to the individual needs of pupils/students*. By collecting and analyzingdata about student/student progress and performance, AI can identify weaknesses andautomatically adapt content and teaching methods to support individual performance improvement. Thus, a personalized and more effective learning experience can be ensured. A highly effective use of AI is to *forecast performance through data analysis, identifying patterns and trends*. By collecting and analyzing data about student performance and behavior, AIcan provide valuable insights into individual performance and make predictions about a student'ssuccess or failure. This can help teachers and schools make informed decisions and provide earlyintervention to support pupils/students.

Huang (2021) maintains here that some benefits for *eliminating manual administrative work in schools*, colleges and universities, such as scheduling, rescheduling classes, marking attendance, marking papers, finance and accounting and record keeping. The same can be said for tasks

ranging from managing large data sets to processing student requests and coordinating extracurricular activities, large time-consuming activities that can now be outsourced to AI. Also, the administration of the premises often consumes a lot of time. With AI capabilities, these repetitive tasks can be automated - monitoring water and energy consumption, controlling heating or air conditioning. Student transportation falls into the same category, an area where AI can have a major impact.

But while artificial intelligence brings many benefits to education, there are also challenges and concerns associated with its widespread use. These include privacy and security of personal data, lack of human interaction, which can affect the development of pupils/students' social and emotional skills, trust in the system which requires these systems to be transparent and provide clear explanations of how they arrive at conclusions and recommendations. The use of artificial intelligence in education brings with it a number of significant opportunities and advantages even if limitations are also identified. From personalizing learning to instant feedback and automated assessment, AI can improve the teaching and learning process, providing a more efficient and effective experience for students and teachers. However, it is important to strike a balance between technology and the human aspects of education.

Summarily therefore, AI performs functions independently of teachers, while in others it augments teaching capabilities. Applications of AI-based education technology in the following ways:

1. Tutoring**:** AI programs commonly referred to as Intelligent Tutoring Systems (ITS) or adaptive tutors engage students in dialogue, answer questions, and provide feedback.
2. Personalizing Learning**:** ITS and adaptive tutors tailor learning material, pace, sequence, and difficulty to each student’s needs. AI can also provide support for special needs students, for instance by teaching autistic children to identify facial expressions.
3. Testing:Computer adaptive assessments adjust the difficulty of successive questions based on the accuracy of the student’s answers, enabling more precise identification of a student’s mastery level.

4. Automating Tasks**:** AI can perform routine tasks such as taking attendance, grading assignments, and generating test questions.

Artificial Intelligence and the Transformation of Teaching and Learning in Schools

Teaching Resources and Teaching Environment

First, with the development of artificial intelligence technology, a large number of companies have developed a variety of intelligent teaching tools and learning tools, and intelligent auxiliary learning equipment, such as intelligent teaching platforms, teaching robots and intelligent learning software, etc. These advanced teaching and learning tools have brought a lot of convenience to teachers and students, bringing new vitality to teaching and learning. In the era of artificial intelligence, a large number of intelligent devices have entered the classroom. Teachers and intelligent assistants will exist together in the classroom. Students and teachers will each wear various intelligent machines with sensor devices. The entire education and teaching process is intelligent. Secondly, the development of artificial intelligence has brought great convenience for students and teachers to obtain learning resources. In the process of intelligent evolution of learning resources, the machine has performed quality control and semantic annotation on the resources, and resources are divided into text, video, and other forms. In this way, when the intelligent learning environment senses learners' needs, it can adaptively push learning resources that are suitable for the learners, and with the development of search engines, learners can quickly find the resources they need without wasting a lot of time in finding materials (Zhu and Wang 2019). Finally, the development of artificial intelligence has provided convenience in building an intelligent learning environment, driving the digital education resource environment to an intelligent learning resource environment. Schools can work with artificial intelligence education companies to use artificial intelligence to create an environment that is conducive for learners to carry out efficient and deep learning.

Teaching and learning Methods

Artificial intelligence can assist teachers of social studies to prepare lessons, teachers can use artificial intelligence, big data and other technical advantages, to help students' personalise learning, and to design scientific and appropriate learning programs. Artificial intelligence and big data can also be a powerful assistant for teachers. Artificial intelligence technology allows teachers to monitor the teaching process in real time and accurately guide the teaching to achieve intelligent and precise teaching. Big data can help teachers understand students' learning situations at any time, help them solve difficulties, help teachers to correct homework, replace teachers' mechanical work, reduce the burden on teachers, help teachers to be free from simple and tedious teaching affairstasks, and enable teachers to have more time to communicate with students. Artificial intelligence can help teachers; it will change the role of teachers, and promote the transformation of teaching models from knowledge transfer to knowledge construction. Education in the era of artificial intelligence needs to cultivate the core literacy of students. The responsibility of teachers is not to instill knowledge, but to help students to grow, to become life mentors or psychological consultants, to help students discover the advantages and realize the value of life.

Teaching Evaluation.

Teaching evaluation is an important way to check and promote learning. In terms of this, diagnostic teaching evaluation in particular, has been identified as one of the areas of most potential for artificial intelligence (Savin-Baden et al. 2019). At present, artificial intelligence technology has also spawned many intelligent diagnostic industries. From the aspect of teacher evaluation, currently, based on artificial intelligence, automatic data aggregation, feature analysis, deep learning and modeling simulation of teaching behavior characteristics can make a detailed and accurate evaluation of teachers' classroom teaching quality. The evaluation of teachers will move towards a comprehensive evaluation produced by artificial intelligence technology, rather than a single evaluation between students and teachers. In this way, diversity in evaluation will give fairer

and more objective evaluations to teachers and provide teachers with greater space to improve, thus providing the direction for teacher's development.

In terms of student evaluation, with the help of artificial intelligence technology, the platform actively collects and automatically captures various data points of student learning at any time to form a data set for all students as a whole and each individual student (Guerrero and Wiley 2019). Based on a specific analysis model, the platform quickly and promptly forms a diagnostic evaluation report for each student's learning, and gives personalised learning resources and development suggestions to effectively achieve "a student with a ruler and a student with multiple rulers" to promote students to be their best selves, by changing a ruler to evaluate the current situation of all students. This makes the evaluation more scientific, objective and timely.

Reformation of Educational Content

First of all, as artificial intelligence will be integrated into our daily lives, it is indispensable that the school's curriculum include the basics of artificial intelligence and its application-related professional settings. By doing so, students can learn about artificial intelligence in all aspects. Secondly, the cross-border integration of artificial intelligence has broken the boundaries between subjects. This requires comprehensive talents, as the subject content that is independent and unrelated to each other is not conducive to development of students' comprehensive capabilities. This requires barriers to be broken down between various subjects and content integration, so that it is conducive for the students' positive transfer of knowledge. Again, education in the intelligent era is enhanced rather than complement education, focusing on students' individual development. Therefore, in the future, the traditional class teaching system will be broken down, and customized educational content will be gradually moved according to everyone's interest and specialty. Finally, due to the large storage capacity of intelligent machines, acquired knowledge can be easily retrieved. Therefore, the education content in schools will focus on the construction of students' tacit knowledge. Instead of focusing on students' abilities to memorize, they will increasingly focus on training students' practical ability and emergency response ability in real life situations.

Conclusion

In the modern sense, the term artificial intelligence emerged in the 1950s with the aim of solving complex mathematical problems and creating machines that could think like humans. Simple early studies in the field evolved into more complex ones that integrated deep learning and machine learning techniques. With these advancements, applications have been developed that can learn from data over time, query this data, and even generate new data. These advancements in the field of artificial intelligence have had significant impacts on various economic, social, academic, and other areas. Artificial intelligence has made significant contributions to reducing human time waste by collecting and processing large datasets, as well as generating new data from them. Additionally, it has brought about significant developments in the fields of education and teaching. The use of artificial intelligence in education offers advantages such as personalized teaching for students, collaborative learning, learning companionship, serving as a research tool for advancing the learning sciences, and providing exploratory learning opportunities. These advantages also extend to monitoring student development, continuous assessment, and providing feedback to educators. Considering the advantages it offers in education, the use of artificial intelligence becomes crucial. Ensuring lasting learning in education and achieving desired goals require the creation of effective teaching designs and the inclusion of innovative teaching practices. Given its rich variety of subjects and the use of technological tools, education becomes a subject that can be easily taught through technological applications. Considering the changes in the world order and the new responsibilities expected from the citizens of the future, it is essential to strengthen education with innovative applications. In this context, using future technologies such as artificial intelligence in education can help future individuals better adapt to the world of tomorrow.

Recommendations

For the purpose of providing effective teaching and learning, schools should embrace new and emerging technologies such as artificial intelligence technologies and other smart technologies. This will help to improve the quality of teaching, learning and research processes in the

school environments. However, this requires a proactive training and retraining of teachers to acquire the required knowledge, skills and competence on how to use AI tools for improved teaching and learning. Therefore, schools in Nigeria and other developing world must adopt innovative, smart and cutting-edge technologies to meet the information needs of the current dynamic ICT savvy users in the changing school environment. Hence, curriculum developers should establish clear guidelines and policies to ensure responsible and ethical use of AI.

The successful integration of AI into the Nigerian educational system also requires careful consideration of contextual adaptability. Researchers should investigate the ways in which AI systems may be more specifically adapted to incorporate the distinct cultural and contextual intricacies of the Nigerian educational environment.

References

Abbass, H. (2023, June). Editorial ınterdisciplinary artificial intelligence research with machine education as an example.*IEEE Transactions on Artificial Intelligence, 4*(03), 399-401. https://doi.org/10.1109/TAI.2023.3267663

Adaralegbe, A. (1980). *The Nigeria social studies programme: Retrospect and prospect, NERDC, Social Studies Teaching: Issues and Problems*. Benin- City:Ethiope Publishers.

Adelouro, T. O. (2010). Education and human development of the special needs child: A global view In T.C. Obani (Eds) *Teaching pupils with special educational needs in the regular classroom.* Ibadan: Oluben printers.

Ahmad, N., Murugesan, S. &Kshetri, N. (2023).Generative artificial ıntelligence and the education sector.*Computer, 56*(6), 72-76. https://doi.org/10.1109/MC.2023.3263576

Aina, M.A., Gbenga-Epebinu, M.A., Olofinbiyi, R.O., Ogidan, O.C., and Ayedun, T.O. (2023). Perception and acceptance of medical chatbot

among undergraduates in Ekiti State University, Nigeria, *British Journal of Education*, 11(11), 1-14

Bittencourt, I. I., Chalco, G., Santos, J., Fernandes, S., Silva, J., Batista, N., Hutz, C. &Isotani, S. (2023). Positive artificial intelligence in education (P-AIED): A roadmap. International Journal of Artificial Intelligence in Education, 1-61. https://doi.org/10.1007/s40593-023-00357-y

Coșman, Oana.(2021). Universal Robots: What are collaborative robots and how can we work alongside them." Available at https://zoom.vodafone.ro/universal-robots-ce-sunt-robotii-colaborativi-si-cum-putem-lucraalaturi- de-ei/, accessed on May 23, 2023.

Diaz, M. (2023). What is AI? Everything to know about artificial intelligence

https://www.zdnet.com/article/what-is-ai-heres-everything-you-need-to-know-about-artificial intelligence/

Duggal, N. (2023). What is artificial intelligence: Types, history, and future.https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial/what-is-artificial-intelligence#:

Edinyang, S. D. (2018). *Social studies methods, materials and resources.* Calabar: University of Calabar Press.

Flasiński, M. (2016).History of artificial intelligence.İçinde M. Flasiński (Ed.).*Introduction to artificial intelligence* (ss. 3-13).Springer.

Fu, Die. {2019). Where is school education going in the era of artificial intelligence.*Modern*

Guo, Y., and Y. Xiao.(2019). Artificial intelligence in education.*In 4th International Conference on Modern Management, Education Technology and Social Science (MMETSS 2019)* Atlantis Press.

Hinojo-Lucena, F. J., I. Aznar-Díaz, and J. M. Cáceres-Reche, M. P., & Romero-Rodríguez. (2019). Artificial intelligence in higher

education: A bibliometric study on its impact in the scientific literature.*Education Sciences* 9(1):51.

Holmes W. and Porayska-Pomsta K. (eds) (2022), The ethics of artificial intelligence in

education: practices, challenges, and debates, Routledge, New York.

Huang, Y. (2021). Artificial intelligence in promoting teaching and learning transformation in schools, *International Journal of Innovation, Creativity and Change* 15*(3),* 893-902

Karsenti, T. (2019).Artificial intelligence in education: The urgent need to prepare teachers for tomorrow's schools.*Formation et Profession* 27(1), 112–16.

Keiper, M. C., Fried, G., Lupinek, J. & Nordstrom, H. (2023). Artificial intelligence in sport management education: Playing the AI game with ChatGPT. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 33, 100456.https://doi.org/10.1016/j.jhlste.2023.100456

Kissock, C. (1981). *Curriculum planning for social studies texcaching*. New York: John Wiley and Sons.

Kuprenko, V. (2020). Artificial intelligence in education: Benefits, challenges, and use cases. Retrieved from https://medium.com/towards-artificial-intelligence/artificial-intelligence-ineducationbenefits-challenges-and-use-cases-db52d8921f7a.

Lee, J. &Jeong, H. (2023).Keyword analysis of artificial intelligence education policy in South Korea.*IEEE Access*. https://doi.org/10.1109/ACCESS.2023.3317261

Liu, H. (2016). *Artificial intelligence and its evolution*. Beijing: Science Press,5-8.

Mahendra, Sanksshep. (2023). How is AI Being Used in Education." Available athttps://www.aiplusinfo.com/blog/how-is-ai-being-used-in-education/, accessed on May 23, 2023.

Malik, G., D. K. Tayal, and S. Vij. (2019). An analysis of the role of artificial intelligence in education and teaching." *In Recent Findings in Intelligent Computing Techniques* 407–17.

Mezieobi, K. A., (2008). *Socialstudies in Nigeria: Teachingmethods, instructional materials and resources*. Owerri: AcadaPeak.

Mureșan, M. (2023).Impact of artificial intelligence on education.*Research Association for Interdisciplinary Studies,* 8*(9),* 81-85

Murugesan, S. &Cherukuri, A. K. (2023). The rise of generative artificial ıntelligence and ıts ımpact on education: the promises and perils. *Computer*, *56*(5), 116-121. https://doi.org/10.1109/MC.2023.3253292

Nwogu, F. C. (2021). The impact of artificial intelligence on library collections and services in Nigeria.*Journal of Library and Information Science*, 19(1), 32-43.

Okorosaye-Orubite, A. K. (2019).Education in Nigeria.In Y.M Abdulrahman& F.G Paulley.*Education and development in Nigeria*. Port Harcourt: PI African Press.

Ololobou, Y. P. (1999). *Dimensions of social studies.*Pankshin: Academic Trust Fund.

Osakwe, E. O &Iedjere, P. O. (2015).*Social studies for tertiary students in Nigeria*. Benin City.Justice Jeco Press Ltd.pdf.pdf, accessed 25 June 2022.

Popenici, S. A. & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education.*Research and Practice in Technology Enhanced Learning, 12*(1), 1-13. https://doi.org/10.1186/s41039-017-0062-8

Tete, S. and Obitor M (2020). Education in nigeria: challenges and way forward. *International Journal of Academic Research and Reflection 8*(1) P 42-48

Vikoo, B. (2016). *Curriculum development: A process approach*. Port Harcourt. Pearl Publishers International Ltd.

UNICEF (2021). Policy guidance on AI for children, available at www.unicef.org/globalinsight/

Vijayakumar&Sheshadri, (2019).Applications of artificial intelligence in academic libraries. *International Journal of Computer Sciences and Engineering* . https://www.google.com/search?q=Artificial+Intelligent+Component+Diagram&oq. DOI: 10.26438/ijcse/v7si16.136140

Xie, C., Ruan, M., Lin, P., Wang, Z., Lai, T., Xie, Y., Fu, S. & Lu, H. (2022). Influence of artificial ıntelligence in education on adolescents' social adaptability: A machine learning study. *International Journal of Environmental Research and Public Health, 19(*13), 7890.https://doi.org/10.3390/ijerph19137890

Yang, W. (2022). Artificial intelligence education for young children: Why, what, and how in curriculum design and implementation. *Computers and Education: Artificial Intelligence*, *3*, 100061. https://doi.org/10.1016/j.caeai.2022.100061

Yetişensoy, O. &Rapoport, A. (2023).Artificial intelligence literacy teaching in social studies education.*Journal of Pedagogical Research*, *7*(3), 100-110. https://doi.org/10.33902/JPR.202320866

Zhang, Zhizheng, Linlin Zhang, and Mang Li. (2019).The due analysis of artificial intelligence education application: The necessity and possibility of teaching automation.*Distance Education in China* (01):25–35.

Zhu, Qiongli, and Minjuan Wang. (2019). Team-based mobile learning supported by an intelligent system: Case Study of STEM students." *Interactive Learning Environments* 1–17.