
Manuscripts on the Artificial Intelligence and Digital Research

Journal homepage: <https://manuscriptology.org/index.php/AIDR>

ARTIFICIAL INTELLIGENCE (AI) IN EDUCATIONAL MANAGEMENT INFORMATION SYSTEM (EMIS)

OKONKWO, CECILIA O. (PhD)^{1,*} CHINELO E. OKONKWO²

^{1,2} Department of Educational Management, Shehu Shagari University of Education Sokoto
Phone Number: 08034374262

*Correspondence: ceciliaokonkwo@gmail.com

ABSTRACT

Globally, management of education system attracts considerable attention due to its role in providing workforce that can manage other sectors of the nation's economy. Obviously, the economic, scientific and technological development of any nation depends on the quantity and quality of skills produced by the education system. Based on this premise, every nations' of the world is challenged by the changing needs of the society, which functional education as a priority can offer by reflecting the paradigm shift to adapt to the evolving world of technology to remain relevant and effective. To attain the main objective of this paper, the researchers collected pieces of data in literature using the Google Scholar Search engine since this search engine indexed the majority of different research articles worldwide; and other secondary data from print resources. Inclusion and exclusion criteria were used to narrow the literature to the theme of the study. Specifically, this paper reviews the following: Concept of Artificial Intelligence (AI) and EMIS, Role of AI and EMIS in the management of Education System; AI in EMIS, Benefits of AI, challenges, conclusions and way forward proffered. Some valuable findings of this paper show that AI has aided effective educational management, and improved teaching and learning processes; which requires increased funding and adequate technological facilities.

© 2024 <https://manuscriptology.org>

ARTICLE HISTORY

Submitted/Received: 03 Oct 2024

First Revised: 29 Oct 2024

Accepted: 19 Nov 2024

Publication Date: 23 Nov 2024

KEYWORDS:

*Artificial Intelligence,
Educational management,
Management Information System.*

INTRODUCTION

Education is a process of training an individual to be useful to himself and the society. Therefore, globally, pressing goal of Education, especially University Education is functionality of the system. Essentially, functional education reflects the needs and demands of the society which are properly integrated through strategic planning with the demands of the world economy. Stich (2009) opined that education is one of the stimulators of the growth and development of any society and it enhances the development of the potentials of human beings, hence every society gives it a priority. William & Anekwe (2010) are of the view that the development of any society depends largely on the creative capacity of the citizens to be capable of effectively exploring and exploiting the country's natural resources and transform them into finished products and services so as to enhance the standard of living of the country's citizens.

However, to achieve the goals of education in any society requires effective and efficient management capacity. For Education to be functional, therefore implies that the management plays crucial role in coordinating all the human and material resources of the institution and create enabling environment for goal attainment. Thus, any changes and or modifications required in any society is preceded by educational revolution. Suffice it to say that Artificial Intelligence (AI) and Educational Management Information (EMIS) are the new technologies of 21st Century which are significantly impacting the education system in various ways.

Educational Management Information System (EMIS) play a crucial role in the administration and operation of educational institutions. Likewise Artificial Intelligence aid Educational Administrators in making data-driven decisions to improve school management. Consequently, integrating Artificial Intelligence (AI) in EMIS has the potential to revolutionize how data is managed, analyzed, and utilized to enhance decision-making, streamline operations, and improve educational outcomes. Therefore, the authors aim to unravel through content analysis the various concepts, impact and benefits as well as challenges of AI in the management of education system, especially higher education. However, the result of this paper will be beneficial to educational institutions, administrators, and other stakeholders; and individuals for future references and knowledge sharing.

Concept of Artificial Intelligence (AI)

Artificial Intelligence (AI) is an evolving technology that tries to stimulate human intelligence using machines. In fact, AI encompasses various subfields, including machine learning (ML) and deep learning, which allow the use of computer systems. It is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. In other words, AI is technology that enables computers and digital devices to learn, read, write, create and analyze data. Therefore, AI can perform most of the functions human beings are capable of performing, especially in schools. It is a technique that enables a machine to mimic human intelligence. Okonkwo (2024) opined that AI are computers designed to mimic the capabilities of the human mind; such as learning from examples and experience, recognizing patterns, analyzing vast amount of data, understanding and responding to language, making predictions, automate complex processes and solving problems. In a similar vein, (AFSA, 2022) holds the view that Artificial Intelligence (AI) has applications across numerous fields, including health care, finance, transportation, customer service and education. It has the potential to transform industries, improve efficiency and create new opportunities.

Frankenfield (2023) defined Artificial Intelligence (AI) as simulation of human intelligence by software-coded heuristics. He reiterates further that Artificial intelligence is a branch of science producing and studying the machines aimed at the simulation of human intelligence processes.

Artificial Intelligence is the 5th generation computers that can operate like human brain. It is becoming a way of life, with new systems and uses evolving the more. For instance, from AI chat bots to machine learning, among others. AI portrays the ability of human being, even though it is a machine but display human-like capabilities such as reasoning, learning, planning and creativity. Though, AI is a machine (computer) but performing tasks that require human brain. It performs such tasks as to generate, classify, image analysis, speech recognition, among others. Ogunode and Ukozor (2023) explained that AI can aid effective tertiary institution administration, effective implementation of teaching programmes, effective management of data, improve security, among others. In the views of Olatunde-Aiyedum (2024), Artificial Intelligence is a collection of systems, packages and applications designed into digital computers or computer-controlled robots to carry out assignments and tasks with human-like intelligence.

Concept of Educational Management Information System (EMIS)

Educational management is a process of utilizing available resources (human and materials) to achieve education goals. Such processes are: planning, organizing, staffing, directing, coordinating, controlling, budgeting and evaluating. In other words, the education manager employs these elements of management in his/her daily activities in the school to be able to achieve the expected goals/objectives. Akpakwu (2012) define educational management as the ability of educational managers to judiciously use human, material, time and financial resources towards achieving the goals of education.

Educational Management Information System (EMIS) therefore can be defined as a system for the collection, integration, processing, maintenance and dissemination of data and information to support decision making, policy analysis and formulation, planning, monitoring and management at all levels of an education system. Hence, EMIS play a crucial role in the management and operation of educational institutions. In other words, EMIS involve the use of computers to perform management functions in the school to generate useful information that support decision-making and general school administration for dissemination of information that helps in creating knowledge economy. It could be seen as central data hub in the university, where school to the benefit of both staff and students can collect, store, analyze and use data (historic and in real time) for communication as it concerns stakeholders of the institution. Therefore, EMIS focus on how an organization or institution best manage and organize data and translate them into information for effective and efficient management. It is a system that monitors the the performance of education programme offered by the institution. John, Erlinda, Leilani and Wendell (2022) opined that EMIS had become a critical component of our everyday living and in education it contributes to assist and at the same time for schools' growth depending on the level of education institution. The bulk of information can drastically impact on how administrator will come up and deal with data following their operation and service prospects.

Artificial Intelligence (AI) in Educational Management Information Systems (EMIS)

Incorporating Artificial Intelligence (AI) into Educational Management Information System (EMIS) is the focus of this review. Essentially, integrating AI into EMIS has the

potential to revolutionize how data is managed, analyzed and utilized to enhance decision-making, streamline operations, and improve educational outcomes. With the fast pace and changes going on with education process, information management in education institutions is a role of the organization's functions and responsibilities. There are various aspects of how Artificial Intelligence (AI) can impact and or transform Educational Management Information Systems (EMIS); such aspects include:

1. **Data Management and Integration:** AI is capable of collecting data from multiple sources like students' records, academic performance, financial information etc. It provides up-to-date information through automation of large volumes of data for easy access and analysis; by integrating it into a unified platform. Ogunode, Okolie, and Chinedu (2023) as well as Okonkwo (2024) are of the view that AI is identified as a valuable tool for supporting virtual learning, refining research program development, optimizing community service programs, managing data effectively, enhancing security, and improving staff attendance in tertiary institutions. Data is vital for planning and decision making. Hence, effective data management in institutions is a crucial task of the administrator for goal attainment which AI helps to achieve.

2. **Decision-making Support and Predictive Analytics:** AI through machine learning algorithms can analyze historical data to predict future trends such as students' enrolment patterns, dropout risks, and resource needs. It can also provide real-time insights and recommendations to educational administrators that are beneficial in strategic planning and resource allocation. Such as identified by Anber and Muhammad (2016) in Okonkwo (2024), that AI technology enhance audit quality, electronic audit tasks, encompassing planning, etc. Samsonova (2018) opined that AI promote idea sharing, enhance class management and class preparation. He further reiterates that Interactive Whiteboard (IWB) enable teachers to integrate computer applications like graphic design tools, database tools, and use social networking technologies such as Youtube, Wiki, Facebook, and Twitter, to create profiles and share information with the users to project files and manipulate them on a board's surface; and will only function when a computer projector and Liquid Crystal Display (LCD) are present.

3. **Personalized Learning and Student Support:** AI as part of our everyday lives in education has come to stay. The emergence of AI is now a tool for enhancing the learning experience across classrooms thereby redefining the way students learn and educators teach. Students do homework using AI chat boxes, like ChatGPT, Bing AI, ChatSonic etc. known as Virtual assistants. Therefore, AI systems can provide personalized learning by analyzing student data that helps them identify learning needs. It is capable of providing students with suggestions on learning paths. It can provide students on daily basis, every needed information regarding their academic processes as well as administrative process through Chatbots and virtual assistants. Evidently, Mamudu and Lamido (2017) and Ogunode, & Gregory (2023c) identified that presentation translator can draw students into a conversation and enhance full class participation. They further reiterate that, in classes where all the learners speak and understand English as the only language spoken, deaf or hard-of-hearing students can follow along with the real-time display, either on the teacher's display or by joining the conversation on their smart phone.

4. **Operational Efficiency:** The use of AI in schools provides the school manager the opportunity to maximize time for more value-added activities. AI therefore ensures

operational efficiency and effectiveness by optimizing, scheduling, classroom allocation, and faculty assignments due to the fact that the operations are based on quality data-driven insights. Therefore, AI can improve the efficiency of school administration by automating school activities. Supporting this view, Chan and Tsi (2023); Ogunode, Agbade, and Bassey (2023); Ogunode and Olowonefa (2023) affirmed that as school activities become automated, like fee collection, admission enquiries management, tracking the circulation of books in the library, helping administrators plan the entire academic year and more; AI can improve the efficiency of school administration.

5. **Improves Communication and Engagement:** AI can facilitate better communication in the school, between students, teachers, parents, and administrators through automated notifications and personalized messages. In other words, AI provides avenue for easy communications in terms of timely, fast and distance become irrelevant. The students can communicate with staff through email and/or short messages services (sms) and get their task or assignment done. In a similar vein, the staff and management can carry out their duties using computers without meeting face to face. For instance, the case of COVID-19 pandemic, during lockdown period, and yet workers carried out their tasks from home using computers. Also, AI can help identify and address issues affecting student involvement and satisfaction through analysis of engagement data. Supporting the above view, Olusegun and Honmane (2024); Ogunode, Idoko and ThankGod (2024); Ogunode, Edinoh, and Chinedu, (2023) in their study, concluded that deployment of AI for teaching and learning of mathematics programme in tertiary institutions aid presentation, preparation of students' result report, mapping, modeling, method for automated simulation, implementation of the method for automated modeling, mathematics research development, improved mathematics student engagement and motivation, enhanced personalized learning, among others.

6. **Security and Data Privacy:** Educational Management Information System through the use of Artificial Intelligence (AI) technologies can enhance the security of EMIS by detecting and assigning cyber security threats in real-time. On the other hand, AI through automated data protection and governance mechanisms can ensure compliance with data privacy regulations.

7. **Evaluation and Assessment:** The evaluation and assessment processes in school through the use of automated systems can be modernized using AI. That is, AI can grade and analyze assessment data and organize it. Also, the students' performance in real-time through the use of AI such as Adaptive Assessment Tools can adjust the difficulty level of the questions. Similarly, AI-powered Chatbots can be used by students to resolve doubts in real-time, and also be used by school authorities to provide information to parents and students; and as well grading assignments, generating reports, among others. Supporting the above view, Ogunode, Okolie, and Chinedu (2023) highlighted the pivotal role of AI in tertiary institution management, emphasizing its contribution to effective administration and implementation of teaching programs, enhancement of student learning, and facilitation of examination processes.

Benefits of Artificial Intelligence (AI) in Educational Management Information System (EMIS)

The value of AI and management information system (MIS), especially in education, has created a more significant avenue for data and information organization. It is easier for schools

to tap different stored information in their data banks. Consequently, the benefits of MIS as it impacts on school administration and management has been detailed above under the subtopic, AI in EMIS. However, Shah (2014) in his view highlighted the following benefits, thus : accessibility of information, efficient administration, high usage of school resources, reduced workloads, better time management, and improved quality of reports. Meanwhile, the benefits of AI in EMIS is not limited to internal school administrations only, but encompass other stakeholders who in one way or the other interacts with the institution. Such as parents, government, local education authority, ministry of education, and other interested individuals and or organizations as the case may be. AI supports distance learning program as it provides access to data and information timely.

Challenges of Artificial Intelligence (AI) in Education Management Information System (EMIS)

Despite the numerous benefits of Artificial Intelligence (AI) in educational management information system (EMIS), there are challenges. However, the challenges may occur in varying degrees depending on the institution and or the country. For instance, in a developed country like USA, UK, or any other, the use of AI in EMIS is not a new thing and as such may not face some minor challenges as would be the case with a developing nation (for example, Nigeria) where AI is a new technology. Consequently, the challenges of AI in EMIS in a developing nation like Nigeria are considered as follows:

1. Inadequate Financial support to education system: Due to inadequate financial support from the government in providing the facilities to incorporate AI in the higher educational institutions, it is difficult to employ the new technologies fully in the management of academic institutions, especially at higher education level where the AI facilities are mostly needed.

2. Data Privacy and Security: Using AI in the management of information in schools requires extra care not to expose salient information. That is, ensuring student and institutional data privacy and security is paramount. Therefore, AI systems must be designed not to violate data protection regulations and the ethical standards in the course of managing huge data.

3. Inadequate communication infrastructure: AI infrastructural facilities are either limited or lacking in many institutions of learning in Nigeria; resulting to limited ease of accessibility. This is partly as a result of poor financing of education and lack of political will to invest or prioritize education.

4. Technical ability: inadequate availability of ICT personnel is a common challenge to developing nation due to generally low digital fluency. For instance, many Nigerian academics are yet to meet up with this challenge. Therefore, to successfully integrate AI into EMIS requires sufficient investment in technology and training for staff to acquire the necessary technical skills/ability for comprehension of EMIS and application.

5. Corruption: due to corruption in the system, bias and fairness in the management of institutions of learning is challenging. Therefore, AI systems must be properly monitored so as to avoid biases, especially in such critical areas like admissions and grading. University management should ensure that there is fairness and equity in AI applications because the AI operators may engage in bribery and corruption, thereby messing up the institution reputation.

6. Reward system: poor remuneration to staff of academic institutions is a red flag to a successful working system, let alone specialized area like integrating Artificial Intelligence

in Educational Management Information System. Such poor reward system can generate other vices like manipulations of data, lack of commitment by the computer operator, bribery as earlier mentioned, and a host of others. Suleiman (2024) remarked ‘there is general acknowledgement of some challenges acting as impediments to the mainstream use of technology in higher education; notable among the impediments are low digital fluency among academic staff and relative lack of reward for teaching’. However, this paper posits that in as much as these challenges may seem surmountable, but are very critical in developing nations like Nigeria where the digital divide between the ICT natives (students) and ICT immigrants (lecturers/managers) is quite a wide gulf.

7. Flexibility: due to rapid changes and uncertainties in technology development, predicting specific future needs is usually difficult. Hence, AI solutions may not be flexible enough to adapt to changing educational environments and policies.

8. Other challenging vices ranging from such issues as, facilitating technology addiction by students, encouraging plagiarism, job displacement; kills originality of content of work in education – critical thinking is hampered. More so, unemployment may arise because machine does many of the works human beings are supposed to do.

Conclusion

Having explored several areas of integrating Artificial Intelligence (AI) in the Management of Information System in higher education, AI has the potential to aid transformation of educational system in Nigeria. The education management deals with vast data. So, to foster comprehension of educational management information system (EMIS) so as to maximize its full potential, especially in our fast-changing environment require seasoned professionals. However, by understanding the diversity of information available in institutions would make the management to engage in applying artificial intelligence (AI) in EMIS considering the benefits. Although, there are challenges of data privacy and security as well as integration and adoption; but gradual follow up provides the support towards needed adaptation in academic institutions.

Way Forward

There are suggestions for future directions that can contribute to the ongoing transformation of educational management, and help institutions to leverage AI to create more efficient, effective and equitable educational environment. They are:

1. Adequate financial support to education by the government through budgetary allocation is essential and imminent.

2. To provide robust information and communication technology (ICT) infrastructure.

3. Provide competent personnel, through training and retraining of staff for skills to engage in EMIS in their institutions. That is, balance innovation with digital literacy.

4. Adequate power (electricity) supply is essential to engage new technologies.

5. Policy design around social media use for teaching and learning is necessary. More so, AI policies should not violate the existing education policies and regulations, even when there is need to upgrade or expand its computer network.

6. Supervision is necessary; deals with management of huge amount of data and information which is a concern, and require professionals and effective monitoring.

Also supervise students’ engagement with ICT to minimize addiction.

REFERENCE

1. Akpakwu, S. O. (2012). Educational Management: Theory and Practice. Makurdi: Destiny Ventures.
2. AFSA. (2022). Artificial intelligence and education. Retrieved June 22, 2023 from <https://www.theschoolleader.org/news/artificial-intelligence-and-education>
3. [Britannic \(2020\). Education . https://www.britannic.com](https://www.britannic.com)
4. Dibia, N. G. and Okpara, M. (2015). University Education in Nigeria in the 21st century: Challenges and Prospects in T. A. Bolarin (ed). *Journal of the Nigerian Academy of Education (JONAED)* 11 (1), 14 – 32.
5. Frankenfield, J. (2023). Artificial Intelligence: what it is and how it is used
6. <https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp>
7. [IBM \(2024\). Technology. https://www.ibm.com](https://www.ibm.com)
8. John, M. R. A, Erlinda, F. L., Leilani, C. L. & Wendell, C. C. (2022). Education Management Information System (EMIS) and its Implications to Educational Policy: A mini-Review. *International Journal of Multidisciplinary: Applied Business and Education Research*. Vol. 3, No. 8, 1389 – 1398.
9. Mamudu, F. & Lamido, A. A. (2017). A comparative analysis of the effects of robots on Nigeria economy, *Journal of Computer Engineering*, 19(5), 36-40. DOI: 10.9790/0661-1905023640.
10. Ogunode, N. J. & Ukozor, C. U. (2023). Curriculum revolution in Higher Education: the mighty role of artificial intelligence. Retrieved June 22, 2023,
11. Ogunode, N., J. & Ejike, C., N. (2023). Artificial Intelligence and Curriculum Implementation of Post-Basic Education and Career Development (PBECD) in Nigeria. *Journal of Innova,on in Educa,on and Social Research*, 1 (4),50-56
12. Ogunode N., J. & Olowonefa J., A. (2023). AI Education in Nigerian Schools. *International Journal of Human Computing Studies*, 5(10),47-55.
13. Ogunode, N. J., Agbade, O. P., & Bassey, U. O. (2023). Barriers to effective usage of artificial intelligence in tertiary institutions in north-central Nigeria. *Web of Semantics: Journal of Interdisciplinary Science*, 1(1), 38-43.
14. Ogunode, N. J., Edinoh, K., & Chinedu, O. R. (2023). Artificial intelligence and tertiary education management. *Electronic Research Journal of Social Sciences and Humanities*, 5, (IV), 18- 31.
15. Ogunode, N., J. Idoko G. & ThankGod , P. (2024). Artificial Intelligence and Implementation of Educational Administration and Planning Programme in Nigerian Tertiary Institutions. *International Journal of Academic Integrity and Curriculum Development* ,1 (1), 41-47.

16. Ogunode, N. J., Gregory, D. M. (2023c). Artificial Intelligence (AI) in Educational Administration. *International Journal on Orange Technologies*, 5(10), 7-16.
17. <https://journals.researchparks.org/index.php/IJOT/article/view/483>
18. Olatunde-Aiyedun, T.G. (2024). Artificial intelligence (A.I) in education: integration of AI into science education curriculum in Nigerian universities. *International Journal of Artificial Intelligence for Digital*, 1(1), 1-14. <https://ssrn.com/abstract=4733349>
19. Olusegun, A. J. & Honmane, O. (2024). Deployment of artificial intelligence for teaching and learning of mathematics programme in tertiary institutions in Nigeria. *Best Journal of Innovation in Science, Research And Development*, 3(1), 126-137.
20. Okonkwo, C. O. (2024). Educational Management and Artificial Intelligence in Nigerian Schools. *American Journal of Technology Advancement*. Vol.1, No.6, 1 – 9.
21. Peretomode, V.E. (1991). *Education and the Law. Principles Cases and Materials in School*, Owerri International University Press.
22. Samsonova, O. (2018). Elementary teachers' uses and perceptions of Interactive Whiteboards for instruction, *International Journal of Learning, Teaching and Educational Research*, 17(8), 17- 35. <https://DOI.org/10.26803/ijlter.17.8.2>
23. Shah, M. (2014). Impact of Management Information System (MIS) on School Administration: What the literature says. *Procedia-Social and Behavioural Sciences*, 116, 2799 - 2804
24. Stitch, T. G. (2009). Making learning relevant in the 21st century. [/http://library/naldntwork.cal/item/5893](http://library/naldntwork.cal/item/5893)
25. Suleiman, R. Y. (2014). Trends in Open and Distance Learning in Nigerian University System. In J. A. Okojie, S. Akirinde, and N. B. Saliu (eds). *The National Universities Commission and University Education in Nigeria: Perspectives on the development of a System*. 203 – 232.
26. [UNESCO \(2020\). Education. http://learningportal.iiep.unesco.org](http://learningportal.iiep.unesco.org)
27. Williams, C. & Anekwe, J. U. (2010). Nigeria University Education and Functionality in the 21st Century in E. C Iloputaife, B. U. Maduewesi & F. O. Igbo. *Issues and challenges in Nigerian Education in 21st century*. West & Solomon Publishing by. Ltd.