ARTIFICIAL INTELLIGENCE ON TEACHING AND LEARNING OF SCIENCE EDUCATION PROGRAMME IN TERTIARY INSTITUTIONS IN NORTH-CENTRAL, NIGERIA

Okwelogu Izunna Somadina
Department of Medical Laboratory Science,
Nnamdi Azikiwe University, Nnewi Campus,
Nigeria
is.okwelogu@unizik.edu.ng

Olamoyegun, Stephania Olabisi
Department of Science and Environmental
Education, Faculty of Education, University of
Abuja
oduyemiolabisi09@gmail.com

Abstract

The study assessed the effects of artificial intelligence on teaching and learning of science education programme in tertiary institutions in Nigeria. The study used descriptive survey method. The population of the study comprises of all academic staff in North-Central Nigeria. The sample for the study was made up of 200 academic staff in the region. The researcher formulated an instrument titled Artificial Intelligence and Science Education Questionnaire (AISEQ). Test and re-test method was used to determine the reliability of the instrument. The result collected on the first and second were correlated and it yielded a coefficient of 0.86 which is high enough for the study. Descriptive statistics was used to analyze data collected for the research questions and hypothesis formulated for the study. The result collected and analyzed disclosed that Al support implementation of science education in Nigerian Tertiary institution in the following areas; Al supports presentation of lecture on science education, assists lecturers to carry out researches in science education, helps lecturer to provide community services, assists lecturers to develop course note, aids effective classroom management, assists lecturers to assign assignments and projects to students, support distance learning education, support individual learning and collaborate learning, assists students in writing research work, assists effective examinations in tertiary institutions and support practical work in laboratory. The result established that artificial intelligence has aided teaching and learning of science education in Nigerian tertiary institutions. Based on this, the study recommended that the tertiary institutions manager should increase funding of science education to enable the procurement and deployment of Al for the teaching and learning of science education in Nigerian tertiary institutions.

Keywords: Artificial intelligence, Science education, Tertiary institutions.

INTRODUCTION

National policy on Education (2013) of Nigeria defined tertiary education as the education given after Post Basic Education in institutions such as Universities and Inter-University

Centres such as the Nigeria French Language Village, Nigeria Arabic Language Village, National Institute of Nigerian Languages, institutions such as Innovation Enterprise Institutions (IEIs), and Colleges of Education, Monotechnics, Polytechnics, and other specialized institutions such as Colleges of Agriculture, Schools of Health and Technology and the National Teachers' Institutes (NTI). Ogunode, Edinoh and Okolie (2023) defined tertiary education as a planned and organized educational system designed for the total development of man/woman and for the total transformation of the society through the utilization of teaching, research and provision of community service. Tertiary education can also be viewed as post basic and secondary school education that embraces advanced teaching, research and community service. Ogunode & Odo (2023) acknowledged that tertiary education is the third tiers of education that is designed for the production of skilled and professionals for the socio-economic and technology advancement.

Tertiary education globally are designed to offer courses or programmes in sciences, social sciences and art. The art programme covers education which also has many programme in arts, social sciences and science education. Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The traditional subjects included in the standards are physical, life earth, space and human science. Science education study requires a variety of unique instructional materials in addition to those materials common to all education.

The importance of science education to the social, economic and technological development of the country cannot be underestimated. (Harry, 2011) observes that Science education promotes intellectual respect for Mother Nature. This action can inform choices with regard to how technology is used to enhance the current living conditions for humans and other living things. Science education encourages learners to reason critically so as to make decisions that are well informed. There are no shortcomings in science education, good knowledge of science principles and facts are vital for a comprehensive education.

The search, collaboration, reporting and communication skills provided by science education can yield a whole generation of people who are more prepared for their careers, such people can make better contributions to the society. Furthermore, learners who have an in-depth knowledge in science education are more willing to use new ideas and technologies that can enhance and strengthen the economy. Through explaining and emphasizing the reliance of living organisms on one another and also on the environment, science education promotes intellectual respect for Mother Nature, This action can inform choice with regards to how technology is used to enhance the current living conditions for both humans and other living things (Christine, & Hayatu. 2014)

The implementation of science education programme in Nigerian tertiary institutions requires both human and materials resources such as ICT and Artificial intelligence. Al in globally have been integrated into the educational sector especially in the tertiary institutions to aid implementation of curriculum. Ogunode, Agbade & Bassey (2023) viewed Al as programs designed with human-like intelligence and structured in forms of computer, robot, or other machines to aid in provision of any kind of service or tasks to

improve social economic and political development of the society. Frankenfield (2023) defined Artificial intelligence (AI) as simulation of human intelligence by software-coded heuristics. Artificial Intelligence is a branch of science producing and studying the machines aimed at the stimulation of human intelligence processes.

For Copeland (2023), Artificial intelligence (AI) can be defined as the ability of a digital computer or computer controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience. Artificial intelligence (AI) according to Ogunode & Ejike, (2023) are machines programme forms with capacities and abilities to execute tasks and responsibilities that human beings are performing with the assistance of human-like intelligence.

Ogunode and Olowonefa (2023) focused on AI Education in Nigerian Schools. Also, Igbokwe, (2023) looked at application of artificial intelligence (AI) in educational management. Chen, L., Chen, and Lin, (2020) focused on Artificial intelligence in education. For Borbajo, Malbas, & Dacanay (2023), their study focus on reforming education: the global impact of integrating artificial intelligence in the classroom environment. Bordia (2023) did a study on How is AI used in education and academics. Femi (2022) focused on Artificial intelligence and Basic school management in Nigeria. At the tertiary institutions, Ocana, Valenzuela-Fernandez, and Garro-Aburto (2019) critically looked at Artificial Intelligence and its implications in higher education while Xiaolin and Xiaojun (2022) investigated Artificial intelligence for higher education development and teaching skills. Ogunode, Agbade, & Bassey (2023) looked at barriers to effective usage of artificial intelligence in tertiary institutions in north-central Nigeria. Also, Ogunode, Edinoh, and Chinedu, (2023) looked at Artificial intelligence and tertiary education management. It is important to also look into the deployment of Artificial intelligence and teaching and learning of science education in Nigerian tertiary institutions. It is based on this that this study is aimed at assessing the effects of artificial intelligence on teaching and learning of science education programme in tertiary institutions in Nigeria.

PURPOSE OF THE STUDY

The study assess the effects of artificial intelligence on teaching and learning of science education programme in tertiary institutions in Nigeria. The sub-objective includes:

i. To ascertain the effects of artificial intelligence on science education programme in tertiary institutions in Nigeria.

RESEARCH QUESTIONS

Based on this research objectives, the researcher formulated the following research questions to address the objectives:

1. What is the effects of artificial intelligence on teaching and learning of science education programme in tertiary institutions in Nigeria?.

METHODS

The study used descriptive survey method. The population of the study comprises of

all academic staff in North-Central Nigeria. The sample for the study was made up of 200 academic staff in the region. The proportionate stratified sampling technique was employed to select the population of the academic staff in the four selected public universities in the region. The researcher formulated a questionnaire titled Artificial Intelligence and Science Education Questionnaire (AISEQ). The questionnaire was divided into two parts- Parts A and Part B. Part covered information about the respondents while part B contains the 20 items separated into two research questions. The instrument was subjected to face and content validation using two academic staff from Educational Management department university Abuja. Test and re-test method was used to determine the reliability of the instrument. The constructed questionnaire were distributed twice after a two weeks interval to 20 selected academic staff in the region which are not part of the sampled population. The result collected on the first and second were correlated and it yielded a coefficient of 0.86 which is high enough for the study. Descriptive statistics was used to analyze data collected for the research questions and hypothesis formulated for the study.

DATA ANALYSIS
Table 1: Analysis of Responses on Artificial Intelligence and Science Education

N= 200

S/N	ITEM	X	SD	DECISION
1	Al support presentation of lecture on science education	2.99		Agreed
2	Al assists lecturers to carry out researches in science education	3.12		Agreed
3	Al helps lecturer to provide community services	3.15		Agreed
4	Al assists lecturers to develop their course note	3.32		Agreed
5	Al aid effective classroom management	2.96		Agreed
6	Al aid lecturers to assign assignment and projects to students	3.02		Agreed
7	Al distance learning education	2.88		Agreed
8	Al support individual learning and collaborate learning	3.05		Agreed
9	Al assists students in writing their research work	3.22		Agreed
10	Al assists effective examinations in institutions	3.09		Agreed
	Average Mean	**3.87**		

Table 1 shows that the lecturers agreed that Al is support implementation of science education in Nigerian Tertiary institution. Specifically, Al support presentation of lecture on science education (item 1, x = 2.99), Al assists lecturers to carry out researches in science education (item 2, x = 3.12), Al helps lecturer to provide community services (item 3, x = 3.15), Al assists lecturers to develop their course note (item 4, x = 3.32), Al aid effective classroom management (item 5, x = 2.96), Al aid lecturers to assign assignment and projects to students (item 6, x = 3.23), Al distance learning education (item 7, x = 2.88), Al support individual learning and collaborate learning (item 8, x = 3.05), Al assists students in writing their research work (item 9, x = 3.22), Al assists effective examinations in institutions (item

10, x = 3.09). The average mean is greater than the cut-off point of 2.50, so is accepted that artificial intelligence has aided teaching and learning of science education in Nigerian tertiary institutions.

DISCUSSION OF FINDINGS

The result collected revealed that lecturers agreed that Al is support implementation of science education in Nigerian Tertiary institution in the following areas; Al support presentation of lecture on science education, assists lecturers to carry out researches in science education, helps lecturer to provide community services, assists lecturers to develop course notes, aids effective classroom management, aid lecturers to assign assignment and projects to students, support distance learning education, support individual learning and collaborate learning, assists students in writing researches, aids effective examinations in institutions tertiary in Nigeria and support practical work in laboratories. The result established that artificial intelligence has aided teaching and learning of science education in Nigerian tertiary institutions. This result is in line with the discovered of Verma (2018); Huang, and Rust, (2021); Zhang, Zhang, and Li, (2019); Borbajo, Malbas, and Dacanay (2023); Ogunode, Edinoh, and Chinedu, (2023); Williams (2023) and Ogunode, Idoko and ThankGod (2024) that concluded that AI aided effective tertiary institution administration, effective implementation of teaching programmes, enhance effective student learning in tertiary institutions, aid effective conduct of examination in tertiary institutions, support virtual learning in tertiary institutions, improve research programme development, improves provision of community service programme, aids effective data management, improves security in tertiary institutions and improves the attendance of staff in tertiary institutions.

CONCLUSION AND RECOMMENDATIONS

The objectives of the study was to assess the effects of artificial intelligence on science education programme in tertiary institutions in Nigeria. The result collected and analyzed disclosed that Al support implementation of science education in Nigerian Tertiary institution in the following areas; Al supports presentation of lecture on science education, assists lecturers to carry out researches in science education, helps lecturer to provide community services, assists lecturers to develop course note, aids effective classroom management, assists lecturers to assign assignments and projects to students, support distance learning education, support individual learning and collaborate learning, assists students in writing research work, assists effective examinations in tertiary institutions and support practical work in laboratory. The result established that artificial intelligence has aided teaching and learning of science education in Nigerian tertiary institutions.

Based on this, the study recommended that the tertiary institutions manager should increase funding of science education to enable the procurement and deployment of Al for the teaching and learning of science education in Nigerian tertiary institutions.

REFERENCES

Borbajo, N. M., Malbas, M. H., & Dacanay, L. R. (2023). Reforming education: The global impact of integrating artificial intelligence in the classroom environment. *American Journal of Language, Literacy and Learning in STEM Education, 1*(05), 16-27.

Bordia, D. (2023). *How is AI used in education and academics?* https://blog.teachmint.com/how- is- ai-used-in-education-academics

Chan, C. K. Y., & Tsi, L. H. (2023). *The AI revolution in education: Will AI replace or assist teachers in higher education*? arXiv preprint arXiv:2305.01185.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Ieee Access*, *8*, 75264-75278.

Copeland, B.J (2022). Artificial Intelligence. https://www.britannica.com/technology/artificial- intelligence

Federal Republic of Nigeria. (2013). *National Policy on Education*. Lagos, NERDC press.

Femi, T. (2022). Artificial intelligence and Basic school management in Nigeria. *International Journal on Technologies*, 5(9), 7-14.

Frankenfield, J, (2023). Artificial Intelligence: What It Is and How It Is Used https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp

Christine,. A. & Hayatu S,. J. (2014). Universal basic education (ube) in Nigeria problems and prospects in learning basic science in the upper basic : a case study of kajuru local government area of Kaduna State.

Harri, D. (2011).*Benefits of science education*. Retrieved from http:// benefits of science education.

Huang, L. and Rust, G. (2021). Preparing lecturers for the application of AI-powered technologies in teaching, Journal of science education, 15(2), 135-145.

Igbokwe, I. C. (2023). Application of artificial intelligence (AI) in educational management. *International Journal of Scientific and Research Publications, 13*(3), 300-307.

Ocana, F. Y., Valenzuela-Fernandez, L., & Garro-Aburto, L. (2019). Artificial Intelligence and its implications in higher education. Propósitosy Representaciones, 7(2), 536-568, DOI: 10.20511/pyr2019.v7n2.274

Ogunode, N,. J. & Odo, R,. C (2023). Social Problems in Tertiary Institutions. *Web of Semantic: Universal Journal on Innovative Education 2(7),* 112-124

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

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*

Ogunode, N. J., Agbade, O. P., & Bassey, U. O. (2023). Barriers to Effective Usage of Artificial Intelligence in Tertiary Institution in North-Central, Nigeria. *Web of Semantics: Journal of Interdisciplinary Science,* 1(1), 38–43. http://web.semanticjournals.org/index.php/wos/article/view/13

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*

Ogunode N,. J. & Olowonefa J,. A. (2023). AI Education in Nigerian Schools.

International Journal of Human Computing Studies, 5(10),47-55.

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.

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.

Verma, M. (2018). Artificial intelligence and its scope in different areas with special reference to the field of education. International Journal of Advanced Educational Research, 3(1), 05-10. Retrieved from www.educationjournal.org

Xiaolin, X. and Xiaojun, L. (2022). Artificial intelligence for higher education development and teaching skills. *Wireless Communications and Mobile Computing*, pp. 1-10.

Williams, M. (2023). Readiness of Nigerian Universities for AI Integration. Higher Education Research, 30(1), 67-82.

Zhang, Z, Zhang, L. and Li, M. (2019). "The Due Analysis of Artificial Intelligence Education Application: The Necessity and Possibility of Teaching Automation." Distance Education in China (01):25–35.