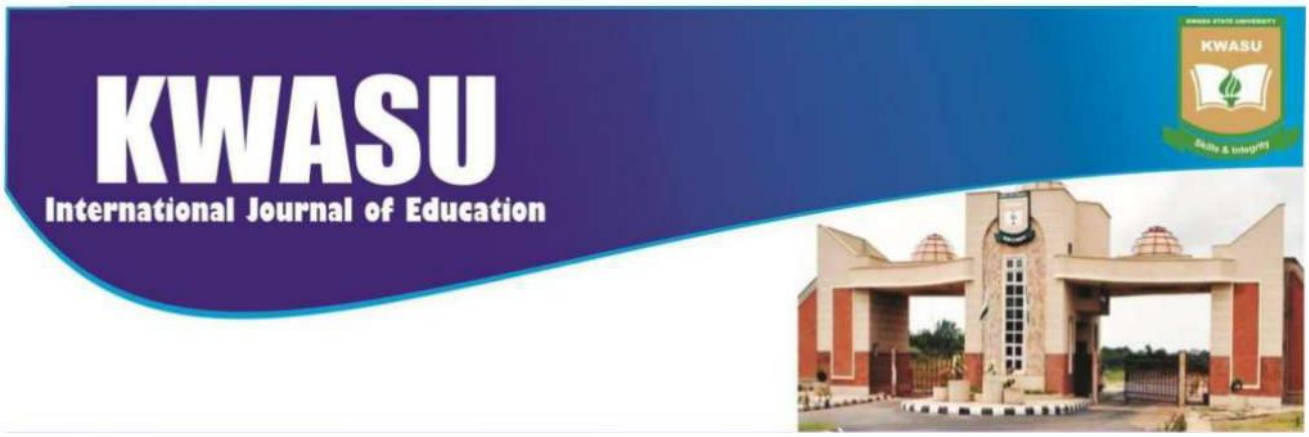


EARLY CHILDHOOD LECTURERS' KNOWLEDGE AND USE OF ARTIFICIAL INTELLIGENCE TOOLS IN TEACHING IN SOUTH-WESTERN, NIGERIA

Olubukola Christianah DADA [1]
Department of Special Education, Faculty of Education, Kwara State University, Malete, Nigeria
olubukola.dada@kwasu.edu.ng
Tel: 08034468438

Usman Tunde SAADU[2]
Department of Early Childhood and Primary Education, Faculty of Education, Kwara State University, Malete, Nigeria
usman.saadu@kwasu.edu.ng
Tel: 08038493554

Joshua Sule **MAMMAN**[3]
Department of Business and Entrepreneurship Education, Faculty of Education, Kwara State University, Malete, Nigeria
Joshua.mamman@kwasu.edu.ng
Tel: 08038632283

Lukman Ajanaku HAMMED[4]
Department of Early Childhood and Primary Education, Faculty of Education, Kwara State University, Malete, Nigeria
Lukman.hammed@kwasu.edu.ng
Tel: 08032075125

Abstract

Globally, the rapid emergence of artificial intelligence tools in education highlights both opportunities and challenges for teaching and learning. In Nigeria, its practical implementation in educational settings is still in its early stages and remains a growing area of concern. This study, therefore, investigated early childhood lecturers' knowledge and use of AI tools in teaching in South-Western Nigeria. This investigation involves answering six research questions and testing two null hypotheses at 0.05 significance level. The target population comprised ninety early childhood lecturers and seven hundred and twenty-three 300 and 400 level students across six public universities in Lagos Ondo and Ekiti states. Descriptive design was adopted. Assessment test and Questionnaire was used to obtained data and 73 lecturers were sampled via multistage and proportionate techniques and validated through face and content validity by expert. Reliability coefficients obtained via test-retest over a two-week interval were 0.79 for the Lecturers

Knowledge and 0.92 for the Lecturers Use. Data were analyzed using means, standard deviations, and MANOVA at 0.05 level of significance. Findings revealed that lecturers possessed high knowledge (mean=70.34) of AI tools but the level of use was low (mean=2.37). Findings from MANOVA analysis revealed that there was no significant gender differences in lecturers' knowledge ($F(1,71) = 0.248$; $p > 0.05$) and use ($F(1,71) = 0.186$; $p > 0.05$) of AI tools. It is concluded that early childhood lecturers in South- Western Nigeria possessed high knowledge of but lecturers under utilise these technologies. It is recommended that the Department of Early Childhood Education organise regular, hands- on AI workshops and seminars to translate lecturers' positive dispositions into ethical and practical integration into teaching and learning.

Keyword words: Early childhood lecturers, Knowledge, Level of use, Artificial intelligence tools

Introduction

Artificial intelligence (AI) has made a big difference in how people live and carry out their activities in every sector of society, especially in the past few years. In the education sector, the integration of artificial intelligence has already begun, and it is gradually becoming an integral part of teaching and learning processes, which Early Childhood and Primary Education is not left out of. As this technology continues to find its way into the sector, there is a need to consider the potentials that lie ahead as far as the future of education is concerned with the use of artificial intelligence. However, despite these possibilities, the integration of artificial intelligence in teaching and learning by Early Childhood educators should not be overemphasised in the field of Early Childhood Education. By doing this, it will appear to be in line with the global advancements in AI and its practical implementation within tertiary institutions in Nigeria. This reality raises concerns about whether the education sector is adequately prepared to harness the transformative capabilities of artificial intelligence and thus warrants the need for further investigation.

Many artificial intelligence tools can be used for teaching, such as adaptive learning platforms, automated grading systems, and speech recognition software. In its simplest definition, artificial intelligence is about making computers do things that are usually done by human beings. However, this definition barely scratches the surface of its vast potential and implications. The growing presence of AI in education has introduced tools like adaptive learning platforms, automated grading systems, speech recognition software, predictive analytics and so on (Habib, Jelani, & Najla, 2022). Artificial Intelligence can be extremely beneficial in helping young children develop their language and speech skills because it can offer accurate, instant feedback and assessment on pronunciation, vocabulary, comprehension, and fluency. In the classroom, Artificial Intelligence could support and benefit early childhood development by personalising learning, providing one-on-one tutoring, and supporting language development. Additionally, Artificial Intelligence can assist teachers and Early Childhood Education staff by streamlining administrative tasks and providing data about children's development (Shannon,2024).

AI tools are also important in early childhood and primary education, a field that focuses on helping children learn and develop skills that prepare them for primary school and future life. These tools can adapt to individual learning needs, analyse large amounts of data, and offer insights that align with the individual requirements of students in this line of field (Luan et al., 2020). For lecturers, AI tools can help streamline administrative tasks such as grading and lesson planning, giving them more time to focus on fostering creativity and critical thinking in young learners. The integration of AI in early childhood education can not only help lecturers manage the diverse needs of their students but can also equip students with the tools necessary to succeed academically and professionally (Adu, 2025). As AI continues to develop, its role in education as a whole will likely expand, offering new ways to support students and lecturers in education, including those in the field of early childhood.

In a bid to promote and scale up the integration of artificial intelligence tools in education, the federal government of Nigeria has also put forward different technological initiatives for higher

institutions to imbibe the culture of embracing modern technologies in teaching and learning. Some of these initiatives, according to Alabi and Mutula (2017), are the Nigerian Universities Network (NUNet), the Polytechnics Network (PolyNet), the National Virtual (Digital) Library, and the Nigerian Education Academic and Research Network (NEARNet). The Federal Ministry of Education also stated that the Nigerian Universities Electronic Teaching and Learning (NUETAL) platform has been established in some Federal and State Universities as a technology-enabled interactive teaching and learning tool (Federal Ministry of Education, 2019). These show that the integration of modern technologies in education, including those based on artificial intelligence, is an issue of national interest. However, despite these technological initiatives and strategies, little or no favourable outcomes have been achieved, and full integration has not been realised.

The aforementioned shows that more work needs to be done, and this has prompted the need for continuous exploration of ways to improve the situation (Chen, Chen, & Lin, 2020). This includes identifying the major factors that might potentially make or mar the full integration of artificial intelligence in teaching and learning. Among these factors, knowledge plays a pivotal role, as it determines the ability of individuals to understand, utilise, and maximise the potential of AI tools in educational settings. Madu and Musa (2024) argued that when lecturers possess adequate knowledge about AI, they are more likely to engage with its applications effectively, whether through adaptive learning platforms, automated grading systems, or data-driven insights that enhance personalised learning. On the other hand, a lack of knowledge might hinder their willingness to adopt and integrate these technologies into teaching processes.

Closely related to knowledge, how lecturers use artificial intelligence tools in teaching processes also has the potential to influence the extent to which these tools are integrated into educational systems. According to Celik et al. (2022), when lecturers employ AI tools for tasks such as automated grading, lesson planning, and performance tracking, they can focus more on interactive teaching methods and student engagement. Similarly, students who actively use AI tools to support their learning, such as through virtual tutors or predictive analytics for academic planning, may experience improved academic outcomes. On the other hand, limited or inappropriate use of these tools might hinder the integration process, as underutilization could result in missed opportunities to enhance teaching and learning. Furthermore, reliance on traditional methods or inconsistent application of AI tools might create gaps in the learning process, thereby impeding the realisation of AI's full potential in education. For example, Aithal, Prabhu and Aithal (2024) suggest that while AI tools hold significant promise, their successful integration requires consistent and meaningful use by lecturers and students alike to create a cohesive and technology-driven learning environment. These dynamics underscore the importance of exploring how the actual usage of AI technologies by lecturers and students shapes their integration into educational systems, particularly in regions like South-Western Nigeria, where the application of such tools is still evolving.

The selection of knowledge, and use as key areas of focus in this study is driven by their important role in the integration and application of artificial intelligence in teaching and learning. Knowledge is essential because it serves as the baseline for understanding what artificial intelligence entails, how it functions, and its potential applications in the educational context (Cope, Kalantzis, & Searsmith, 2021). Without sufficient knowledge, lecturers are unlikely to recognise the value AI can add to teaching processes, let alone adopt its tools effectively. knowledge provides the foundation; the use is a practical extension of knowledge as it reflects the actual engagement with AI tools in teaching. The degree to which AI tools are utilised offers a tangible measure of how well they have been integrated into the educational process (Grájeda et al., 2024). All these make knowledge and use worthy of consideration when examining the integration of AI in education. Furthermore, knowledge and use cannot be considered alone; it is also necessary to determine gender as a moderating variable in the study if this varies among male and female individuals.

Gender is a variable of interest in this study because it provides a unique lens to investigate how societal expectations shape the adoption and utilisation of AI in education. This focus is especially

relevant in the context of Nigeria, where cultural and social constructs surrounding gender can sometimes influence technological exposure and participation in digital innovation (Umukoro et al., 2021). Gender disparities in technology use and digital literacy, as highlighted by researchers like Stöhr, Ou and Malmström (2024), suggest that male and female lecturers might engage with AI tools differently. For instance, Bubou and Job (2022) and Katyal and Jung (2021) argued that male educators are often more inclined to explore and adopt emerging technologies, while females may perceive them as overly complex or intimidating and may sometimes face cultural biases that might limit their engagement with these tools. This, however, does not imply that one gender is inherently better suited for AI integration but rather highlights the nuanced ways in which gender dynamics might shape attitudes toward and usage of AI technologies in teaching and learning (Goel, 2025). Likewise, in fields like early childhood and primary education, which have been historically described as female-dominated, it becomes pertinent to investigate whether this gender dynamics influences how AI tools are perceived and utilised by lecturers and students (Taniavska, 2024; Wu, 2023). By examining gender as a moderating variable, this study seeks to uncover whether and how gender dynamics impact the knowledge and use of artificial intelligence in teaching and learning processes.

Understanding these dynamics is not only timely but also critical given the increasing global emphasis on 21st-century skills and the potential of artificial intelligence in reshaping educational practices, particularly in early childhood and primary education (González-Pérez, & Ramírez-Montoya, 2022). This is particularly significant in South-Western Nigeria, where efforts to incorporate modern technologies into teaching and learning processes are still at an evolving stage. By exploring the relationships among these variables, the study aims to provide more clarity and shed light on the preparedness of lecturers in early childhood education to embrace AI-based technologies. Thus, it is against this background that the researcher considers it essential to examine early childhood lecturers' knowledge and use of artificial intelligence tools in teaching in South-Western Nigeria.

Statement of the Problem

The integration of artificial intelligence (AI) into teaching and learning processes has gained considerable attention globally. However, in Nigeria, its practical application in teaching and learning remains a growing area of research and an area of concern. A few researchers have made valuable insights on this subject matter; however, there are still gaps in the literature. From the literature reviewed by the researcher, available data shows that there was no significant difference in the mean rating of respondents on the need for artificial intelligence in teaching and learning as well as performing administrative tasks among universities in Southern part of Nigeria, there was little availability of Artificial intelligence technological tools in handling universities` activities poor internet facilities, instabilities in governance, inadequate funding, poor electricity supply among others are factors inhibiting implementation Artificial Intelligence.

Although previous studies have examined technology integration in Nigerian tertiary institutions, there is limited research specifically addressing Artificial Intelligence's role in Early Childhood Education. This gap is particularly critical given the unique pedagogical approaches required in early childhood education. This is a field of study that focuses on helping children learn and develop skills that prepare them for primary school and future life; thus, addressing this gap is essential to understanding how artificial intelligence can be effectively leveraged to support foundational learning and development.

Likewise, this study considered the interplay between knowledge and use of artificial intelligence tools among educators of Early childhood education as a whole in a single study. While some research has explored lecturers' opinions on artificial intelligence, limited attention has been given to these variables. This is part of the gaps this study intends to fill by adopting in-depth perspective on the subject matter. Understanding the moderating role of gender is crucial for

identifying potential barriers to AI integration and designing targeted interventions that promote equitable adoption across all groups.

Observations made from the present researcher's interactions with some lecturers in the South-Western part of Nigeria also suggest that the integration of artificial Intelligence in education has sparked both excitement and concern. While AI holds great potential to revolutionise educational practices, there are growing concerns about its implications, especially in the field of Early Childhood and Primary Education. The concern is that reliance on AI might lead to people losing their jobs and might contribute to a reduction in individualised intervention that is essential for effective teaching in Early Childhood and Primary Education, where understanding the emotional and psychological aspects of learning is critical. The present study intends to address these identified gaps and contribute to the body of knowledge in the literature. Therefore, this study investigates early childhood lecturers' knowledge and use of artificial intelligence tools in teaching in South-Western Nigeria.

Research Questions

The following research questions were raised for the study

1. What is the level of lecturers' knowledge of artificial intelligence tools in teaching in South-Western, Nigeria?
2. What is the level of lecturers' use of artificial intelligence tools in teaching in South-Western, Nigeria?

Research Hypotheses

The null hypothesis was formulated and tested at 0.05 level of significance.

$H_0$1: There is no significant difference of early childhood lecturers' knowledge and use of artificial intelligence tools in teaching in South-Western, Nigeria, based on gender.

Methodology

A descriptive survey research design was adopted for this study. The population of the study comprises all lecturers, in public (State and Federal) Universities that offer Early Childhood Education in South-Western Nigeria. Lagos, Ogun, Osun, Ondo, Oyo, and Ekiti states. The sample size comprised 73 Early Childhood lecturers using a simple random sampling technique. The researcher makes Lecturers' Knowledge of Artificial Intelligence Tools Assessment Test and Lecturers' Use of Artificial Intelligence Tools Questionnaire. The researcher makes use of the face and content validity method. The reliability of the research instruments was determined through a pilot study using 25 copies of all two research instruments. The test-retest method was done within the interval of two weeks and reliability coefficients of 0.79 for Lecturers' Knowledge and 0.92 for Lecturers' Use. The data obtained for this study were analysed using both descriptive and inferential statistics. A summary of the demographic characteristics of the respondents was analysed using frequency count and percentages, while the research questions were addressed using the mean and standard deviation. formulated null hypotheses, Multiple Analysis of Variance (MANOVA) was used at 0.05 level of significance.

Results

Research Question One: What is the level of lecturers' knowledge of artificial intelligence tools in teaching in South-Western Nigeria?

Table 2: Table showing the level of lecturers' knowledge of artificial intelligence tools in teaching in South-Western, Nigeria

Dispersion	Score	N	Mean Score	Remark
Minimum	25	73	70.34	lecturers' knowledge of artificial intelligence tools level was high
Maximum	100			

Key: 0.00 – 49.99 = Low High: 50.00 – 100.00

Table 2 shows the level of lecturers' knowledge of artificial intelligence tools in teaching in South-Western Nigeria. Apparently, the minimum score was 25 while the maximum score was 100. Then the mean score was 70.34, which indicated that lecturers' knowledge of artificial intelligence tools in teaching in South-Western, Nigeria level was high.

Research Question Two: What is the level of lecturers' use of artificial intelligence tools in teaching in South-Western Nigeria?

Table 4: Table showing the level of lecturers' use of artificial intelligence tools in teaching in South-Western Nigeria

S/N	ITEMS	Mean	Std. Deviation	Remarks
1.	I use Artificial Intelligence-powered teaching tools to present my lectures to early childhood students within and outside the classroom	2.42	.927	Low
2.	I use educational software with Artificial Intelligence features to explain new topics in Early Childhood Education	2.97	.687	High
3.	I use automated grading systems to evaluate students' work	2.97	.645	High
4.	I use chatbots to answer frequently asked questions from students	2.40	.456	Low
5.	I use Artificial Intelligence tools to help design my lesson notes	2.23	.858	Low
6.	I use Artificial Intelligence to track and monitor early childhood students' progress over time	1.84	.707	Low
7.	I use Artificial Intelligence tools to provide timely feedback to my students	2.15	.720	Low
8.	I use Artificial Intelligence tools to assist in planning my daily and weekly lessons	2.01	.790	Low
9.	I use Artificial Intelligence for creating or editing multimedia teaching materials	2.36	.991	Low
10.	I use Artificial Intelligence-based educational games to make learning fun and interactive	2.23	1.100	Low
11.	I use voice assistants (such as speech-to-text tools) during my lectures	2.26	1.000	Low
12.	I use adaptive learning systems that adjust content based	2.29	.979	Low

	on student performance			
13.	I use Artificial Intelligence to analyse students' data for better understanding of learning needs	2.10	.945	Low
14.	I use Artificial Intelligence systems to help schedule and manage lecture time efficiently	2.26	1.167	Low
15.	I use Artificial Intelligence tools when preparing assignments and learning activities	2.90	.988	High
16.	I use Artificial Intelligence tools to monitor students' behaviour during lecture	2.27	.768	Low
17.	I use Artificial Intelligence to recommend additional learning resources to students	2.55	1.106	High
18.	I use Artificial Intelligence-based systems to record and manage attendance	2.04	.857	Low
19.	I use Artificial Intelligence to hold virtual meetings or webinars with my students	2.60	1.010	High
20.	I use digital content developed with Artificial Intelligence in my teaching materials	2.49	.748	Low
	Weighted average	**2.37**		
Decision: Low: 1.00 – 2.49			**High: 2.50 – 4.00**	

Table 4 shows the level of lecturers' use of artificial intelligence tools in teaching in South-Western Nigeria**.** The weighted average is **2.37,** which is less than 2.49, the baseline for positive opinion. This therefore shows a numeric indicator that the level of lecturers' use of artificial intelligence tools in teaching in South-Western Nigeria was low.

Research Hypothesis One: There is no significant difference of early childhood lecturers' knowledge and use of artificial intelligence tools in teaching in South-Western, Nigeria, based on gender.

Table 5: Showing summary of Multivariate Analysis of Variance (MANOVA) on early childhood lecturers' knowledge and use of artificial intelligence tools in teaching in South-Western, Nigeria, based on gender

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Knowledge	101.551[a]	1	101.551	.248	.620	.003
	Lecturers' Use	3.116[b]	1	3.116	.186	.668	.003
	Lecturers' Attitude	1.748[c]	1	1.748	.318	.575	.004
Intercept	Knowledge	361096.072	1	361096.072	882.089	.000	.926
	Lecturers' use	163492.431	1	163492.431	9757.673	.000	.993
	Lecturers' Attitude	252805.255	1	252805.255	45955.124	.000	.998
Gender	Knowledge	101.551	1	101.551	.248	**.620**	.003

	Lecturers' Use	3.116	1	3.116	.186	**.668**	.003
	Lecturers' Attitude	1.748	1	1.748	.318	**.575**	.004
Error	Knowledge	29064.887	71	409.365			
	Lecturers' Use	1189.624	71	16.755			
	Lecturers' Attitude	390.580	71	5.501			
Total	Knowledge	390375.000	73				
	Lecturers' Use	164903.000	73				
	Lecturers' Attitude	253680.000	73				
Corrected Total	Knowledge	29166.438	72				
	Lecturers' Use	1192.740	72				
	Lecturers' Attitude	392.329	72				

Table 5 shows that there was no significant difference of early childhood lecturers' knowledge of artificial intelligence tools in teaching in South-Western, Nigeria, based on gender ($F_{(1; 71)} = .248$, $P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significance value (.620) is greater than 0.05. This implies that gender does not significantly influence early childhood lecturers' knowledge of artificial intelligence tools in their teaching. The partial eta squared values of lecturers' knowledge were extremely low (.003), suggesting that gender explains only a very small proportion of the variance in lecturers' knowledge of artificial intelligence tools.

Also, Table 5 shows that there was no significant difference in early childhood lecturers' use of artificial intelligence tools in teaching in South-Western Nigeria, based on gender. ($F_{(1; 71)} = .186$; $P > 0.05$). The hypothesis is therefore not rejected in the light of the result since the significance value (.668) is greater than 0.05. This implies that gender does not significantly influence Early Childhood lecturers' use of artificial intelligence tools in their teaching. The partial eta squared values of lecturers' use were extremely low (.003), suggesting that gender explains only a very small proportion of the variance in lecturers' use of artificial intelligence tools.

Discussion of Findings

The first finding of this study revealed that the level of lecturers' knowledge of artificial intelligence tools in teaching in South- Western, Nigeria was high. This finding supports Fasola (2024), whose investigation of Library and Information Science educators in Nigerian higher institutions reported a high degree of AI awareness and knowledge. This could be as a result of both found high lecturer knowledge that both took place in Nigeria and sampled Nigerian university lecturers. It contradicts Ibrahim (2024), who reported a moderate level of AI knowledge among Arts faculty lecturers in Nigerian universities.

The second finding revealed that the level of lecturers' use of artificial intelligence tools in teaching in South- Western, Nigeria was low. This finding is in tandem with Idika et al. (2025), who surveyed 206 University of Calabar lecturers using a four-point frequency scale and likewise found inadequate AI utilization. It disagrees with McDonald et al. (2024), who analysed AI adoption policies across 116 U.S. R1 universities and found that 63% explicitly encourage ethical use of generative AI in teaching, provide sample syllabi, and embed AI activities in their curricula.

Another finding of this study revealed that there was no significant difference in early childhood lecturers' knowledge of artificial intelligence tools in teaching in South-Western, Nigeria, based on

gender. A possible reason for this finding could be that both male and female lecturers in the selected universities have received the same exposure to AI tools. This finding aligns with that of Onwuagboke et al. (2024) which was revealed that there was no gender difference in AI awareness among Nigerian lecturers at Alvan Ikoku Federal University of Education. This contrast to research conducted by Gesser- Edelsburg et al. (2024) emphasised that Israeli men reported significantly higher familiarity and knowledge with AI and Generative AI tools than women, even though actual usage rates did not differ by gender.

Also in another finding, it was revealed that there was no significant difference in early childhood lecturers' use of artificial intelligence tools in teaching in South- Western, Nigeria, based on gender. It could be as a result of lecturers' use of AI tools is largely self-motivated and shaped by individual teaching needs rather than by gender- linked factors. This finding is in tandem with Thomas et al. (2024), who sampled Nigerian university lecturers and found a grand mean of 1.85 ("Rarely Used"), indicating no significant gender difference in AI use. Thomas et al. and this present study obtained similar findings because both were conducted among Nigerian lecturers, used a descriptive survey design and a similar method of data analysis (t-test).

The aforementioned finding, however, contradicts the evidence obtained in the study of Kalim et al. (2025), where it was highlighted that "technological unawareness" and socio-cultural barriers disproportionately limit women's access to and use of AI tools, indicating lower adoption rates among female academics in several Asian contexts.

Conclusion

In view of the findings of the study, it was concluded that early childhood lecturers in South- Western Nigeria both possess high levels of knowledge of artificial intelligence tools in teaching. Despite this, lecturers' actual use of these technologies was low. Gender comparisons did not produce any significant differences in knowledge and use for lecturers.

Recommendations

In light of the findings of the study, the following recommendations were made

1. The Department of Early Childhood Education should organise regular workshops and seminars to sustain and enhance lecturers' practical knowledge and skills in order to keep them up to date with emerging AI applications.
2. Academic departments should address lecturers' low utilisation of AI tools by addressing ethical concerns and providing accessible infrastructural resources, ongoing technical support, and hands-on training sessions tailored to Early Childhood teaching contexts.
3. Policy makers should maintain and strengthen gender-inclusive professional development and mentoring schemes to ensure equitable participation of lecturers in AI tool adoption across South-Western Nigeria.

References

Adu, I. E. (2025). Integrating computational thinking and AI in early childhood education using holistic stem framework. IGI Global Scientific Publishing.

Aithal, P. S., Prabhu, S., & Aithal, S. (2024). Future of higher education through technology prediction and forecasting. Poornaprajna International Journal of Management, Education, and Social Science (PIJMESS), 1(1), 01-50.

Alabi, A. O., & Mutula, S. (2017). Exploring the use of instructional technology: A survey of academics at two Nigerian universities. Mousaion, 35(4), 1–20. https://doi.org/10.25159/0027-2639/2868

Bubou, G. M., & Job, G. C. (2022). Individual innovativeness, self-efficacy and e-learning readiness of students of Yenagoa study centre, National Open University of Nigeria. Journal of Research in Innovative Teaching & Learning, 15(1), 2-22.

Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The promises and challenges of artificial intelligence for teachers: A systematic review of research. TechTrends, 66(4), 616-630.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. Ieee Access, 8(2), 75264-75278.

Cope, B., Kalantzis, M., & Searsmith, D. (2021). Artificial intelligence for education: Knowledge and its assessment in AI-enabled learning ecologies. Educational philosophy and theory, 53(12), 1229-1245.

Federal Ministry of Education. (2019). National policy on information communication technology in education. Federal Ministry of Education Publications. Abuja. https://education.gov.ng/wp-content/uploads/2019/08/national-policy-on-ict-in-education

Gesser-Edelsburg, A., Hijazi, R., Eliyahu, E., & Tal, A. (2024). Bridging the divide: An empirical investigation of artificial intelligence and generative artificial intelligence imtegration across genders, disciplines and academic roles. The European Journal of Open, Distance and E-Learning, 2(2), 1-7. https://doi.org/10.2478/eurodl-2024-0008

Goel, H. (2025). Moving beyond gender: Recognizing equality and inclusivity across cultures through feminist AI. CRC Press.

González-Pérez, L. I., & Ramírez-Montoya, M. S. (2022). Components of education 4.0 in 21st century skills frameworks: Systematic review. Sustainability, 14(3), 1493-1497.

Grájeda, A., Burgos, J., Córdova, P., & Sanjinés, A. (2024). Assessing student-perceived impact of using artificial intelligence tools: Construction of a synthetic index of application in higher education. Cogent Education, 11(1), 228-336.

Habib, H., Jelani, S. A. K., & Najla, S. (2022). Revolutionizing inclusion: AI in adaptive learning for students with disabilities. Multidisciplinary Science Journal, 1(01), 1-11.

Ibrahim, A. B. (2024). Assessing the knowledge and perception of artificial intelligence for teaching and research among lecturers in the faculties of arts in Nigeria. Journal of Global Research in Education and Social Science, 18(2), 25-33.

Katyal, S. K., & Jung, J. Y. (2021). The gender panopticon: AI, gender, and design Justice. UCLA Law Review, 68(1), 692-700.

Luan, H., Geczy, P., Lai, H., Gobert, J., Yang, S. J., Ogata, H., & Tsai, C. C. (2020). Challenges and future directions of big data and artificial intelligence in education. Frontiers in psychology, 11(1), 58-69.

Madu, C. O., & Musa, A. (2024). Lecturers' level of awareness of artificial intelligence as correlate of their digital competence at Federal University Wukari, Nigeria. Journal of Educational Research in Developing Areas, 5(1), 59-67.

Onwuagboke, B. B. C., Nnajieto, C., Nzeako, R., & Umune, H. (2024). Lecturers' awareness of artificial intelligence tools for teaching and research in Alvan Ikoku federal university of education, Nigeria. African Journal of Humanities and Contemporary Education Research, 17(1), 1-14.

Shannon, A. (2024). Artificial Intelligence in Early Childhood Education. https://www.famly.co/us/blog/ai-in-early-childhood education#:~:text=AI%20can%20be %20Extremely%20beneficial,vocabulary%2C%20comprehension%2C%20and%20fluey.

Stöhr, C., Ou, A. W., & Malmström, H. (2024). Perceptions and usage of AI chatbots among students in higher education across genders, academic levels and fields of study. Computers and Education: Artificial Intelligence, 7(1), 100-107.

Taniavska, Y. (2024). "Female" profession of a preschool teacher: Experience, trends, and prospects. Aesthetics and Ethics of Pedagogical Action, 29(1), 53–62. https://doi.org/10.33989/2226-4051.2024.29.306134

Thomas, G. D., Gambari, A. I., Yusuf, H. T., Oluwafemi, A. M., & Daramola, F. O. (2024). Assessment of lecturers' awareness of artificial intelligence for education in a Nigerian university. Educational Technology Quarterly, 1(1), 4-20. https://doi.org/10.55056/etq.777

Umukoro, I. O., Omolade-Lawal, A. O., Babalola, S. O., Akinsumbo, K. S., Aligwa, R. M., & Abdul-Jeleel, B. A. (2021). Gender differences in access to and use of ICTs in Nigeria. IGI Global.

Wu, S. (2023). Critically consider the role of gender in early childhood education. Research and Advances in Education, 2(1), 41–49. https://doi.org/10.56397/rae.2023.01.07