

# Relationship Between Effective Implementation and Utilization of Artificial Intelligence and Promoting Quality Education Among Teacher Educators in Delta State

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## ABSTRACT

This study assessed the factors of teacher preparedness and government policy support in order to examine the relationship between effective implementation and utilization of Artificial Intelligence (AI) and promoting quality education among teacher educators in Delta State. Adopting a descriptive survey research design, the study targeted all teacher educators in Delta State public secondary schools, comprising junior and senior secondary levels, with a population of 14,000 educators. Using purposive sampling, Delta State was selected for its suitability in examining technology utilization in secondary schools, and a sample size of 2,640 teachers was drawn. Data collection involved a structured questionnaire titled “Implementation and Utilization of Artificial Intelligence among Teacher Educators Questionnaire (IUAITEQ).” Descriptive statistical tools such as frequency counts, mean scores, and standard deviation were used for analysis, while hypotheses were tested using the Product Moment Correlation Coefficient ( $r$ ). The findings reveal critical gaps in teacher preparedness in AI utilization and government policies that supports the need for AI implementation. Recommendations include providing comprehensive AI-related pre-service and in-service training for educators. Furthermore, partnerships between educational institutions and technology firms are encouraged to improve access to AI tools and expertise thereby improving the quality of teaching and learning experiences.

**Keywords:** Artificial Intelligence, Quality Education, Teacher Education and Teacher Preparedness

## INTRODUCTION

The advent of Artificial Intelligence (AI) has introduced innovative changes across various sectors, including education. AI technologies are increasingly being integrated into educational systems to enhance teaching, learning, and administrative processes (Edtech., 2020; Holmes et al., 2019). In the context of teacher education, AI has the potential to revolutionize the way education is carried out by offering personalized learning experiences, automating administrative tasks, and improving assessment methods. Globally, the teacher education level has embraced the adoption of AI-driven tools to improve teacher training programs, enhance curriculum design, and provide data-driven insights into teaching effectiveness (Hennekeuser et al. 2024). However, the implementation of AI among teacher educators in Nigeria, particularly in Delta State, remains under-explored, with many institutions lacking the necessary infrastructure, expertise, and resources to effectively integrate these technologies into their curricula (Basse et al., 2020).

Despite the recognized benefits of AI in education, its implementation and utilization among teacher educators face numerous challenges. These challenges necessitate a comprehensive assessment of the factors that influence the effective deployment of AI tools for improving educational outcomes. This study seeks to

explore the factors of teacher preparedness and government support policies required for the successful implementation and utilization of AI , with a focus on Delta State, Nigeria.

AI technologies have been widely recognized for their capacity to personalize learning experiences, automate administrative tasks, and provide real-time feedback, thereby promoting more effective teaching and learning processes (Zawacki-Richter et al., 2019). Teacher education programs, which are designed to prepare future educators, must integrate AI to keep pace with the evolving demands of modern education so that in turn, these teacher educators will be apply the knowledge in their teaching practices. In many developed countries, AI is already being used to enhance teacher professional development, support curriculum design, and facilitate more efficient assessment strategies (Seldon & Abidoye, 2018). However, in developing contexts such as Delta State, the implementation and utilization of AI by teacher educators remains limited, due to infrastructural, economic, and policy-related barriers.

Several factors influence the successful implementation of AI among teacher educators. These include the availability of technological infrastructure, teacher preparedness, access to training resources, government policies, and socio-economic conditions (Holmes et al., 2019). Delta State, like many regions in Nigeria, faces significant challenges in these areas, particularly with regard to insufficient funding, inadequate technological infrastructure, and a lack of expertise in AI applications (Bassey et al., 2020). These factors suggest the need for a thorough investigation into how teacher education programs can overcome these barriers to fully integrate AI for improved implementation and utilization by teacher educators.

While existing studies have addressed the potential of AI in education, few have examined its specific application by teacher educators within the Nigerian context (Adedoyin, 2020). Research on AI among teacher educators in Nigeria often focuses on broad educational reforms, without addressing the unique challenges faced by teacher training institutions. Furthermore, there is a paucity of data on how AI can be utilized to enhance the pedagogical skills of teachers-in-training, particularly in regions like Delta State where socio-economic and infrastructural limitations prevail (Ezenwafor & Nwankwo, 2022). This gap points to a need for localized studies that assess the factors required for effective AI implementation and utilization among teacher educators.

There are ongoing debates among scholars regarding the role of AI in teacher education. Some argue that AI has the potential to dehumanize education by placing too much emphasis on technology-driven approaches, at the expense of human interaction and critical thinking (Ezenwafor & Nwankwo, 2022). Others contend that AI, when properly integrated, can augment traditional teaching methods and improve educational quality (Luckin, 2017). This study seeks to contribute to this debate by examining how AI can be harnessed to complement, rather than replace, traditional pedagogical approaches among teacher educators.

Another critical gap in the literature is the paucity of data on the actual implementation and utilization of AI among teacher educators in Delta State. Existing studies tend to focus on the potential benefits of AI without examining the real-world application of these technologies by teacher educators in classroom settings (Holmes et al., 2019). This study seeks to fill this gap by providing empirical data on the current state of AI implementation and utilization among teacher educators in Delta State public secondary schools, offering insights into their level of preparedness and government support policies.

Delta State, like many regions in Nigeria, faces significant challenges related to the integration of AI in its educational sector. These challenges include limited technological infrastructure, insufficient teacher training, and a lack of government support for AI-driven educational initiatives (Ezenwafor & Nwankwo, 2022). Teacher educators, in particular, have not fully embraced the use of AI to enhance teaching practices and improve learning outcomes. Given the importance of teacher education in shaping the quality of education in any society, it is crucial to examine the factors that can facilitate the effective implementation and utilization of AI among teacher educators.

The primary objective of this study thus, is to examine the relationship between effective implementation and utilization of Artificial Intelligence (AI) and promoting quality education among teacher educators in Delta

State. Specifically, the study aims to:

1. Assess teacher preparedness and access to AI training resources.
2. Investigate the role of government policies in supporting AI implementation.
3. Examine the relationship between effective implementation and utilization of AI among teacher educators and quality education in Delta State.

This study seeks to answer the following research questions:

1. To what extent are teacher educators in Delta State prepared to integrate Artificial Intelligence into instructional practices?
2. What role do government policies play in supporting or hindering the implementation of Artificial Intelligence in teacher education programs in Delta State?

The following alternate hypothesis was tested at 0.05 level of significance:

There is a significant relationship between effective implementation and utilization of AI among teacher educators and quality education in Delta State.

## LITERATURE REVIEW

### Theoretical Framework

#### Constructivist Learning and Connectivism Theories

This study is hinged on the theories of Constructivist Learning and Connectivism. Constructivist Learning Theory as propounded Piaget posits that learners construct knowledge through active engagement and interaction with their environment (Wiyono et al., 2025). AI aligns with this theory by providing interactive platforms, such as intelligent tutoring systems, that adapt to the learner's input and offer personalized experiences that foster deep learning (Seldon & Abidoeye, 2018). For teacher education, AI tools create opportunities for prospective educators to engage with real-world teaching scenarios through simulations and virtual learning environments, allowing them to develop practical skills in a controlled setting.

Connectivism theory on the other hand emphasizes learning in the digital age, where knowledge is distributed across networks, and learning happens through interaction with technology (Siemens, 2005). AI fits within this framework as it facilitates networked learning by connecting teachers to vast resources, peers, and AI-driven tools that support collaborative learning and problem-solving (Anderson & Dron, 2017). In teacher education programs, AI can provide access to a global network of teaching resources, data analytics, and peer feedback, which are crucial for developing effective educators. Additionally, AI enhances collaborative learning environments by enabling real-time collaboration, feedback, and adaptive learning experiences that can adjust to the learning needs of both teachers and students.

#### Teacher Preparedness and Access to AI Training Resources

Teachers' attitudes toward the adoption of Artificial Intelligence (AI) in education significantly impact the effectiveness of its implementation. Recent research highlights both optimism and skepticism among educators regarding AI's role in transforming education. Holmes et al. (2019) found that while many teachers recognize the potential of AI to enhance student learning, others are concerned about its implications for teacher autonomy and job security.

This divide in attitudes stems from a lack of understanding of AI's capabilities and how it complements, rather than replaces, traditional teaching roles. Moreover, teachers who have negative perceptions of AI are less

likely to adopt it, even when presented with tools that could improve classroom outcomes (Luckin et al., 2016). Though literature often emphasizes the need to improve teachers' perceptions of AI, but it fails to delve into how institutional culture, leadership, and ongoing support play a role in shaping these attitudes.

### **Role of Government Policies in Supporting AI Implementation**

In recent years, the Nigerian government has recognized the potential of Artificial Intelligence (AI) to transform the education sector. However, the development of a clear policy framework for AI adoption in education is still in its early stages. According to Igbokwe and Nwokoye (2021), while Nigeria's broader ICT policies emphasize the integration of digital tools in education, specific policies focusing on AI are either underdeveloped or non-existent. The Nigerian government has established initiatives like the National Information Technology Development Agency (NITDA) to drive digital transformation, but there is a lack of a dedicated AI policy that outlines the implementation strategies for teacher education programs. This gap has left many educational institutions without a coherent guide on how to incorporate AI technologies effectively.

### **Implementation and Utilization of AI in Teacher Education Programs and Quality Education**

Implementation and utilization of Artificial Intelligence (AI) has the potential to significantly enhance teaching and learning outcomes in teacher training programs. AI technologies, such as adaptive learning platforms and intelligent tutoring systems, offer personalized educational experiences by tailoring content and instructional strategies to individual learners' needs (Holmes et al., 2019). For instance, AI-driven systems can analyze students' interactions and performance data to provide customized feedback and learning paths, which helps address diverse learning styles and paces (Bates et al., 2021). These personalized approaches are believed to improve student engagement and retention by catering to specific strengths and weaknesses.

Despite the promising potential of AI, there is a gap in empirical studies that measure the effectiveness of these AI tools in actual classroom settings, particularly among teacher educators. While theoretical models suggest significant benefits, there is limited longitudinal research on how AI tools impact long-term teaching and learning outcomes (Zawacki-Richter et al., 2019). For instance, AI systems can improve the quality of education through the use of natural language processing to evaluate written assignments, offer detailed feedback on students' writing skills, and even predict future performance based on current progress. This real-time analysis allows for more timely interventions and supports data-driven decision-making in educational settings (Ogunode & Musa, 2020).

Understanding these factors will provide insights into how AI can be leveraged to improve the quality of teacher education and, by extension, the overall educational system in Delta State. This study seeks to fill this gap by assessing the factors necessary for the successful integration of AI in teacher education programs, thereby contributing to the broader discourse on AI in education in Nigeria. This study seeks to address these gaps by investigating the critical factors required for effective AI implementation and utilization in teacher education programs, thereby providing actionable recommendations to improve the quality of education in Delta State and similar contexts.

## **METHODOLOGY**

### **Research Design**

The study employed a descriptive survey research design. Descriptive survey design is a systematic method of gathering data from a sample of individuals through questionnaires or interviews to describe a population's characteristics, attitudes or behaviour. The design was considered appropriate because it enabled the researcher to identify the characteristics of the population objectively.

### **Area of the Study**

The area of study is Delta State, Nigeria. It is located in the South-South geo-political zone of Nigeria and

named after the Niger Delta. It shares boundaries to the East with Anambra State and Edo State to the west. Delta State is an Oil-rich State with arable land for agriculture and water body for fishing. The state was initially created in August 27, 1991 with 12 local governments but currently has 25 local governments. Asaba is the state capital while Warri is largely regarded as the economic nerve of the state. The state has three senatorial districts which are Delta North, South and Central. This will guide the study in selection of sample area. The area of study was purposively selected from among the thirty-six states in Nigeria as it bears same characteristics with other states in regard to implementation and utilization of Artificial Intelligence among teacher educators.

### **Population of the Study**

The population of the study consists of all teacher educators in public schools in Delta State both at the junior and senior secondary levels who have passed through training in various teacher training institutions. Currently in Delta state, across the 25 local government areas, there are four hundred and seventy-three secondary schools (Ministry of Basic and Secondary Education, curriculum workshop data, 2020) with a population of over fourteen thousand (14000) teachers.

### **Sample and Sampling Techniques**

Purposive sampling technique was used to select Delta State as the area of study based on researchers' good knowledge of the area, proximity and the state having the characteristics needed to investigate technology integration in secondary schools. Multi-stage sampling was used to cluster Delta State into three based on her senatorial districts from which one cluster (senatorial district – Delta North) was randomly selected. Delta North senatorial district selected was then clustered based on the nine (9) local governments. Simple random sampling technique was then used to select five local governments (Oshimili North, Oshimili South, Ika North East, Aniocha North and Aniocha South). Comprehensive sampling technique was used to select all the public schools in that local government while simple random sampling technique was used to select thirty teachers from each school to make up the sample size.

### **Instrument for Data Collection**

A structured questionnaire titled “Implementation and Utilization of Artificial Intelligence among Teacher Educators Questionnaire (IUAITEQ)” was used to collect data. The instrument consisted of two sections. The first section elicited response on respondents personal data while the second section elicited response based on the variables measured in the study.

### **Procedure for Data Collection**

The researchers' having selected the sample locations obtain a letter of introduction from their institution - Federal College of Education (Technical), Asaba which was used to secure permission from Delta State Ministry of Secondary Education to carry out the research in the selected local government areas. At the level of the schools, the approval documents from the State ministry of education was used to secure the school principal's approval to administer the instruments in their schools. The instruments was given to the respondents within school hours. However, because of the number of items to be answered in the instruments, on-the-spot- method was not be employed rather the respondents kept the instruments for about two weeks upon which the research assistants appointed in each school that made up the sample supervised and collected them. The researchers later made a return trip to these locations to collect the instruments from the research assistants. Out of the 2640 questionnaire administered, 2200 copies were returned, which represented 83% rate of return.

### **Methods of Data Analysis**

Descriptive statistics of frequency counts, mean and standard deviation was used to answer the research questions asked while inferential statistics of Pearson Product Moment Correlation was used to analyze hypothesis generated. For the research questions asked, the decision rule is that any item with a mean score of

2.50 and above was regarded as Strongly Agree/Agree and any item with mean score below 2.50 is regarded as Disagree/Strongly Disagree. In order to determine the mean, the weights of the options were added together and divided by the number of options. This was done thus:  $4+3+2+1=10 \div 4 = 2.50$ . Therefore, 2.50 was the benchmark for acceptance of a mean score as Agree/Disagree or High Extent/Low Extent.

## RESULTS

**Table 1: Mean and Standard Deviation Response Scores on Extent Teacher Educators in Delta State are Prepared to Integrate Artificial Intelligence into their Teaching Practices.**

S/N	STATEMENTS	VHE	HE	LE	VLE	X	SD	Remark
1.	Teacher educators are well-trained to incorporate AI into their teaching practices.	105	180	275	1640	1.43	1.05	Low Extent
2.	I am confident in using AI technologies to improve my teaching.	180	250	330	1440	1.62	1.08	Low Extent
3.	My institution provides sufficient AI-related professional development opportunities.	100	210	525	1365	1.56	1.11	Low Extent
4.	Teacher educators regularly engage in AI training programs to stay updated.	50	430	770	950	1.80	1.03	Low Extent
5.	Teacher educators possess the technical skills needed to implement AI in their curriculum.	125	265	500	1300	1.63	1.25	Low Extent
6.	There is adequate support for teacher educators seeking to integrate AI tools into their teaching.	70	200	840	1100	1.66	1.12	Low Extent
	<b>Grand Mean/SD</b>					<b>1.61</b>	<b>1.10</b>	<b>Low Extent</b>

The responses in Table 1 shows that respondents rated preparedness of teacher educators as very low because the mean score on all statements were below the mean score average of 2.50. The overall grand mean of 1.61 also reflects a low level of preparedness among teacher educators for AI integration and the standard deviation of 1.10 shows that respondents were not far apart in their responses. This implies that the extent to which teacher educators in Delta State are prepared to integrate Artificial Intelligence into instructional practices is low.

**Table 2: Mean and Standard Deviation Response Scores on Role of Government Policies in Supporting or Hindering the Implementation of Artificial Intelligence in Teacher Education**

S/N	STATEMENTS	SA	A	D	SD	X	SD	Remark
8.	Government policies encourage the integration of AI in teacher education programs.	205	280	175	1540	1.61	1.15	Disagree
9.	The government provides funding for AI initiatives in teacher education.	280	350	230	1340	1.80	1.02	Disagree
10.	Government regulations are clear and supportive of AI implementation in education.	200	310	425	1265	1.74	1.11	Disagree
11.	There is sufficient policy support for the development of AI technologies in education.	150	530	670	850	1.99	1.09	Disagree
12.	Government policies are a barrier to the adoption of AI in teacher education programs.	1300	500	265	125	3.34	0.56	Agree
13.	The government offers incentives for institutions that adopt AI in their teacher education programs.	170	230	800	1000	1.80	1.02	Disagree
	<b>Grand Mean/SD</b>					<b>2.04</b>	<b>0.99</b>	<b>Disagree</b>

Table 2 shows that government policies in Delta State play a limited role in supporting the implementation of Artificial Intelligence (AI) in teacher education programs, and in some cases, act as barriers as most statements raised did not meet the mean score average of 2.50. Furthermore, a significant majority also see government policies as a barrier to AI adoption with a Mean score of 3.34. The grand mean of 2.04 reflects an overall negative perception of government policy support for AI in teacher education and the grand standard deviation of 0.99 shows that respondents were not far apart in their views.

**Table 3: Pearson Moment Correlation on Relationship between Effective Implementation and Utilization of AI in Teacher Education Programs and Quality Education**

Correlations			
		EFFECTIVE IMPLEMENTATION AND UTILIZATION OF AI IN TEACHER EDUCATION PROGRAMS	QUALITY EDUCATION
EFFECTIVE IMPLEMENTATION AND UTILIZATION OF AI IN TEACHER EDUCATION PROGRAMS	Pearson Correlation	1	.592**
	Sig. (2-tailed)		.000
	N	2200	2200
QUALITY EDUCATION	Pearson Correlation	.592**	1
	Sig. (2-tailed)	.000	
	N	2200	2200

\*\* . Correlation is significant at the 0.05 level (2-tailed).

Table 3 shows a moderate positive correlation between the effective implementation and utilization of AI in teacher education programs and quality education, with a Pearson correlation coefficient of 0.592. This value suggests a significant association, where improvements in AI adoption and utilization within teacher education programs correspond to an enhancement in educational quality. The correlation is statistically significant at the 0.05 level ( $p = 0.000$ ), confirming that the relationship is not due to chance and the alternate hypothesis postulated upheld. Therefore, there is a significant relationship between effective implementation and utilization of AI in teacher education programs and quality education in Delta State.

## DISCUSSION OF FINDINGS

This study reveals that the extent to which teacher educators in Delta State are prepared to integrate Artificial Intelligence into instructional practices is low. The finding aligns with that of Adedoyin (2020). Their research indicated that teachers often lack the training, confidence, and technical skills required to adopt AI-based instructional strategies. In addition, Ogunode and Musa (2020), also found a significant gap in professional development opportunities related to AI, which limits educators' ability to stay updated with evolving technologies. This lack of preparedness, as highlighted by both studies, is a critical obstacle to the successful adoption of AI in the educational sector.

Furthermore, this study found that government policies play a limited role in supporting the implementation and utilization of Artificial Intelligence among teacher educators, and in some cases, act as barriers to effective curriculum implementation. This finding aligns with the assertion made by Zawacki-Richter et al. (2019) that for AI to be successfully implemented in education, there must be a concerted effort from policymakers and educational leaders to create conducive environments for AI technologies to thrive. The authors emphasized the need for structured professional development programs and clear policy frameworks that support AI adoption. It is only when this is considered that institutional and governmental efforts to bridge the gap between current technological capabilities and the demands of AI utilization among teacher educators can be said to be taken serious.

Finally, this study found that there is a significant relationship between effective implementation and utilization of AI among teacher educators and quality education in Delta State. This finding aligns with that of Holmes et al. (2019) that the implementation and utilization of Artificial Intelligence has the potential to significantly enhance teacher training programs and by extension, how teacher educators teaching and learning outcomes. Also, it aligns with the findings of Bates et al. (2021) that AI technologies, such as adaptive learning platforms and intelligent tutoring systems, offer personalized educational experiences by tailoring content and instructional strategies to individual learners' needs and these personalized approaches are believed to improve student engagement and retention when employed by teacher educators.

## CONCLUSION

Despite the fact that there is a significant relationship between implementation and utilization of AI and quality education, teacher educators are still not adequately prepared for its utilization in their teaching practices. In addition, government policies do not sufficiently support the implementation of AI among teacher educators. Teacher educators are therefore faced with numerous challenges in implementing AI. There is therefore an undeniable need for policymakers and educational leaders to facilitate AI implementation and utilization by increasing funding, offering more professional development, collaborating with tech firms, and developing clearer policies.

## RECOMMENDATIONS

Based on the findings of the study, teacher education institutions should prioritize the provision of comprehensive AI-related training and professional development opportunities for educators to ensure they are equipped with the necessary skills to utilize AI. Also, the federal, state and local government educational policies should be revised and strengthened to provide clear guidelines and frameworks that encourage and facilitate the implementation of AI technologies among teacher educators. Furthermore, educational institutions can take the initiative to establish partnerships with technology firms to enhance access to AI tools, software, and expertise, as well as to improve the implementation and utilization in order to enhance the quality of teaching and learning experiences in schools.

## REFERENCES

1. Adedoyin, O. B. (2020). Technology-enhanced teaching and learning: A review of the use of AI in education. *Journal of Educational Technology & Society*, 23(1), 67–79.
2. Anderson, T., & Dron, J. (2017). *Teaching crowds: Learning and social media*. Athabasca University Press.
3. Bates, T., Sangrà, A., & Holmes, B. (2021). *Teaching in a digital age: Guidelines for designing teaching and learning for a digital age*. Tony Bates Associates Ltd.
4. Basse, A. O., Etim, P. J., & Eno, E. A. (2020). Barriers to the adoption of artificial intelligence in Nigerian education. *International Journal of Educational Management*, 34(5), 809–819.
5. Edtech. (2020). Successful AI examples in higher education that can inspire our future. *Edtech Magazine*. Retrieved from <https://edtechmagazine.com/higher/article/2020/01/successful-ai-examples-higher-education-can-inspire-our-future>
6. Ezenwafor, J. I., & Nwankwo, O. (2022). Artificial intelligence in Nigerian teacher education: Challenges and prospects. *Journal of Education and Practice*, 13(4), 12–23.
7. Hennekeuser, D., Vaziri, D. D., Golchinfar, D., Schreiber, D., & Stevens, G. (2024). Enlarged education: Exploring the use of generative AI to support lecturing in higher education. *International Journal of Artificial Intelligence in Education*, 1–33.
8. Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
9. Igbokwe, C., & Nwokoye, C. (2021). Integrating AI technologies into Nigerian education: Challenges and prospects. *International Journal of Educational Research*, 15(1), 56–72.
10. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson.

11. Luckin, R. (2017). Towards AI for education: Lessons learned from human intelligence. *Frontiers in Artificial Intelligence*, 3(2), 1–7.
12. Ogunode, N. J., & Musa, A. (2020). Challenges facing ICT integration in Nigerian education sector: Policy gaps and solutions. *International Journal of Educational Development in Africa*, 12(3), 34–48.
13. Seldon, A., & Abidoeye, O. (2018). *The fourth education revolution: Will artificial intelligence liberate or infantilise humanity?* University of Buckingham Press.
14. Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1).
15. Wiyono, B. B., Imron, A., Sumarsono, R. B., Musa, K., & Binti Mohd Saat, R. (2025). The effect of constructivist learning and project-based learning model on students' entrepreneurial competence in higher education. *Cogent Education*, 12(1), 2557606.
16. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education*.