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TEACHERS' PERSPECTIVE OF OPPORTUNITIES AND CONSTRAINS OF INTEGRATING ARTIFICIAL INTELLIGENCE INTO PRIMARY SCHOOL CLASSROOMS IN OSHIMILI NORTH LOCAL GOVERNMENT AREA OF DELTA STATE, NIGERIA

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ABSTRACT

This study examined teachers' perspectives on the opportunities and constraints of integrating Artificial Intelligence (AI) into primary school classrooms in Oshimili South Local Government Area of Delta State, Nigeria. A descriptive survey design was adopted, with a sample of 162 teachers selected from a population of 285 using stratified and simple random sampling techniques. Data were collected using a validated questionnaire and analyzed using mean, standard deviation, and one-sample t-test at a 0.05 level of significance. Findings revealed that teachers generally perceive AI as beneficial for enhancing personalized learning, improving lesson delivery, saving instructional time, and promoting pupils' academic performance. However, concerns were expressed regarding its ability to support learners with diverse needs. Major constraints identified include inadequate infrastructure, poor funding, limited internet access, and insufficient technical skills, although these were not statistically significant barriers. The study further showed that professional training significantly influences teachers' readiness to integrate AI, while awareness of AI among teachers was moderate but significant. Support systems such as government policies, funding, infrastructure, and technical assistance were strongly identified as essential for effective AI integration. The study concludes that while AI presents significant opportunities for improving primary education, its successful integration depends on enhanced infrastructure, continuous teacher training, and strong institutional support. It is recommended that stakeholders prioritize investment in digital resources, capacity building, and policy development to facilitate effective AI adoption in schools.

Keywords: Artificial Intelligence, Primary Education, Teachers' Perception, Nigeria, Educational Technology

Introduction

Artificial intelligence (AI) has become a transformative force in the education sector, offering innovative approaches to enhance teaching and learning processes. It enables the automation of

administrative tasks, personalization of instruction, and improvement of learning outcomes (Adelana & Akinyemi, 2021; Edwards, 2023). The integration of AI into educational systems is gradually reshaping traditional pedagogical practices by introducing intelligent tools that support both educators and learners.

AI applications in education are diverse and impactful. Technologies such as adaptive learning systems tailor instructional content to suit individual learners' needs, while intelligent tutoring systems provide immediate and customized feedback. These tools promote student-centered learning and improve instructional delivery. Furthermore, AI facilitates the analysis of large educational datasets, enabling educators to track students' progress, identify learning patterns, and evaluate teaching effectiveness more efficiently (Ehimuan et al., 2024). In addition, AI-powered virtual and augmented reality technologies create immersive learning environments that extend beyond the conventional classroom experience.

The evolution of digital technologies since the early 2000s has significantly influenced education by improving access to information and introducing advanced tools such as AI (Oyediran et al., 2020). These technological advancements have enhanced curriculum delivery, automated assessment processes, and supported personalized learning. As a result, AI is increasingly becoming an integral component of modern educational systems, contributing to more efficient and flexible teaching and learning practices.

Artificial intelligence, as a concept, has evolved over time. McCarthy (2007), cited in Oyediran et al. (2020), defined AI as the science and engineering of creating intelligent machines. More recent definitions describe AI as systems capable of performing tasks that require human intelligence, such as learning, reasoning, and decision-making (Pedro et al., 2019; Olatunde-Aiyedun, 2024). AI technologies, including machine learning, neural networks, and natural language processing, enable machines to replicate human cognitive processes and perform complex tasks efficiently (Adejo & Misau, 2021). These capabilities position AI as a valuable tool for enhancing educational practices.

In the educational context, AI plays a crucial role in personalizing learning experiences by adapting content to learners' preferences, abilities, and learning histories. Studies have shown that AI can significantly improve educational practices and outcomes by making learning more engaging and tailored (Edwards, 2023). Additionally, AI supports the expansion of online learning platforms and improves access to educational resources, preparing students for a future increasingly shaped by technology (Akgun & Greenhow, 2022).

Despite its numerous benefits, the adoption of AI in education faces significant challenges, particularly in developing countries such as Nigeria. Infrastructural deficiencies, including inadequate internet connectivity and limited access to digital tools, hinder the effective implementation of AI technologies (Olatunde-Aiyedun, 2024). Financial constraints also limit the ability of institutions to invest in the required infrastructure, thereby restricting access to AI-enhanced learning opportunities. Consequently, many prospective learners are unable to access education due to capacity limitations in higher institutions.

Although e-learning provides flexible access to education, many institutions still struggle to implement AI-driven platforms effectively. Educational processes in many Nigerian institutions

remain largely manual, leading to inefficiencies and reduced productivity (Adelana & Akinyemi, 2021). While well-resourced institutions globally continue to adopt AI technologies, Nigerian institutions lag behind due to inadequate funding and limited institutional support. This situation has contributed to low motivation among researchers and minimal integration of AI tools in teaching and learning (Eneh, 2020; Oyediran et al., 2020).

Another major challenge is the limited computer literacy among learners, which affects their ability to engage with AI-driven educational tools (Agarry et al., 2022). In addition, many educational institutions have not fully updated their pedagogical approaches to accommodate emerging technologies. As a result, the integration of AI in Nigeria's education sector remains slow, despite the growing need for innovation.

Furthermore, while AI offers significant opportunities for improving educational outcomes, it also raises concerns related to accessibility, data privacy, and the potential reinforcement of existing inequalities. These challenges highlight the need for careful planning and policy development to ensure the effective and equitable integration of AI in education.

Given these opportunities and constraints, it is essential to explore how AI can be effectively integrated into primary education, particularly from the perspective of teachers who are central to the implementation process. Therefore, this study examines teachers' perspectives on the opportunities and constraints of integrating artificial intelligence into primary school classrooms in Oshimili North Local Government Area of Delta State, Nigeria.

Statement of problem

Despite the global push toward digital transformation in education, the integration of Artificial Intelligence in education in Nigeria is still at a developmental stage, especially in primary schools. Teachers' perspectives both in terms of the opportunities AI presents and the constraints they encounter are crucial to successful implementation. While AI holds significant promise for improving teaching efficiency, personalizing learning, and enhancing student engagement, many Nigerian primary school teachers face constraints such as inadequate training, limited access to digital infrastructure, and a lack of policy guidance. Moreover, there is a limited empirical data of how teachers perceive the benefits and challenges of using AI in their classrooms. This study seeks to explore the perspectives of primary school teachers in Nigeria regarding the opportunities and constraints of integrating Artificial Intelligence into teaching and learning, in order to inform policy and practice.

Purpose of the Study

Generally, the purpose of this study is to examine Teacher's Perspective of opportunities and Constrains of Integrating Artificial Intelligence into Primary School Classrooms in Oshimili South Local Government Area of Delta State, Nigeria. Specifically, the study seeks:

1. To explore the opportunities that Nigerian primary school teachers perceive in integrating Artificial Intelligence into classroom teaching and learning in Oshimili south local Government Area of Delta state, Nigeria.
2. To identify the major constraints faced by primary school teachers in Nigeria when using AI in their instructional practices Oshimili south local Government Area of Delta state, Nigeria.

3. To examine how the level of training and professional development influences teachers' readiness and ability to integrate AI Oshimili south local Government Area of Delta state, Nigeria.
4. To assess the level of awareness and understanding of Artificial Intelligence among Nigerian primary school teachers Oshimili south local Government Area of Delta state, Nigeria.
5. To investigate the types of support systems teachers, believe are necessary for effective AI integration in primary education Oshimili south local Government Area of Delta state, Nigeria.

Research Questions

For the purpose of the study the following research questions will be raised:

1. What opportunities do Nigerian primary school teachers perceive in the integration of Artificial Intelligence into classroom teaching and learning in Oshimili south local Government Area of Delta state, Nigeria?
2. What are the major constraints or challenges faced by Nigerian primary school teachers in integrating Artificial Intelligence into their instructional practices in Oshimili south local Government Area of Delta state, Nigeria?
3. How does the level of training and professional development influence teachers' readiness and ability to use AI tools in the classroom Oshimili south local Government Area of Delta state, Nigeria?
4. What is the level of awareness and understanding of Artificial Intelligence among primary school teachers in Nigeria in Oshimili south local Government Area of Delta state, Nigeria?
5. What support systems (e.g., infrastructure, policy, administrative support) do teachers believe are necessary for the effective integration of AI into primary education in Nigeria in Oshimili south local Government Area of Delta state, Nigeria?

Hypotheses

The following hypotheses will be formulated in line with the purpose of the study and tested at 0.05 level of significance:

1. There is no significant relationship between teachers' perceived opportunities and their willingness to integrate AI in the classroom in Oshimili south local Government Area of Delta state, Nigeria.
2. Constraints such as lack of training and infrastructure do not significantly affect AI integration in Nigerian primary schools in Oshimili south local Government Area of Delta state, Nigeria.
3. The level of professional training has no significant effect on teachers' readiness to use AI tools in the classroom in Oshimili south local Government Area of Delta state, Nigeria.
4. Teachers' awareness and understanding of AI have no significant influence on their perception of its usefulness in Oshimili south local Government Area of Delta state, Nigeria.
5. Perceived support systems have no significant impact on teachers' ability to effectively integrate AI in Oshimili south local Government Area of Delta state, Nigeria.

Methodology

This study adopted a descriptive survey research design to examine teachers' perspectives on the opportunities and constraints of integrating artificial intelligence into primary school classrooms. The design was considered appropriate as it enables the collection of data on participants' opinions, attitudes, and experiences.

The study was conducted in Oshimili South Local Government Area of Delta State, Nigeria. The target population comprised all teachers (male and female) in public primary schools within the area, totaling 285 teachers across 25 schools.

A combination of simple random sampling and stratified random sampling techniques was used to select the sample. Eighteen (18) schools were first selected from both rural and urban areas using stratified random sampling. Thereafter, nine (9) teachers were randomly selected from each of the selected schools, resulting in a total sample size of 162 teachers. The simple random sampling technique, specifically the raffle draw method, ensured that each teacher had an equal chance of selection, thereby minimizing bias.

Data were collected using a structured questionnaire developed by the researchers based on relevant literature. The instrument consisted of two sections: Section A, which captured respondents' socio-demographic information, and Section B, which contained items related to the objectives of the study.

To ensure validity, the questionnaire was subjected to face validation by experts in Test and Measurement and Primary Education. These experts assessed the relevance, clarity, and alignment of the items with the research objectives.

The reliability of the instrument was established using the test-retest method. The questionnaire was administered to a group representing about 10% of the sample size in a different but similar setting. After an interval of two weeks, the same instrument was re-administered to the same group. The responses obtained were analyzed using Pearson's Product Moment Correlation to determine the reliability coefficient.

For data collection, the questionnaires were distributed to the selected teachers with the assistance of trained research assistants, who ensured proper administration and retrieval of all copies.

Data analysis was carried out using mean and standard deviation to answer the research questions, while t-test statistics at a 0.05 level of significance were used to test the hypotheses.

Presentation of Results.

Research Question 1: What opportunities do primary school teachers perceive in integrating Artificial Intelligence into classroom teaching and learning in Oshimili South Local Government Area of Delta State, Nigeria?

Table 1: Mean and Standard Deviation Scores on Perception of Primary School Teachers of Opportunities in Integrating Artificial Intelligence into Classroom Teaching and Learning in Oshimili South Local Government Area of Delta State, Nigeria

S/N	STATEMENT	SA	A	D	SD	MEAN	SD	DECISION
1	Artificial Intelligence can enhance personalized learning for pupils in primary schools.	72	58	20	12	3.17	0.92	Agree
2	AI tools can improve lesson delivery and classroom engagement.	63	78	14	7	3.22	0.78	Agree
3	The integration of AI can help teachers save time in lesson planning and assessment.	61	59	23	19	3.00	1.00	Agree
4	AI can support learners with different learning abilities and needs.	22	11	72	57	1.99	0.98	Disagree
5	The use of AI in teaching can improve pupils' academic performance.	54	32	61	15	2.77	1.02	Agree
Grand Mean and Standard Deviation						**2.83**	**0.94**	**Agree**

The results in Table 1 shows mean and standard deviation scores on perception of primary school teachers of opportunities in integrating Artificial Intelligence into classroom teaching and learning in Oshimili South Local Government Area of Delta State. Specifically, respondents rated Items 1, 2, 3 and 5 (M = 3.17, SD = 0.92), (M = 3.22, SD = 0.78), (M = 3.00, SD = 1.00), and (M = 2.77, SD = 1.02) above the criterion mean of 2.50 respectively, suggesting agreement among respondents that AI enhances personalized learning, improves lesson delivery, saves time, and supports academic performance.

However, Item 4 (M = 1.99, SD = 0.98) was rated below the criterion mean, indicating that respondents generally do not believe AI adequately supports learners with diverse abilities. The relatively moderate standard deviations across items (ranging from 0.78 to 1.02) suggest a reasonable level of consistency in responses, although some variability exists. The grand mean of 2.83 with a standard deviation of 0.94 indicates overall agreement that AI presents meaningful opportunities in primary education. Analysis of data suggests that teachers perceive AI as offering significant instructional advantages, although there is skepticism regarding its inclusivity for diverse.

Research Question 2: What major constraints or challenges primary school teachers face in integrating Artificial Intelligence into their instructional practices in Oshimili South Local Government Area of Delta State, Nigeria?

Table 2: Mean and Standard Deviation Scores on Major Constraints Faced by Primary School Teachers in Using AI in their Instructional Practices in Oshimili South Local Government Area of Delta State, Nigeria.

S/N	STATEMENT	SA	A	D	SD	*Mean*	*SD*	*Decision*
6	Lack of adequate digital infrastructure limits the integration of AI in primary schools.	56	48	42	16	2.89	1.00	Agree
7	Inadequate funding is a major barrier to adopting AI tools in teaching.	50	45	40	27	2.73	1.07	Agree
8	Limited access to reliable internet connectivity affects AI usage in schools.	60	35	26	41	2.70	1.21	Agree
9	Teachers lack sufficient technical skills to effectively use AI tools.	50	47	30	35	2.69	1.13	Agree
10	Resistance to change among teachers hinders the adoption of AI in classrooms	21	16	64	61	1.98	1.00	Disagree
Grand Mean and Standard Deviation						**2.60**	**1.08**	**Agree**

Table 2 shows mean and standard deviation scores on major constraints or challenges primary school teachers face in integrating Artificial Intelligence into their instructional practices in Oshimili South Local Government Area of Delta State, Nigeria. Items 6, 7, 8, and 9 were rated (M = 2.89, SD = 1.00), (M = 2.73, SD = 1.07), (M = 2.70, SD = 1.21), and (M = 2.69, SD = 1.13) respectively above the criterion mean, indicating agreement that infrastructural deficits, inadequate funding, limited internet access, and insufficient technical skills are key barriers.

In contrast, Item 10 was rated (M = 1.98, SD = 1.00) below the criterion mean score of 2.50 suggesting that teachers do not consider resistance to change a major obstacle. The relatively higher standard deviations (up to 1.21) indicate greater dispersion in responses, implying variability in how teachers experience these constraints. The grand mean of 2.60 (SD = 1.08) suggests a general agreement that constraints exist, though not overwhelmingly strong. This implies that primary school teachers recognize infrastructural deficits, inadequate funding, limited internet access, and insufficient technical skills (as structural and technical) barriers to AI integration.

Research Question 3: How does the level of training and professional development influence teachers' readiness and ability to use Artificial Intelligence tools in classrooms in Oshimili South Local Government Area of Delta State, Nigeria?

Table 3: Mean and Standard Deviation Scores on the Level of Training and Professional Development Influencing Teachers' Readiness and Ability to Integrate AI Oshimili South Local Government Area of Delta State, Nigeria

S/N	STATEMENT	SA	A	D	SD	*Mean*	*SD*	*Decision*
11	Teachers who receive AI-related training feel more confident using AI tools in teaching.	49	43	40	30	2.69	1.09	Agree
12	Professional development programs improve teachers' competence in integrating AI.	52	45	35	30	2.73	1.10	Agree
13	Continuous training enhances teachers' readiness to adopt AI in instructional practices.	45	50	40	27	2.70	1.05	Agree
14	Workshops and seminars on AI positively influence teachers' classroom application of AI tools.	54	43	35	30	2.75	1.11	Agree
15	Lack of professional training reduces teachers' willingness to integrate AI into teaching	52	44	30	36	2.69	1.14	Agree
Grand Mean and Standard Deviation						**2.71**	**1.10**	**Agree**

The results in Table 3 shows responses on the level of training and professional development influence teachers' readiness and ability to use Artificial Intelligence tools in classrooms in Oshimili South Local Government Area of Delta State. Items 11–15 recorded mean scores ranging from 2.69 to 2.75, all above the criterion mean, indicating that teachers acknowledge the importance of training in enhancing confidence, competence, and readiness to integrate AI. Standard deviation scores ranged from 1.05 – 1.14, suggest moderate variability, indicating that while most respondents agree, the strength of agreement varies. The grand mean of 2.71 (SD = 1.10) confirms a general consensus that professional development plays a crucial role in AI adoption. This implied that training and professional development are widely perceived as essential drivers of teachers' readiness and ability to integrate AI effectively.

Research Question 4: What is the level of awareness and understanding of Artificial Intelligence among primary school teachers in Oshimili South Local Government Area of Delta State, Nigeria?

Table 4: Mean and Standard Deviation Scores on the Level of awareness and understanding of Artificial Intelligence Among Primary School Teachers in Oshimili South Local Government Area of Delta State, Nigeria

S/N	STATEMENT	SA	A	D	SD	*Mean*	*SD*	*Decision*
16	I have a clear understanding of what Artificial Intelligence means in the educational context.	58	37	30	37	2.72	1.18	Agree
17	I am aware of AI tools that can be used in primary school teaching.	49	43	40	30	2.69	1.09	Agree
18	I understand how AI can support teaching and learning processes.	46	50	39	27	2.71	1.06	Agree

19	I am familiar with examples of AI applications in education.	55	50	37	20	2.86	1.02	Agree
20	I can differentiate between AI tools and other digital educational technologies.	51	42	38	31	2.70	1.11	Agree
Grand Mean and Standard Deviation						**2.74**	**1.09**	**Agree**

Table 4 reveals the mean and standard deviation response scores on the level of awareness and understanding of Artificial Intelligence among primary school teachers in Oshimili South Local Government Area of Delta State. All items (16–20) recorded mean scores above 2.50, ranging from 2.69 to 2.86, indicating agreement that teachers possess basic knowledge of AI concepts, tools, and applications. The standard deviations (1.02–1.18) indicate some variability in the depth of understanding among respondents. The grand mean of 2.74 (SD = 1.09) suggests that, teachers are reasonably aware of AI, though this awareness may not be uniformly deep or comprehensive. This suggests that primary school teachers exhibit a generally acceptable level of awareness of AI, but variations suggest uneven depth of understanding.

Research Question 5: What support systems (e.g., infrastructure, policy, and administrative support) do primary school teachers consider necessary for the effective integration of Artificial Intelligence into primary education in Oshimili South Local Government Area of Delta State, Nigeria?

Table 5: Mean and Standard Deviation Scores on Types of Support Systems Teachers Believe are Necessary for Effective AI Integration in Primary Education in Oshimili South Local Government Area of Delta State, Nigeria

S/N	STATEMENT	SA	A	D	SD	*Mean*	*SD*	*Decision*
21	Government policies are necessary to guide the integration of AI in primary education.	70	71	11	10	3.24	0.83	Agree
22	Adequate provision of digital infrastructure is essential for AI implementation.	84	56	12	10	3.32	0.86	Agree
23	Administrative support from school leadership is important for AI adoption.	33	24	64	41	2.30	1.06	Disagree
24	Technical support personnel are needed for effective AI integration in schools.	44	78	23	17	2.92	0.91	Agree
25	Funding and financial support are critical for the successful use of AI in primary education.	86	76	0	0	3.53	0.50	Agree
Grand Mean and Standard Deviation						**3.06**	**0.84**	**Agree**

Table 5 indicates mean and standard deviation response scores on types of support system (e.g., infrastructure, policy, and administrative support) primary school teachers perceive as necessary for effective AI integration in primary education in Oshimili South Local Government Area of Delta State. Items 21 was rated (M = 3.24, SD = 0.83), 22 rated (M = 3.32, SD = 0.86), 24 rated (M = 2.92, SD = 0.91), and 25 rated (M = 3.53, SD = 0.50) all showing a clear agreement that policy, infrastructure, technical support, and funding are critical. However, Item 23 was rated (M = 2.30, SD = 1.06) indicates disagreement regarding the role of administrative support, suggesting that teachers may not perceive school leadership as a key driver of AI adoption. The

grand mean of 3.06 (SD = 0.84) reflects strong overall agreement. This showed that primary school teachers need policy, infrastructure, technical support, and funding (systemic and structural) support for effective AI integration into teaching and learning activities.

Test of Hypotheses

H_1: The mean perception score of primary school teachers regarding the opportunities for integrating Artificial Intelligence into classroom teaching and learning is not significantly different from the criterion mean of 2.50 in Oshimili South Local Government Area of Delta State, Nigeria.

Table 6: One Sample t-Test of No Significant Difference Between the Perception Score of Teachers Regarding Opportunities for Integrating Artificial Intelligence and the Criterion Mean of 2.50.

Variable	N	Mean	SD	Test Mean	t	t-crit.	df	p-value	α	Decision
Perceived Opportunities	162	2.83	0.94	2.50	4.47	1.97	161	.001	0.05	Reject H0

The result of the one-sample t-test in Table 6 shows that the mean perception score of teachers regarding opportunities for integrating Artificial Intelligence (M = 2.83, SD = 0.94) is significantly higher than the criterion mean of 2.50, $t(161) = 4.47$, $p = .001 < .05$. The null hypothesis is therefore rejected.

This indicates that teachers' perception of opportunities for AI integration is significantly above the benchmark level of moderate agreement. The mean difference of 0.33, though not large, is sufficient relative to the variability in responses to produce a statistically significant result. The standard deviation suggests a moderate spread of responses, implying some variation in perceptions among teachers, but not enough to undermine the overall trend. This confirms that, on average, teachers rate the opportunities for AI integration more positively than the reference point.

H_2: The mean perception score of primary school teachers regarding the constraints affecting the integration of Artificial Intelligence in instructional practices is not significantly different from the criterion mean of 2.50 in Oshimili South Local Government Area of Delta State, Nigeria.

Table 7: One Sample t-Test of No Significant Difference Between the Perception Score of Teachers Regarding Constraints Affecting AI Integration and the Criterion Mean of 2.50

Variable	N	Mean	SD	Test Mean	t	t-crit.	df	p-value	α	Decision
AI Constraints	162	2.60	1.08	2.50	1.18	1.97	161	.24	0.05	Retain H0

The result of the one-sample t-test in Table 7 indicates that the mean perception score of teachers regarding constraints to AI integration (M = 2.60, SD = 1.08) is not statistically different from the criterion mean of 2.50, $t(161) = 1.18$, $p = .24 > .05$. This implies that the observed mean difference of 0.10 is too small relative to the variability in responses to be considered statistically meaningful. Substantively, this suggests that although teachers report the presence of constraints, these

constraints are not perceived at a level strong enough to significantly exceed the benchmark of moderate agreement. The relatively large standard deviation further indicates inconsistency in responses, meaning that while some teachers experience notable barriers, others do not. Therefore, constraints cannot be regarded as a uniformly significant impediment to AI integration across the study population.

H_3: The mean perception score of primary school teachers regarding the influence of professional training and development on their readiness to integrate Artificial Intelligence into classroom instruction is not significantly different from the criterion mean of 2.50 in Oshimili South Local Government Area of Delta State, Nigeria.

Table 8: One Sample t-Test of No Significant Difference Between the Perception Score of Teachers Regarding Professional Training Influence on AI Readiness and the Criterion Mean of 2.50

Variable	N	Mean	SD	Test Mean	t	t-crit	df	p-value	α	Decision
Professional Training	162	2.71	1.10	2.50	2.43	1.97	161	0.16	0.05	Reject H0

The result of the one-sample t-test in Table 8 reveals that the mean perception score for professional training (M = 2.71, SD = 1.10) is significantly higher than the criterion mean of 2.50, $t\,(161) = 2.43$, $p < .05$. This indicates that the difference of 0.21 is statistically significant. However, the p-value reported in the table (0.16) is incorrect and inconsistent with the t-value. A t-value of 2.43 with 161 degrees of freedom corresponds to approximately $p \approx 0.016$, confirming statistical significance and justifying the rejection of the null hypothesis.

In practical terms, this finding demonstrates that teachers perceive professional training as an important factor that enhances their readiness to integrate AI into classroom instruction. While the effect is statistically significant, the mean difference is modest, suggesting that training contributes meaningfully but is not overwhelmingly strong in magnitude.

H_4: The mean perception score of primary school teachers regarding their level of awareness and understanding of Artificial Intelligence is not significantly different from the criterion mean of 2.50 in Oshimili South Local Government Area of Delta State, Nigeria.

Table 9: One Sample t-Test of No Significant Difference Between the Perception Score of Teachers Regarding Awareness of Artificial Intelligence and the Criterion Mean of 2.50

Variable	N	Mean	SD	Test Mean	t	t-crit.	df	p-value	α	Decision
AI Awareness	162	2.74	1.09	2.50	2.80	1.97	161	0.006	0.05	Reject H0

The analysis in Table 9 shows that the mean perception score for AI awareness (M = 2.74, SD = 1.09) is significantly higher than the criterion mean of 2.50, $t(161) = 2.80$, $p = .006 < .05$. The null hypothesis is therefore rejected. This indicates that teachers' awareness and understanding of AI are significantly above the average benchmark. The implication is that teachers possess a relatively higher level of awareness of AI, which may support positive disposition toward its

integration. However, the moderate mean value suggests that awareness is present but not exceptionally high, leaving room for further improvement.

H_5: The mean perception score of primary school teachers regarding the support systems required for effective integration of Artificial Intelligence in primary education is not significantly different from the criterion mean of 2.50 in Oshimili South Local Government Area of Delta State, Nigeria.

Table 10: One Sample t-Test of No Significant Difference Between the Perception Score of Teachers Regarding Support Systems for AI Integration on the Criterion Mean of 2.50

Variable	N	Mean	SD	Test Mean	t	t-crit	df	p-value	α	Decision
Support Systems	162	3.06	0.84	2.50	8.48	1.97	161	.001	0.05	Reject H0

The result in Table 10 indicates that the mean perception score for support systems (M = 3.06, SD = 0.84) is significantly higher than the criterion mean of 2.50, $t(161) = 8.48$, $p < .05$. The null hypothesis is therefore rejected. This very high t-value reflects a large and consistent deviation from the criterion mean, supported by a relatively low standard deviation, indicating agreement among respondents.

Substantively, this suggests that teachers strongly perceive support systems such as infrastructure, institutional backing, and technical assistance as critical to effective AI integration. However, your earlier claim that this is "the most influential factor" is not statistically justified, since no comparative test of effect sizes across variables was conducted. What can be stated with confidence is that support systems are perceived as highly important and consistently endorsed among respondents.

Summary of Findings

The following findings of the study emerged:

1. Primary school teachers perceive AI as offering important instructional advantages, although there is skepticism regarding its inclusivity for diverse.
2. Primary school teachers recognize infrastructural deficits, inadequate funding, limited internet access, and insufficient technical skills (as structural and technical) barriers to AI integration.
3. Training and professional development are widely perceived as essential drivers of primary school teachers' readiness and ability to integrate AI effectively.
4. Primary school teachers exhibit a generally acceptable level of awareness of AI, but variations suggest uneven depth of understanding.
5. Primary school teachers need policy, infrastructure, technical and funding (systemic and structural) supports for effective AI integration into teaching and learning activities.
6. Primary school teachers exhibit a significantly positive perception of the opportunities for integrating Artificial Intelligence into classroom teaching and learning, as their mean rating is significantly higher than the criterion mean.
7. There is no statistically significant difference between teachers' perception of constraints and the criterion mean, indicating that constraints are not perceived as a strong or consistent barrier to AI integration among the respondents.

8. Primary school teachers' perception of professional training is significantly higher than the criterion mean score indicating that professional training is viewed as an important factor in enhancing readiness for AI integration.
9. Primary school teachers demonstrate a significantly above-average level of awareness and understanding of AI, suggesting that awareness is relatively well established among the respondents.
10. Support systems are perceived at a significantly high level, indicating that teachers strongly recognize the importance of institutional, technical, and infrastructural support for effective AI integration.

Discussion of Findings

The findings of this study indicate that primary school teachers hold a generally positive perception of the opportunities presented by Artificial Intelligence (AI) in education. Teachers agreed that AI enhances personalized learning, improves lesson delivery, saves instructional time, and supports pupils' academic performance. These findings are consistent with previous studies which highlight the role of AI in enabling adaptive learning and automating routine tasks, thereby improving teaching effectiveness (Holmes et al., 2019; Zawacki-Richter et al., 2019; Luckin et al., 2018). The hypothesis test further confirmed that teachers' perception of AI opportunities is significantly positive, supporting global assertions of AI as a transformative educational tool (UNESCO, 2021). However, teachers expressed reservations about AI's ability to support learners with diverse abilities, which contrasts with studies that emphasize AI's potential for inclusive education (Adebayo & Okoli, 2021). This difference may be attributed to limited exposure to advanced AI applications, highlighting a gap between theoretical knowledge and practical experience.

The study also identified key constraints to AI integration, including inadequate infrastructure, poor funding, limited internet access, and insufficient technical skills. These findings align with research conducted in developing countries, where infrastructural challenges significantly hinder the adoption of educational technologies (Oke & Fernandes, 2020; Yusuf et al., 2022; Aremu & Adewale, 2021). Despite these challenges, teachers did not view resistance to change as a major barrier, suggesting a willingness to embrace innovation. The hypothesis test indicated that constraints were not significantly severe across respondents, likely due to variations in access to resources and individual competencies.

Furthermore, the study revealed that training and professional development significantly influence teachers' readiness to integrate AI. Teachers acknowledged that training improves their confidence, competence, and willingness to adopt AI tools. This finding is consistent with existing literature emphasizing the importance of capacity-building for effective technology integration (Darling-Hammond et al., 2020; Koehler & Mishra, 2019). The significant hypothesis result also supports the Technological Pedagogical Content Knowledge (TPACK) framework, although the modest mean difference suggests that the impact of training depends on its quality and relevance. In terms of awareness, teachers demonstrated a generally acceptable understanding of AI concepts and applications, aligning with global trends (OECD, 2021). However, variability in responses indicates uneven levels of knowledge, supporting earlier findings that while awareness of AI is increasing, in-depth understanding remains limited (Chassignol et al., 2018).

Finally, the study highlighted the importance of support systems such as government policies, infrastructure, funding, and technical assistance. Teachers strongly agreed on the need for these supports, consistent with studies emphasizing the role of institutional backing in successful technology integration (Selwyn, 2019; UNESCO, 2021). Interestingly, administrative support was not perceived as a major factor, which contrasts with literature stressing the importance of school leadership (Fullan, 2020). This may reflect limited administrative involvement in AI initiatives within the study area. Overall, the findings suggest that while teachers recognize the significant potential of AI in education, successful integration depends on addressing infrastructural challenges, improving training, and strengthening systemic support.

Conclusion

This study examined teachers' perspectives on the opportunities and constraints of integrating Artificial Intelligence (AI) into primary school classrooms in Oshimili South Local Government Area of Delta State, Nigeria. The findings reveal that teachers generally hold a positive perception of AI, recognizing its potential to enhance teaching and learning processes. AI was seen as a valuable tool for supporting personalized learning, improving lesson delivery, saving instructional time, and enhancing pupils' academic performance. These outcomes suggest that AI has the capacity to significantly transform primary education if effectively implemented.

Despite this positive outlook, the study also identified several critical challenges that hinder the effective integration of AI in primary schools. These include inadequate infrastructure, poor funding, limited internet access, and insufficient technical skills among teachers. Such constraints reflect broader systemic issues within the Nigerian educational system, particularly in developing regions where access to digital resources remains limited. Although teachers demonstrated a willingness to adopt AI, the lack of enabling conditions poses a major barrier to its practical implementation.

The study further established that training and professional development play a crucial role in enhancing teachers' readiness to integrate AI into classroom practices. Teachers who received training showed higher levels of confidence, competence, and willingness to adopt AI tools. This highlights the importance of continuous capacity-building initiatives in ensuring effective technology integration in education.

In conclusion, while AI presents significant opportunities for improving educational outcomes in primary schools, its successful integration depends largely on addressing infrastructural deficiencies, enhancing teacher training, and strengthening institutional support systems. Without these enabling factors, the full potential of AI in education may not be realized.

Recommendations

1. Government should invest in educational infrastructure such as, adequate provision of electricity, internet access, and digital tools should be prioritized to support AI integration in schools.

2. Regular training and professional development for teachers such as workshops, seminars, and hands-on training programs should be organized by the Government to improve teachers' competence in using AI technologies.
3. Incorporation of AI education into teacher training curriculum by the curriculum planners in colleges of education and universities should include AI-related courses to prepare future teachers for technology-driven classrooms.
4. Government and educational stakeholders should develop clear policies and allocate sufficient funds to support AI implementation in schools.
5. Structured programs should be organized by the government to deepen teachers' understanding of AI and its practical applications in teaching and learning.

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