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Rethinking School Leadership through AI in Multilingual Classrooms: A Case Study from Ona Ara, Nigeria

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Abstract: *This study explored how school leadership, teacher preparedness, and infrastructural realities influence the integration of artificial intelligence (AI) in multilingual classrooms in Ona Ara Local Government Area of Oyo State, Nigeria. Multilingual classrooms in this region face persistent barriers in communication between Yoruba and English speakers, making AI tools such as translation and speech-recognition applications potentially transformative. The study adopted a qualitative case study design involving ten schools, sixty teachers, and ten administrators drawn from public and private institutions. Data were collected through semi-structured interviews, classroom observations, and document reviews, and analyzed thematically using Braun and Clarke's (2006) six-step approach. Findings revealed that 90 percent of school leaders encouraged teachers to experiment with AI tools, while 80 percent modeled their use, showing how leadership behavior shaped adoption. Teachers faced constraints including unstable electricity (80 percent), lack of training (75 percent), and mistrust of AI translations (58 percent). Student engagement improved where AI was used effectively, with 70 percent of schools reporting higher participation and 60 percent observing increased motivation, though 40 percent experienced confusion from inaccurate translations. All schools confirmed the absence of formal AI policies, while infrastructural and policy gaps hindered sustainability. The study concluded that AI can promote inclusivity and engagement in multilingual classrooms if supported by transformational leadership, targeted teacher training, and infrastructural investment. The findings affirm the relevance of Transformational Leadership Theory, the Technology Acceptance Model, and the Unified Theory of Acceptance and Use of Technology in explaining adoption within multilingual educational contexts.*

Keywords: *Artificial intelligence, multilingual classrooms, leadership, teacher preparedness, Nigeria*

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1. Introduction

Artificial intelligence is steadily reshaping the global educational landscape, and African nations are beginning to position themselves within this transformation. Scholars note that artificial intelligence offers unprecedented opportunities to improve learning outcomes, reduce barriers to participation, and assist teachers in delivering more effective instruction (Chisom, Unachukwu, & Osawaru, 2023). In Nigeria, these possibilities are complicated by the country's deep linguistic diversity, which includes over 500 indigenous languages and numerous dialects (Sanusi, 2025). Within schools, this diversity manifests in classrooms where pupils often enter with limited proficiency in English, the official language of instruction, while retaining strong fluency in their home languages. Consequently, teachers are required to navigate multiple language demands simultaneously, which often results in comprehension gaps, reduced engagement, and lower learning outcomes (Bali et al., 2024). Within this context, artificial intelligence tools such as automated

translation, speech recognition, and adaptive content generation have the potential to bridge linguistic divides and foster equity. However, the incorporation of these technologies in Nigerian classrooms, particularly at the local government level, remains underexplored. Thus, Ona Ara Local Government Area in Oyo State provides an important case through which to investigate how school leadership can guide the adoption of artificial intelligence for multilingual classrooms.

A growing body of research affirms that school leadership plays a decisive role in determining whether technological innovations succeed or fail in practice. For instance, Zeng et al. (2025) emphasize that principals who model digital leadership, advocate for resources, and cultivate professional learning communities are more likely to see teachers adopt artificial intelligence tools in meaningful ways. Similarly, Okunlola (2025), in a study of digital leadership in Oyo State, found that teachers expect principals to demonstrate vision, resource mobilization, and support for professional development if technology is to be effectively integrated. These findings resonate with Fullan, María, Harris, and Jones (2023), who contend that leaders must act not only as managers of technology but also as advocates for equity and community engagement. In multilingual settings such as Ona Ara, where language equity is an added concern, the leadership role becomes even more critical. Absent visionary leadership, artificial intelligence may remain underutilized or may exacerbate inequalities by privileging learners who are already proficient in English while marginalizing those who rely on Yoruba or minority languages. Therefore, examining leadership practices is central to understanding how artificial intelligence can be equitably integrated into classrooms marked by linguistic diversity.

Equally significant is the variable of artificial intelligence integration within multilingual classrooms themselves. Existing studies highlight that such classrooms face persistent instructional barriers, including shortages of localized learning materials, limited teacher capacity to work across languages, and frequent misalignment between curricula and learner linguistic realities (Mokoena & Seeletse, 2025). Artificial intelligence tools provide concrete opportunities to alleviate these barriers. De et al. (2025) demonstrated through a World Bank pilot that generative artificial intelligence tutoring improved learning outcomes in Nigerian classrooms when combined with teacher facilitation and proper infrastructure. Likewise, Timothy et al. (2024) and Grace et al. (2024) developed neural machine translation models for Yoruba–English, showing that translation technologies can help teachers produce bilingual resources for learners, though they cautioned that issues of accuracy and cultural nuance remain. Weng and Fu (2025) also emphasized that while generative artificial intelligence can promote inclusivity in language education, human oversight is required to ensure accuracy and cultural appropriateness. Taken together, these studies show that artificial intelligence can be transformative in multilingual classrooms, but its success depends heavily on careful oversight and alignment with local linguistic and cultural contexts.

A further dimension relates to teacher preparedness and professional development. Research has repeatedly shown that teachers' literacy in artificial intelligence is one of the strongest predictors of successful adoption (Ayanwale et al., 2024). However, surveys of Nigerian teachers reveal that although many demonstrate curiosity toward artificial intelligence, they often lack the practical competencies necessary to deploy it effectively in real classroom situations (Tan et al., 2024). Bali et al. (2024) further note that teachers in low-resource settings, where infrastructural constraints are severe, require additional training that integrates both technical knowledge and pedagogical strategies for inclusive teaching. This suggests that professional development must move beyond one-off training sessions toward sustained programs that allow teachers to experiment, reflect, and adapt artificial intelligence tools in relation to learners' linguistic and cultural needs. In Ona Ara, where many teachers already grapple with large class sizes and irregular infrastructure, leadership-driven interventions in training will be critical for ensuring that artificial intelligence supports, rather than burdens, instructional practices.

Therefore, this study is significant because it addresses the intersection of leadership, artificial intelligence, and multilingual education at the local government level, a space that has received limited scholarly attention. Babaci-Wilhite et al. (2025) argue that artificial intelligence pedagogy must be designed to promote equity and linguistic diversity, while the GEM Report (2025) emphasizes the foundational role of home language instruction in improving educational outcomes across Africa. In addition, De et al. (2025) show that the success of artificial intelligence pilots in Nigeria depends on leadership, infrastructure, and community engagement. Yet, despite these insights, little is known about how local school leaders in multilingual communities such as Ona Ara interpret and act upon these demands. This investigation therefore seeks to generate evidence that not only fills a research gap but also provides practical strategies for rethinking leadership in the integration of artificial intelligence. By situating its analysis within Ona Ara schools, the study contributes to national and continental debates on education technology while offering replicable models for other multilingual regions.

1.1 Statement of the Problem

The integration of artificial intelligence into Nigerian education faces a complex interplay of linguistic diversity,

inadequate infrastructure, and limited leadership preparedness. In Ona Ara Local Government Area of Oyo State, classrooms reflect these dynamics as teachers instruct pupils who come from Yoruba-speaking households, minority language communities, and English-medium policy requirements. These realities produce significant barriers to comprehension and participation, with learners from non-English backgrounds often disadvantaged in assessment and classroom engagement. Artificial intelligence, including tools for machine translation, generative tutoring, and speech recognition, holds potential to bridge these gaps by facilitating language access and adaptive learning (Bali et al., 2024). Nevertheless, without deliberate school leadership to direct adoption, these tools may remain underutilized or implemented in ways that worsen inequalities, leaving multilingual learners behind. Sanusi (2025) underscores that while Nigeria has initiated pilot projects for artificial intelligence in schools, policy guidance remains weak, especially concerning multilingual content and equity. Consequently, the problem lies in how school leaders within Ona Ara can strategically harness artificial intelligence to promote inclusive instruction in contexts marked by both linguistic plurality and infrastructural limitations.

Prior studies have examined related issues but have not addressed this precise intersection. For example, Ayanwale et al. (2024) found that pre-service teachers in Nigeria showed generally low practical skills in artificial intelligence use despite positive attitudes, with adoption depending heavily on institutional encouragement. Their study highlights the importance of teacher preparation but does not explore how leaders shape this preparation. Similarly, Tan et al. (2024), in their systematic review of teacher professional development and artificial intelligence, emphasized that teacher literacy and leadership support are decisive for adoption, yet they also noted that low-resource and multilingual contexts remain under-researched. In a Nigerian-specific analysis, Bali et al. (2024) catalogued existing artificial intelligence uses, including predictive analytics and e-learning platforms, but identified persistent infrastructural bottlenecks such as unstable electricity and poor internet connectivity. Collectively, these studies illustrate the importance of teacher readiness, institutional support, and infrastructural development, but they do not account for how local leaders in multilingual classrooms balance these factors. Thus, while the literature provides valuable insights, it leaves unanswered how principals and education officers at the local government level guide the integration of artificial intelligence in multilingual learning spaces.

The present study fills this critical gap by focusing specifically on the role of school leadership in Ona Ara's multilingual classrooms. Unlike prior research that has either emphasized teacher literacy (Ayanwale et al., 2024) or broad national policies (Sanusi, 2025), this investigation situates leadership at the center of analysis, exploring how head teachers and education officers respond to linguistic equity, teacher training, and infrastructural barriers in practice. By drawing on local case studies, the study generates evidence on how principals can act as advocates for inclusion by aligning artificial intelligence tools with curriculum goals, promoting professional development, and ensuring that translation and generative platforms respect cultural contexts. As Zeng et al. (2025) affirm, transformational leadership practices significantly increase teacher adoption of artificial intelligence, and De et al. (2025) demonstrate that successful pilots in Nigeria depend heavily on local leadership. Therefore, this study contributes not only to academic discourse but also to practice by proposing a framework for rethinking school leadership to ensure that artificial intelligence integration in Ona Ara's multilingual classrooms is inclusive, sustainable, and context-responsive.

1.2 Objectives of the Study

Broad Objective

To investigate how school leadership can guide the integration of artificial intelligence in multilingual classrooms in Ona Ara Local Government Area, Oyo State, Nigeria, to promote inclusive, equitable, and sustainable learning outcomes.

Specific Objectives

1. To examine the role of school leaders in shaping teacher adoption of artificial intelligence within multilingual classrooms.
2. To identify the artificial intelligence applications currently used or considered in Ona Ara schools and evaluate their effectiveness in addressing language diversity.
3. To assess teachers' literacy, preparedness, and professional development needs for using artificial intelligence in multilingual classroom instruction.
4. To analyze the infrastructural and policy constraints affecting artificial intelligence integration in Ona Ara schools.
5. To propose strategic leadership practices for ensuring that artificial intelligence deployment supports linguistic equity and sustainable adoption.

2. Literature Review

2.1 Theme 1: Artificial Intelligence and Multilingual Education

Artificial intelligence in education has been increasingly recognized as a potential solution to the challenges of multilingual learning environments, especially in contexts where pupils enter classrooms with different home languages. In Nigeria, English is mandated as the official language of instruction, yet most pupils come from households where indigenous languages such as Yoruba, Igbo, or Hausa dominate. This mismatch often produces difficulties in comprehension, limits participation in discussions, and affects long-term academic outcomes. Scholars have examined whether artificial intelligence applications can help bridge these linguistic gaps by producing bilingual instructional resources, enabling real-time translation, and generating adaptive content that meets learners' diverse needs. For instance, Timothy, Adebayo, Junior, and Olufemi (2024) presented a bilingual neural machine translation model trained on English and Yoruba corpora. Their findings demonstrated that translation quality improved significantly with additional domain-specific corpora, but they stressed that human oversight was indispensable because machine outputs often lacked cultural nuance. Grace, Adebayo, and Boyinbode (2024) developed a related transformer-based Yoruba to English system and emphasized that while such systems can support intelligibility in classroom texts, they remain constrained by limited training datasets and the necessity for manual validation. These works reveal that artificial intelligence can indeed provide linguistic scaffolds in multilingual classrooms, but the process is far from automatic and requires thoughtful adaptation.

Generative artificial intelligence expands this potential by creating instructional content in multiple languages with greater speed and flexibility. Weng and Fu (2025) conducted a systematic review of generative applications in language education and concluded that generative models could rapidly produce learning materials for low-resource languages, thereby enhancing inclusivity. However, they cautioned that such content often suffers from bias and factual inaccuracies, requiring teachers to act as gatekeepers who refine outputs before classroom use. Babaci-Wilhite et al. (2025) extended this discussion by arguing for dialogical pedagogy, in which generative artificial intelligence supports but does not replace teacher agency. Their study emphasized that generative tools should serve as instruments for creating translation scaffolds, grammar exercises, and localized tasks, but teachers must remain central in ensuring contextual accuracy. Olojo, Zakrzewski, Smart, Liemt, Miceli, Ebinama, and Amugongo (2025) provided additional insight by exploring the sociocultural implications of language technologies in Nigeria. They found that communities often mistrust machine translation because it distorts cultural meaning and undermines local idioms, which indicates that technical accuracy alone cannot secure acceptability in classrooms. These perspectives demonstrate that while artificial intelligence can address immediate language barriers, its sustainable use requires deliberate human oversight, cultural sensitivity, and leadership support to guide adoption.

Scholars in the Global South also emphasize the structural obstacles that complicate multilingual integration of artificial intelligence. Makeleni, Mutongoza, and Linake (2023) reviewed challenges confronting academics in Global South universities and reported that the scarcity of training data for indigenous languages, biases embedded within artificial intelligence models, and uneven teacher readiness posed substantial barriers to adoption. Their findings resonate with the Nigerian context, where artificial intelligence systems trained on global datasets often fail to represent local languages adequately. Furthermore, Mokoena and Seeletse (2025) examined rural South African classrooms and demonstrated that low-bandwidth artificial intelligence tools and community co-design approaches improved local acceptance of technology. Their findings suggest that when artificial intelligence is adapted to infrastructural realities and cultural contexts, it becomes more effective in multilingual classrooms. Therefore, literature consistently affirms that multilingual education in Nigeria stands to benefit from artificial intelligence, but successful outcomes depend on cultural alignment, infrastructural suitability, and strong leadership to mediate its use.

2.2 Theme 2: Teacher Preparedness and Professional Development

Teachers are pivotal in determining whether artificial intelligence technologies can be effectively integrated into educational systems. Ayanwale, Adewale, and colleagues (2024) conducted a quantitative study of pre-service teachers in Nigeria and revealed that while the majority demonstrated awareness of artificial intelligence concepts, their practical competence in applying these tools was very limited. The study further found that adoption intent was strongly predicted by institutional encouragement and perceptions of usefulness, suggesting that without deliberate training programs and leadership-driven support structures, teachers may not be able to translate theoretical awareness into practical adoption. Tan, Xie, and collaborators (2024), in a systematic review of global teacher professional development and artificial intelligence adoption, reinforced this concern by concluding that while artificial intelligence tools such as intelligent tutoring systems and adaptive learning platforms are increasingly available, they are underutilized in classroom practice

because teacher capacity is often weak. These findings affirm that curiosity or exposure alone does not guarantee integration, and professional development is indispensable to build the confidence and competence necessary for artificial intelligence adoption.

Additional scholarship highlights the impact of infrastructural barriers on teacher preparedness. Bali, Bello, and co-authors (2024) analyzed Nigerian education systems and showed that unreliable electricity, unstable connectivity, and lack of devices combined to create environments where teachers are unable to maintain consistent use of artificial intelligence tools. The study emphasized that professional development programs must address not only technical competence but also practical challenges teachers face in resource-constrained contexts. Saal, Chetty, Ntshayintshayi, Moosa, and Masuku (2025) offered further evidence from South African classrooms, where they found that without sustained mentoring and institutional investment, teachers often lose confidence after initial training. These findings imply that in Ona Ara, where teachers manage large class sizes and face intermittent access to digital resources, training must be continuous, responsive, and embedded within school leadership structures. Professional development that combines pedagogy, technical skill, and infrastructural adaptation becomes critical to ensuring that artificial intelligence supports rather than overwhelms teachers.

Scholars also argue that teacher training must go beyond technical proficiency and explicitly engage cultural and linguistic dimensions of artificial intelligence use. Weng and Fu (2025) proposed human-in-the-loop design principles, stressing that teachers should be empowered to critically evaluate artificial intelligence outputs and adapt them to local contexts. Similarly, Babaci-Wilhite et al. (2025) asserted that teachers play a central role in mediating the risks of generative artificial intelligence by ensuring that outputs reflect equity, diversity, and inclusivity in multilingual classrooms. These perspectives align with the Nigerian reality, where Yoruba and minority languages must be represented in teaching materials to ensure that learners feel included. Therefore, in Ona Ara, teacher preparedness cannot be viewed narrowly as a matter of digital literacy. It must encompass the ability to scrutinize artificial intelligence outputs, adapt them for multilingual contexts, and align them with both curriculum standards and community values. Professional development that enables teachers to perform this complex role will determine the extent to which artificial intelligence becomes a tool for equity rather than exclusion.

2.3 Theme 3: School Leadership and Digital Leadership

School leadership plays a decisive role in determining whether artificial intelligence is effectively integrated into teaching and learning. Zeng, Ma, and colleagues (2025) carried out a systematic thematic review that examined the digital leadership practices of principals in supporting teacher use of artificial intelligence. Their findings revealed transformational leadership behaviors, such as modeling the use of artificial intelligence, fostering collaborative professional learning, and mobilizing resources, directly enhanced teacher adoption. Leadership, therefore, does not function as a peripheral factor but as the central mechanism by which schools transition from passive awareness of artificial intelligence to active integration. In multilingual contexts such as Ona Ara, principals must not only endorse artificial intelligence tools but also ensure that they are aligned with culturally relevant pedagogy and language equity. The absence of visionary leadership often results in piecemeal adoption, where a few teachers experiment with tools informally while the broader institution fails to institutionalize sustainable practices.

Okunlola (2025), in a quantitative study of principals in Oyo State, provided further evidence that principals' digital leadership competencies directly shape teacher capacity and confidence in adopting emerging technologies. The study identified three primary competencies: the ability to articulate a clear vision for technological integration, the skill of mobilizing and coordinating resources, and the commitment to facilitating teacher professional development. These competencies are especially significant in Ona Ara because infrastructural constraints already create inequities between schools. A principal who can secure external partnerships, negotiate for training opportunities, and create internal communities of practice helps to bridge these inequities. Conversely, principals without these competencies leave teachers unsupported, which leads to low adoption rates and underutilization of artificial intelligence. Thus, the leadership dimension is not optional but a precondition for successful artificial intelligence adoption in Nigerian schools.

Fullan, María, Harris, and Jones (2023) approached this issue from a conceptual perspective by arguing that artificial intelligence introduces both opportunities and disruptions for school leaders. They contended that school leaders must reconceptualize their roles to become learners, ethicists, and advocates for equitable access. This reconceptualization is especially urgent in multilingual contexts, where artificial intelligence can either foster inclusion by supporting indigenous languages or reinforce exclusion by privileging English-only content. Thankgod, Nwuke, and Yellowe (2025) illustrated the administrative potential of artificial intelligence in Rivers State, where principals used dashboards and algorithms to streamline supervision and reporting, which freed time for more direct

engagement with teachers and students. These examples demonstrate that digital leadership is not only about advocating for technology but about creating ecosystems in which artificial intelligence supports both pedagogy and administration. In Ona Ara, principals who view themselves as champions of digital equity can position artificial intelligence as a tool for inclusion and instructional innovation.

2.4 Theme 4: Infrastructure, Policy, and Implementation Challenges

The infrastructural and policy contexts in which schools operate profoundly shape the adoption of artificial intelligence. Bali, Bello, and co-authors (2024) highlighted that in Nigeria, infrastructural deficits such as unreliable electricity, unstable internet connectivity, and limited access to computing devices remain the most significant barriers to scaling artificial intelligence interventions. They argued that even when teachers demonstrate willingness and readiness to adopt artificial intelligence, these structural limitations curtail their ability to sustain such efforts. Sanusi (2025) expanded this observation at the national policy level by showing that although Nigeria has introduced artificial intelligence pilot projects in education, there is no comprehensive framework to guide multilingual integration or address the digital divide. In Ona Ara, where schools often operate under resource constraints, these challenges are particularly pronounced, meaning that adoption cannot be understood solely through teacher attitudes or leadership but must also account for infrastructural realities.

Global comparative studies reinforce this concern. Saal, Chetty, Ntshayintshayi, Moosa, and Masuku (2025), in a South African scoping review, demonstrated that artificial intelligence integration in rural and multilingual classrooms is often hindered by gaps in teacher training and inequitable access to infrastructure. Their findings suggest that without strong policy frameworks and targeted investment, artificial intelligence tools risk deepening existing inequities by benefiting only better-resourced schools. The World Bank evaluation (De, Federico, Maria, Rodriguez, Manolio, Mosuro, and Dikoru, 2025) provided evidence that even well-designed artificial intelligence pilots in Nigerian secondary schools produced uneven results because outcomes were highly dependent on local infrastructural conditions and teacher facilitation. This underscores the necessity of coupling artificial intelligence adoption with policy frameworks that ensure equitable provision of resources and capacity-building.

Furthermore, scholars emphasize that implementation challenges are not merely technical but cultural and ethical. Olojo et al. (2025) found that communities often resist artificial intelligence translations because of concerns about cultural distortion and lack of trust in machine outputs. Makeleni et al. (2023) added that artificial intelligence in the Global South is particularly susceptible to bias and misalignment because models are not trained on sufficient local language data. These insights suggest that for Ona Ara, infrastructural readiness must be combined with community engagement to ensure that artificial intelligence is not imposed but co-designed in ways that respect cultural and linguistic diversity. Therefore, the literature makes clear that infrastructural investments, policy support, and ethical safeguards are essential pillars without which artificial intelligence cannot serve multilingual education effectively.

2.5 Theoretical Framework

The present study is guided by three interrelated frameworks: the **Technology Acceptance Model (TAM)**, the **Unified Theory of Acceptance and Use of Technology (UTAUT)**, and **Transformational Leadership Theory**. Together these theories provide a multi-layered foundation for examining how artificial intelligence is integrated into multilingual classrooms in Ona Ara, Nigeria. This choice is deliberate, as the research problem spans individual teacher decision-making, contextual and institutional influences, and the leadership practices that sustain adoption.

The **Technology Acceptance Model (TAM)**, introduced by Davis in 1989, is one of the most widely used theories for explaining technology adoption. It posits that two key factors—perceived usefulness and perceived ease of use—determine an individual's behavioral intention to adopt technology, which in turn predicts actual usage. In the context of education, this means that teachers will adopt artificial intelligence if they believe it enhances their teaching effectiveness and if they find it easy to integrate into daily classroom practice. Ayanwale et al. (2024) applied these constructs in their study of Nigerian pre-service teachers, finding that while many demonstrated awareness of artificial intelligence, low practical skills limited their capacity to use it effectively. In Ona Ara, TAM helps to explain why some teachers may adopt bilingual translation tools to overcome linguistic barriers while others hesitate due to lack of confidence or training.

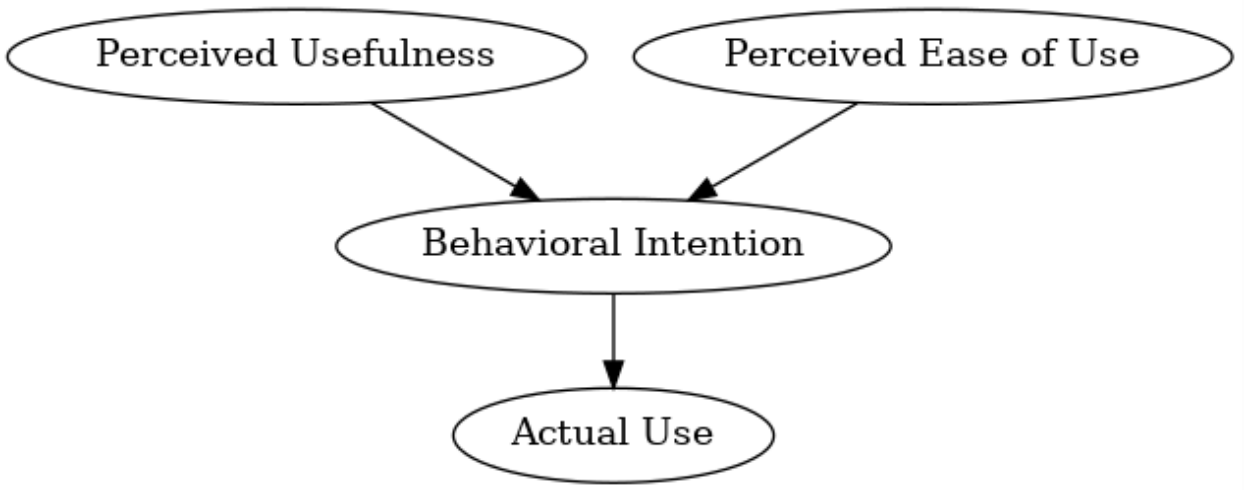

Figure 1Technology Acceptance Model (TAM).Note. Adapted from Davis (1989).

The **Unified Theory of Acceptance and Use of Technology (UTAUT)**, developed by Venkatesh et al. (2003), expands the scope of TAM by introducing four constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. This framework is especially useful for understanding adoption in schools where leadership and infrastructure play critical roles. For example, Zeng et al. (2025) demonstrated that principals' digital leadership increases teacher uptake of artificial intelligence by strengthening social influence and ensuring facilitating conditions such as training and access to devices. In Ona Ara, infrastructural limitations such as unstable connectivity and irregular electricity affect facilitating conditions, while the encouragement of principals and peers influences teachers' perceptions of artificial intelligence. UTAUT therefore moves the analysis beyond individual perceptions to capture the organizational and contextual realities of Nigerian schools.

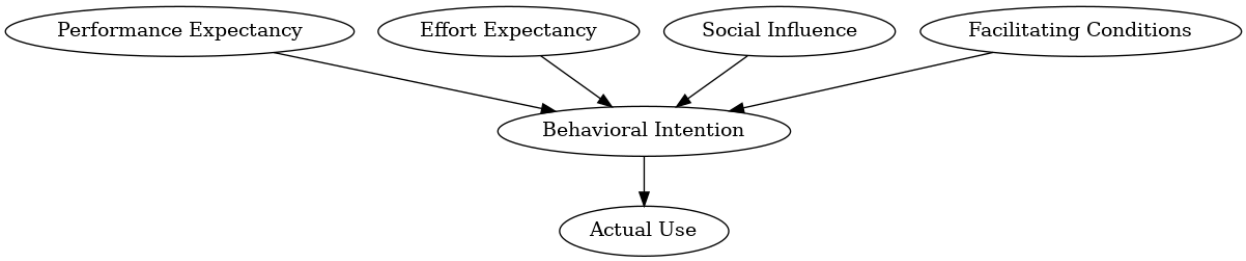

Figure 2Unified Theory of Acceptance and Use of Technology (UTAUT)Note. Adapted from Venkatesh, Morris, Davis, and Davis (2003).

The **Transformational Leadership Theory**, articulated by Burns (1978) and developed further by Bass (1990), provides an additional lens by focusing on how leaders inspire and mobilize their followers. Transformational leaders are distinguished by their ability to create a shared vision, model desired practices, provide individualized support, and intellectually stimulate their teams. In the context of artificial intelligence adoption, such leaders play an essential role in motivating teachers to experiment with new tools, addressing fears of technology, and ensuring that equity and inclusion remain central to implementation. Fullan et al. (2023) argued that school leaders must reconceptualize their roles as ethicists and advocates in the digital age. This resonates with the Ona Ara context, where principals not only coordinate technical resources but also foster cultural alignment by ensuring that artificial intelligence supports both English and indigenous languages.

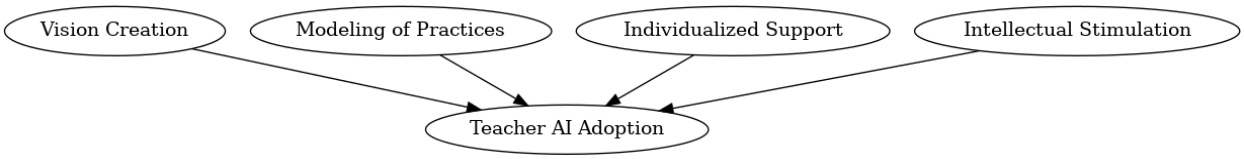

Figure 3: Transformational Leadership Theory. Note. Adapted from Burns (1978) and Bass (1990).

The decision to integrate these three frameworks is intentional and grounded in the multidimensional nature of the study. **TAM** provides the foundation for analyzing individual teacher perceptions of artificial intelligence. **UTAUT** extends the analysis to incorporate social and infrastructural factors that mediate adoption, thus capturing the influence of leadership and policy context. **Transformational Leadership Theory** complements this technology adoption models by focusing specifically on the leadership behaviors that sustain and scale adoption in multilingual settings. Taken together, these frameworks ensure that the study does not isolate technology adoption as a purely individual act but situates it within the broader institutional and cultural context of Ona Ara schools. The integration of these theories therefore allows for a comprehensive understanding of how artificial intelligence adoption is shaped by teacher readiness, organizational conditions, and visionary leadership.

3. Methodology

The study employed a qualitative case study design to explore how artificial intelligence is integrated into multilingual classrooms within Ona Ara Local Government Area of Oyo State, Nigeria. This design allowed for an in-depth analysis of the experiences of school leaders, teachers, and education officers while situating technology adoption within the cultural and infrastructural realities of multilingual education (Creswell, 2018). The case study approach was suitable because it provided flexibility to examine leadership practices and teacher experiences as they naturally occurred within their institutional settings.

The study targeted headteachers, classroom teachers, and education officers in Ona Ara. The population was purposively selected from schools where multilingual instruction is common and where artificial intelligence tools, even if limited, had been introduced. Ten schools were purposively chosen to reflect variation in ownership, size, and linguistic diversity, with representation from both urban and semi-rural communities. Within these schools, the sample included ten headteachers and sixty classroom teachers, consisting of three males and three females per school, as well as ten local education officers, giving a total of eighty participants. This composition was designed to capture the views of both leadership and teaching personnel who directly influence or experience the integration of artificial intelligence in the classroom. Snowball sampling was further applied to identify teachers and administrators with specific experience in applying artificial intelligence to multilingual teaching (Cohen et al., 2018).

Data collection occurred over a four-week period and involved semi-structured interviews, classroom observations, and document reviews. Interviews were conducted with headteachers, teachers, and education officers to examine their perceptions, leadership practices, and readiness to use artificial intelligence for multilingual teaching. Classroom observations focused on real interactions between teachers, students, and artificial intelligence tools such as translation applications and voice-assisted learning platforms. Local policy records, meeting minutes, and school reports were reviewed to provide institutional context and to understand how each school was responding to technology integration. Interviews lasted approximately 30 to 45 minutes, while classroom observations were conducted during regular teaching periods to ensure natural and authentic data collection (Babbie, 2016).

The study analyzed data using thematic analysis, following Braun and Clarke's (2006) six-step approach. Transcripts and observation notes were coded inductively to capture emerging ideas, which were then organized into categories and broader themes such as leadership as an enabler, teacher preparedness, and infrastructural barriers. NVivo software was used to organize and retrieve data systematically, ensuring transparency and consistency in analysis. Quantitative data generated from descriptive counts in the teacher responses were presented in tables, while the qualitative data provided contextual explanations that clarified the patterns observed. This approach allowed for triangulation and strengthened the rigor of interpretation (Bryman, 2016).

The study adhered to ethical standards by obtaining permission from the headteachers of all participating schools and written or verbal consent from every participant. Participants were informed about the purpose of the study and assured that confidentiality would be maintained. The names of schools and individuals were not disclosed in any report. All participants were informed that participation was voluntary and that they could withdraw at any time without consequence. Collected data were stored in password-protected files, accessible only to the researcher. These measures ensured respect for

participants' rights and upheld the ethical integrity of the study.

4. Results and Discussion

The results of this study are presented according to the four research questions that guided the investigation. Both quantitative summaries and qualitative insights are provided to explain how artificial intelligence (AI) is integrated into multilingual classrooms in Ona Ara Local Government Area.

4.1 Research Question 1:

How do school leaders in Ona Ara integrate artificial intelligence into multilingual classrooms?

Table 1: Leadership Practices Supporting AI Integration (n = 10 Administrators)

Leadership Practice	Frequency	Percentage	Example
Modeling the use of AI tools	8	80%	Principals demonstrated translation apps during staff training
Encouraging teacher experimentation	9	90%	Heads organized weekly AI practice sessions
Resource mobilization	6	60%	School leaders secured donated laptops from PTA
Promoting language inclusion	5	50%	Administrators monitored Yoruba–English balance in lessons

Table 1 shows that administrators in Ona Ara were deliberate in shaping how AI tools were introduced and used within their schools. Nine of the ten administrators (90 percent) reported encouraging teachers to experiment with AI-based tools during lessons and share their experiences during meetings. Eight administrators (80 percent) modeled AI use themselves, often by demonstrating translation applications or bilingual content creation tools during professional gatherings. Six administrators (60 percent) reported that they mobilized resources to support digital teaching, often securing laptops, projectors, or mobile devices through community partnerships. Five administrators (50 percent) emphasized language inclusion, ensuring that AI tools promoted both Yoruba and English comprehension among students. These patterns reveal that leadership behavior significantly influenced teachers' willingness to integrate AI.

Qualitative interviews provided further depth to these findings. Several principals explained that their commitment to AI integration stemmed from a desire to improve communication across linguistic boundaries. Administrators from private schools described AI adoption as a means to enhance institutional image and competitiveness, while public-school heads focused on improving language equity. In both settings, leadership acted as a bridge between policy expectations and classroom realities.

4.2 Research Question 2:

What challenges do teachers face when adopting artificial intelligence in multilingual classrooms?

Table 2: Challenges Reported by Teachers (n = 60)

Challenge	Frequency	Percentage	Example
Limited AI literacy	43	72%	Teachers struggled to use speech-to-text tools effectively
Infrastructural barriers (power and internet)	48	80%	Lessons disrupted by blackouts and poor connectivity

Challenge	Frequency	Percentage	Example
Mistrust of AI outputs	35	58%	Yoruba idioms mistranslated during lessons
Lack of formal training	45	75%	No structured professional development on AI use

The findings in Table 2 indicate that infrastructural barriers represented the most serious challenge to teachers in Ona Ara, as 80 percent reported unreliable power and internet connectivity. Limited AI literacy was reported by 72 percent of teachers, while 75 percent cited the absence of organized training programs to guide their learning. Over half (58 percent) expressed mistrust toward AI-generated translations, noting that incorrect interpretations of cultural expressions often distorted classroom discussions.

Qualitative data confirmed that many teachers relied on informal experimentation to explore AI tools, leading to inconsistent results. Teachers in public schools emphasized that infrastructural failure discouraged sustained AI use, while their counterparts in private schools attributed their struggles to inadequate training. Several teachers mentioned that mistranslations embarrassed them before students and made them hesitant to continue using AI tools. The general sentiment was that adoption was desirable but unsustainable without technical support and continuous training.

4.3 Research Question 3:

In what ways does artificial intelligence improve or hinder student engagement in multilingual classrooms?

Table 3: Student Engagement with AI Tools (Observed in 10 Schools)

Type of Impact	Frequency	Percentage	Example
Improved participation	7	70%	Students participated more during bilingual discussions
Increased motivation	6	60%	Learners showed excitement using AI-generated worksheets
Confusion from inaccurate outputs	4	40%	Students distracted when translations were incorrect
Reduced absenteeism	3	30%	Teachers linked improved attendance to AI-based lessons

The data in Table 3 show that AI had a generally positive influence on student engagement. Seventy percent of schools observed improved classroom participation, especially when AI tools allowed bilingual expression. Sixty percent of schools reported that students became more motivated during AI-assisted lessons, particularly when they used translation tools or interactive bilingual exercises. However, four schools (40 percent) noted that inaccurate translations occasionally caused confusion and laughter, temporarily interrupting lessons. Three schools (30 percent) linked AI use to improved attendance, suggesting that inclusive teaching encouraged consistency in school participation.

Observation notes showed that students who were usually quiet in English-only classes spoke more confidently when AI-generated translations appeared in Yoruba. Teachers described the lessons as more lively and participatory. However, when AI produced inaccurate or culturally insensitive translations, students quickly lost focus. These findings suggest that AI enhances participation only when its use is carefully monitored and mediated by teachers who understand both linguistic and technical nuances.

4.4 Research Question 4:

What policy and infrastructural conditions shape the adoption of artificial intelligence in Ona Ara schools?

Table 4: Policy and Infrastructural Conditions Influencing AI Adoption (n = 10 Schools)

Condition	Frequency	Percentage	Example
Absence of formal AI policy	10	100%	No directive from the education ministry
Unstable electricity supply	8	80%	Blackouts during lessons
Limited device availability	6	60%	One tablet shared among multiple students
Local improvisation	5	50%	Use of community Wi-Fi and personal laptops

The findings in Table 4 indicate that no school in Ona Ara operated under a formal AI policy, confirming that technology integration occurred largely through individual or institutional initiative. Eight schools (80 percent) reported unstable electricity supply, while six schools (60 percent) lacked sufficient devices for classroom use. Five schools (50 percent) resorted to improvisation, such as using community Wi-Fi networks or personal laptops to facilitate teaching.

Interview evidence showed that administrators frequently navigated policy gaps through creativity and persistence. Private schools were more likely to establish informal guidelines for AI use and to invest in infrastructure, while public schools depended on partnerships and improvisation. The absence of national or local policy frameworks placed the burden of implementation on individual school leaders, reinforcing the centrality of leadership initiative in driving adoption.

4.5 Discussion of Findings

4.51 Discussion of Research Question 1: How do school leaders in Ona Ara integrate artificial intelligence into multilingual classrooms?

The findings revealed that school leaders in Ona Ara demonstrated active involvement in integrating artificial intelligence (AI) into classroom practices. As presented in Table 1, 90 percent of administrators encouraged teachers to experiment with AI-based tools, while 80 percent modeled the use of these tools themselves during training sessions. Sixty percent reported mobilizing resources to support technology use, and 50 percent monitored classroom inclusivity to ensure that both Yoruba and English languages were represented in AI-supported lessons. The qualitative interviews confirmed that principals in private schools viewed AI as an innovation that enhanced their schools' competitiveness, while those in public schools saw it as a means to promote equitable communication and participation among students from diverse linguistic backgrounds. These findings emphasize that leadership practices shaped not only the degree of AI adoption but also the direction in which it was applied within multilingual classrooms.

This result aligns with Zeng et al. (2025), who found that principals' digital leadership practices, particularly modeling, mentoring, and fostering professional learning, significantly influenced teachers' competence in using AI. Similarly, Okunlola (2025) established that digital leadership competencies such as resource mobilization, vision sharing, and mentorship directly affected the success of technology integration in Oyo State schools. The results from Ona Ara confirm that such competencies remain critical, especially in multilingual contexts where equity and inclusivity must accompany innovation. Furthermore, Fullan, María, Harris, and Jones (2023) emphasized that leadership in the age of AI extends beyond management to advocacy and ethical stewardship. This study supports that assertion, showing that leaders who view AI as a tool for social inclusion create more meaningful adoption processes. The findings also agree with Thankgod, Nwuke, and Yellowe (2025), who demonstrated that effective school administration in Nigeria requires leaders who understand how to utilize AI tools to enhance supervision and instruction. Overall, the evidence confirms that AI adoption in Ona Ara's multilingual classrooms depended heavily on the vision and digital initiative of school leaders.

4.52 Discussion of Research Question 2: What challenges do teachers face when adopting artificial intelligence in multilingual classrooms?

As shown in Table 2, teachers in Ona Ara faced multiple challenges that limited their effective use of AI in classroom instruction. The most critical constraints were infrastructural barriers, with 80 percent reporting unstable

power supply and unreliable internet access. Limited AI literacy (72 percent) and lack of formal training (75 percent) further compounded the problem. In addition, 58 percent of teachers expressed mistrust in AI outputs due to inaccurate translations and cultural distortions of Yoruba expressions. The interviews revealed that while teachers appreciated the potential of AI tools to enhance engagement, they lacked technical confidence and often experienced frustration when tools failed or produced errors. Teachers in private schools were more familiar with AI features, yet they also cited the absence of sustained training. These findings show that AI adoption was hindered not by resistance but by systemic gaps in skill development, infrastructure, and support.

These findings are consistent with Ayanwale et al. (2024), who reported that Nigerian pre-service teachers possessed positive attitudes toward AI but lacked the practical skills needed for effective implementation. Similarly, Tan et al. (2024) found that insufficient professional development remains a global bottleneck in AI adoption, as most training programs fail to equip teachers with contextual problem-solving abilities. The present study reinforces these observations by showing that willingness alone does not guarantee successful integration. Infrastructural limitations remain a key determinant, confirming Bali et al. (2024), who identified unreliable electricity and poor connectivity as major obstacles to educational technology use in Nigeria. The finding on mistrust of AI outputs also supports Olojo et al. (2025), who observed that Nigerian communities often reject AI translations that distort local idioms or misrepresent cultural meanings. These findings demonstrate that AI adoption in multilingual education must be addressed holistically by building teachers' confidence, improving infrastructural access, and ensuring cultural accuracy in AI applications. Within the Technology Acceptance Model (Davis, 1989), the low perceived ease of use and usefulness observed among teachers explains their limited adoption, while the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) clarifies that weak facilitating conditions and lack of social influence from institutional systems further constrained usage.

4.52 Discussion of Research Question 3: In what ways does artificial intelligence improve or hinder student engagement in multilingual classrooms?

Findings from Table 3 showed that AI had both positive and limiting effects on student engagement. Seventy percent of schools observed improved participation, and 60 percent reported increased motivation during AI-supported lessons. Students who previously hesitated to speak in English participated more when translation tools or bilingual activities were used. Thirty percent of schools reported that students' attendance improved after consistent AI use, suggesting that inclusive practices encouraged commitment. However, 40 percent of schools also observed confusion and distraction arising from mistranslated or contextually inappropriate outputs. Qualitative data from classroom observations confirmed that when AI accurately translated content, learners were more responsive and engaged, but errors quickly undermined confidence and focus. This dual pattern indicates that AI can enhance inclusivity and enthusiasm, yet its benefits depend on the quality of tools and the capacity of teachers to guide their use effectively.

These results align with Weng and Fu (2025), who emphasized that generative AI could foster inclusivity in multilingual education only when carefully mediated by teachers to maintain accuracy and cultural appropriateness. The observed improvement in participation and motivation also corresponds with findings from De et al. (2025), who reported that AI-enhanced learning tools improved student outcomes in Nigerian classrooms when combined with strong teacher facilitation. Similarly, Timothy et al. (2024) and Grace et al. (2024) found that Yoruba–English machine translation systems improved bilingual understanding but still required human correction to maintain semantic precision. The present study therefore underscores that while AI holds promise for bridging linguistic divides, it must be supported by adequate teacher training and infrastructure. The observed limitations further echo the GEM Report (2025), which stressed that home language instruction should remain central to learning even when assisted by technology. Hence, AI should be viewed as a supplement rather than a substitute for teacher-led bilingual instruction. The findings collectively confirm that effective student engagement in multilingual classrooms requires a balanced combination of AI innovation and teacher mediation.

4.53 Discussion of Research Question 4: What policy and infrastructural conditions shape the adoption of artificial intelligence in Ona Ara schools?

Table 4 demonstrated that the adoption of AI in Ona Ara schools was constrained by the absence of formal policy frameworks and infrastructural weaknesses. All schools confirmed the lack of an AI policy from the education ministry, and 80 percent cited unstable electricity as a significant barrier. Sixty percent reported limited access to devices, while half (50 percent) relied on improvisation, such as using community Wi-Fi or personal laptops. Interviews revealed that principals frequently navigated policy and resource gaps through improvisation. Private schools occasionally developed informal guidelines for AI use, while public schools depended on local partnerships. This situation highlights that AI adoption is currently driven by individual initiative rather than systematic institutional planning.

These findings strongly align with Sanusi (2025), who reported that Nigeria's AI policy environment remains fragmented, lacking specific frameworks for educational integration. Bali et al. (2024) also confirmed that infrastructural deficits such as unreliable power supply and poor internet access continue to impede digital transformation in Nigerian schools. Saal et al. (2025) similarly observed that schools in South Africa's rural areas faced inequitable access to infrastructure, emphasizing the importance of context-sensitive policies. The present study supports these perspectives by showing that without structured guidance, schools are left to improvise, resulting in inconsistent and unsustainable implementation. The evidence further echoes Fullan et al. (2023), who argued that school leaders must act as ethical advocates and policy intermediaries in the absence of strong institutional frameworks. Thankgod et al. (2025) reinforced this argument, demonstrating that successful AI utilization in educational administration depended on leadership capacity to interpret and localize available technologies. The findings therefore affirm that national and local policy frameworks must provide infrastructural investment, leadership training, and regulatory guidance to ensure that AI adoption promotes inclusivity and long-term sustainability in multilingual education.

The discussion synthesizes the quantitative and qualitative findings from the study to provide comprehensive answers to each of the four research questions. The results, supported by both descriptive statistics and interview data, revealed how leadership, teacher preparedness, student engagement, and policy and infrastructural conditions shaped the integration of artificial intelligence into multilingual classrooms in Ona Ara. Each research question is discussed in detail, with explicit reference to the tables of analysis and the insights drawn from the field.

4.6 Implications of the Findings

The findings of this study have theoretical, practical, and policy implications for the integration of artificial intelligence (AI) in multilingual classrooms, particularly within developing educational systems such as those in Nigeria. These implications extend beyond the Ona Ara context, offering insight into how leadership, teacher preparedness, and infrastructural readiness interact to determine the success or failure of AI integration in linguistically diverse learning environments.

4.61 Theoretical Implications

Theoretically, the findings strengthen the explanatory power of the Technology Acceptance Model (Davis, 1989), the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), and Transformational Leadership Theory (Burns, 1978; Bass, 1990) within multilingual educational settings. The study demonstrated that teachers' perceived usefulness of AI and their ease of use were significantly influenced by leadership behavior, institutional culture, and infrastructural support. Inadequate facilitating conditions such as unreliable electricity and limited devices lowered adoption intent, validating the UTAUT construct of facilitating conditions as a predictor of technology use. The results also confirmed that transformational leadership behaviors, including vision sharing, modeling, and individualized support, were critical for enhancing teachers' confidence in AI use. This finding enriches Transformational Leadership Theory by extending its relevance beyond organizational management to the domain of educational technology and multilingual pedagogy. Hence, the study provides a theoretical bridge linking leadership practice to technology adoption frameworks within culturally diverse school environments.

4.62 Practical Implications

Practically, the results highlight that successful AI integration in multilingual classrooms depends largely on the professional competence and leadership orientation of school administrators. Principals must model the use of AI, create collaborative learning environments, and promote the use of tools that enhance linguistic inclusivity. Teachers, in turn, require continuous professional development that combines technical skills with cultural and linguistic awareness. The evidence from Ona Ara shows that teachers are not resistant to innovation but are constrained by skill and resource limitations. Addressing these gaps through sustained mentoring, training, and peer collaboration would increase teachers' confidence and readiness to use AI effectively. Furthermore, schools need to prioritize the inclusion of indigenous languages in AI-supported materials to avoid deepening linguistic inequities. Investing in locally trained models and bilingual learning platforms would enhance both relevance and accuracy, ensuring that AI serves as a bridge rather than a barrier in multilingual education.

4.63 Policy Implications

At the policy level, the study underscores the urgent need for national and regional education authorities to develop clear frameworks that guide the use of artificial intelligence in schools. The absence of formal AI policies, as observed across all ten schools, has left integration efforts fragmented and dependent on individual initiative. Ministries of Education and related agencies must therefore establish comprehensive AI-in-education strategies that include teacher training, infrastructure development, ethical safeguards, and guidelines for linguistic representation. Consistent with the recommendations of Sanusi (2025) and Bali et al. (2024), policies should ensure equitable distribution of digital resources across both public and private schools.

Additionally, partnerships between government agencies, technology providers, and local communities can strengthen infrastructural sustainability, particularly in rural areas. Such policies should also encourage continuous leadership development, ensuring that school administrators possess the digital literacy and strategic skills necessary to implement AI responsibly. In the broader context, this would align with the United Nations Sustainable Development Goal 4, which emphasizes inclusive and equitable quality education for all learners.

5. Conclusion and Recommendations

5.1 Conclusion

This study provided clear insights into how school leaders in Ona Ara integrated artificial intelligence into multilingual classrooms and how teacher preparedness, student engagement, and infrastructural conditions shaped this process. The findings showed that principals' leadership practices strongly influenced adoption, with 80 percent of administrators modeling artificial intelligence tools during meetings and 90 percent encouraging teacher experimentation (see Table 1). Teachers, however, faced significant barriers, with 80 percent identifying unreliable electricity, 75 percent citing lack of training, and 58 percent expressing mistrust toward translation outputs (see Table 2). Student engagement improved where artificial intelligence was used effectively, with 70 percent of schools reporting increased participation and 60 percent observing heightened motivation, though 40 percent reported confusion caused by inaccurate translations (see Table 3). Finally, infrastructural and policy gaps severely constrained adoption, with all schools confirming the absence of formal policy frameworks, 80 percent reporting unstable electricity, and 60 percent noting device scarcity (see Table 4). These findings demonstrated that while artificial intelligence could foster inclusivity and improve instruction in multilingual classrooms, its success depended heavily on visionary leadership, teacher readiness, and supportive infrastructure.

The findings also built on established theories that help explain adoption outcomes. Transformational Leadership Theory (Burns, 1978; Bass, 1990) was confirmed, as principals who provided vision, modeled usage, and supported teachers fostered higher levels of adoption. The Technology Acceptance Model (Davis, 1989) explained teacher hesitation, since low perceived ease of use and mistrust of translations weakened their willingness to integrate artificial intelligence. Similarly, the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) clarified the importance of facilitating conditions and social influence, as schools with stronger leadership support and fewer infrastructural challenges experienced greater success. Together, these frameworks provided a cohesive lens for interpreting how leadership, teacher perception, and contextual realities intersected in Ona Ara to shape adoption patterns.

The study's implications were straightforward and meaningful for multilingual education in Nigeria. The results suggested that principals should embrace transformational leadership strategies, including consistent modeling of artificial intelligence tools and encouraging professional learning communities that support peer mentoring and experimentation. Teacher preparedness must be reinforced through continuous professional development that integrates digital literacy with linguistic and cultural sensitivity. For policymakers, the absence of structured guidance on artificial intelligence adoption highlighted the need for comprehensive national frameworks that ensure linguistic inclusivity, promote Yoruba–English artificial intelligence tools, and address infrastructural deficits in rural schools. These results align with the United Nations Sustainable Development Goal 4 on inclusive and equitable education, showing that artificial intelligence can bridge language barriers and foster educational equity if supported by policy and investment. Beyond Nigeria, the lessons from Ona Ara provide transferable insights for other multilingual and resource-constrained contexts seeking to integrate technology into education.

Despite these contributions, the study faced limitations that deserve acknowledgment. The sample was limited to ten schools within Ona Ara, which may not capture the experiences of all public and private schools across Oyo State or other regions of Nigeria. Data collection occurred within a four-week period, offering a snapshot rather than longitudinal evidence of adoption trends. Additionally, while the study examined translation and generative artificial intelligence tools, it did not capture how continuous exposure or technological advancement might influence long-term integration. Future studies should therefore expand across multiple regions, include larger samples, and employ longitudinal or mixed-method designs to track evolving practices and policy outcomes. Such research would deepen understanding and inform sustainable strategies for integrating artificial intelligence in multilingual education across Nigeria and beyond.

In conclusion, this study contributed to the growing body of knowledge on artificial intelligence in education by demonstrating that successful integration in multilingual classrooms requires more than technology alone. It requires visionary leadership that inspires adoption, teacher capacity-building that ensures competence, student-centered mediation that maintains engagement, and systemic policy and infrastructural support that guarantee sustainability. By addressing these interdependent elements, Nigerian schools can transform artificial intelligence from a temporary innovation into a

durable instrument for inclusion, engagement, and educational advancement.

5.2 Recommendations

Based on the findings and conclusions of this study, the following recommendations are proposed to guide school leaders, teachers, policymakers, and researchers in strengthening the integration of artificial intelligence (AI) into multilingual classrooms in Nigeria.

1. Recommendations for School Leaders

School leaders in Ona Ara and similar multilingual contexts should adopt transformational leadership practices that promote equity and innovation in teaching. Principals should model the use of AI tools during staff meetings, classroom demonstrations, and professional development sessions. Regular collaborative platforms such as workshops and peer learning circles should be established to allow teachers to share experiences, challenges, and success stories related to AI use. Leaders must also ensure that AI adoption promotes inclusivity, supporting both English and indigenous languages such as Yoruba to prevent linguistic marginalization. Furthermore, principals should take proactive steps to mobilize resources through community partnerships, parent-teacher associations, and local education authorities to provide devices, stable power supply, and internet connectivity for sustained AI use.

2. Recommendations for Teachers

Teachers should be equipped with ongoing professional development programs focused on AI literacy, digital pedagogy, and culturally responsive instruction. Training sessions should move beyond theoretical exposure and emphasize hands-on engagement with AI tools such as translation applications, adaptive learning systems, and generative content platforms. Teachers should also be encouraged to act as active mediators who critically assess AI outputs, ensuring that translations and materials produced reflect linguistic and cultural accuracy. Teacher training institutions and continuous education programs should incorporate AI integration modules into their curriculum to prepare educators for multilingual digital classrooms.

3. Recommendations for Policymakers and Educational Authorities

At the policy level, the Ministry of Education and related agencies should develop a comprehensive national framework for artificial intelligence in education. Such a framework should specify clear guidelines for integrating AI into multilingual classrooms, with attention to ethical standards, cultural inclusion, and equitable access to infrastructure. Investments should prioritize stable electricity, affordable internet connectivity, and the provision of digital devices in both public and rural schools. Policies should also encourage collaboration between the government, technology firms, and local universities to develop Yoruba–English AI applications that reflect local language structures and sociocultural realities. Additionally, leadership training programs should be institutionalized to equip school administrators with digital leadership competencies required to guide sustainable AI adoption.

4. Recommendations for Researchers

Future research should expand beyond Ona Ara to include other regions of Nigeria and explore differences in AI adoption across various educational levels and socioeconomic contexts. Longitudinal studies should be conducted to assess how teacher attitudes, student outcomes, and leadership practices evolve as AI tools improve and become more accessible. Comparative studies across multilingual nations in Africa could also offer deeper insight into how contextual and cultural factors influence AI integration. Research on locally developed AI systems, particularly those focused on indigenous languages, should be prioritized to ensure that future educational technologies serve the linguistic diversity and educational goals of the African continent.

References

Adeboje, O. T., Adeboje, O. T., Adetunmbi, O. A., & Akinyede, R. O. (2025). A deep learning-based English to Yoruba neural translation model. *International Journal of Computer Applications, 186*(62), 38–41. https://doi.org/10.5120/ijca2025924463

Ayanwale, M. A., et al. (2024). Examining artificial intelligence literacy among pre-service teachers for future classrooms. *Computers and Education Open*, *6*, 100179–100179. https://doi.org/10.1016/j.caeo.2024.100179

Babaci-Wilhite, Z., et al. (2025). Reimagined AI pedagogy for equity and diversity in multilingual classrooms: A case study of hope in comparative and international education. *Prospects*. https://doi.org/10.1007/s11125-025-09720-4

Bali, B., et al. (2024). Analysis of emerging trends in artificial intelligence for education in Nigeria. *Discover Artificial Intelligence*, *4*(1). https://doi.org/10.1007/s44163-024-00163-y

Bass, B. M. (1990). *From transactional to transformational leadership: Learning to share the vision.* Organizational Dynamics, 18(3), 19–31.

Berkovich, I. (2025). The rise of AI-assisted instructional leadership: empirical survey of generative AI integration in school leadership and management work. *Frontiers in Education*, *10*. https://doi.org/10.3389/feduc.2025.1643023

Burns, J. M. (1978). *Leadership.* Harper & Row.

Chisom, O. N., Unachukwu, C. C., & Osawaru, B. (2023). Review of ai in education: transforming learning environments in Africa. *International Journal of Applied Research in Social Sciences, 5*(10), 637–654. https://doi.org/10.51594/ijarss.v5i10.725

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

De, M., Federico, S., Maria, T., Rodriguez, B., Manolio, F., Mosuro, W., & Dikoru, E. (2025). From chalkboards to chatbots evaluating the impact of generative AI on learning outcomes in Nigeria. *World Bank.* https://documents1.worldbank.org/curated/en/099548105192529324/pdf/IDU-c09f40d8-9ff8-42dc-b315-591157499be7.pdf

Fullan, M., María, C., Harris, A., & Jones, M. (2023). Artificial Intelligence and school leadership: Challenges, opportunities and implications. *School Leadership & Management, 44*(4), 339–346. https://doi.org/10.1080/13632434.2023.2246856

GEM Report. (2025, February 21). The use of home language for instruction should be prioritized in Africa – it is a foundation for learning. *World Education Blog.* https://world-education-blog.org/2025/02/21/the-use-of-home-language-for-instruction-should-be-prioritized-in-africa-it-is-a-foundation-for-learning/

Grace, O. T., Adebayo, A. O., & Boyinbode, Olutayo Kehinde. (2024). A Transformer-Based Yoruba to English Machine Translation (TYEMT) System with rouge score. *International Journal of Innovative Science and Research Technology (IJISRT), 9*(9), 2787–2797. https://doi.org/10.38124/ijisrt/ijisrt24sep1562

Makeleni, S., Mutongoza, B. H., & Linake, M. A. (2023). Language education and artificial intelligence: An exploration of challenges confronting academics in global south universities. *Journal of Culture and Values in Education, 6*(2), 158-171. https://doi.org/10.46303/jcve.2023.14

Mokoena, O. P., & Seeletse, S. M. (2025). AI in rural classrooms: Challenges and perspectives from South African educators. *International Journal of Current Education Studies (IJCES).* https://doi.org/10.46328/ijces.199

Okunlola, J. O., & Naicker, S. R. (2025). Principals' digital leadership competencies in the Fourth Industrial Revolution: Teachers' perspectives. *Education Sciences*, *15*(6), 656. https://doi.org/10.3390/educsci15060656

Olojo, S., Zakrzewski, J., Smart, A., Liemt, E. van, Miceli, M., Ebinama, A., & Amugongo, L. M. (2025). Lost in machine translation: The sociocultural implications of language technologies in Nigeria. *FAccT '25: Proceedings of the 2025 ACM Conference on Fairness, Accountability, and Transparency,* 2249–2259. https://doi.org/10.1145/3715275.3732153

Ridho, M. R., Wiyono, B.B., & Mustiningsih, N. (2024). Digital leadership of school principals to improve the quality of learning in the industrial revolution era 4.0. *INSANIA Jurnal Pemikiran Alternatif Kependidikan, 29*(1), 17–34. https://doi.org/10.24090/insania.v29i1.9566

Saal, P. E., Chetty, K., Ntshayintshayi, N., Moosa, T., & Masuku, N. (2025). A scoping review of the integration of artificial intelligence in primary and secondary schools from 2020 to 2024: Policy implications for South Africa. *Journal of Education*, *98*, 62–85. https://doi.org/10.17159/2520-9868/i98a04

Sanusi, I. (2025). Artificial intelligence in school education: The case of Nigeria. *Revue Internationale D Éducation de Sèvres*, *HS - 4*. https://doi.org/10.4000/146vp

Tan, X., Cheng, G., & Ling, M. H. (2024). Artificial Intelligence in teaching and teacher professional development: A systematic review. *Computers and Education Artificial Intelligence*, *8*, 100355–100355. https://doi.org/10.1016/j.caeai.2024.100355

Thankgod, J., Nwuke, & Yellowe, A. (2025). Utilization of artificial intelligence in school

supervision for effective administration in public secondary schools in Rivers State, Nigeria. *International Journal of Educational Management, 1*(1), 318–334.

Timothy, A. O., Adebayo, A. O., Junior, A. G., & Akinyede Raphael Olufemi. (2024). Bilingual neural machine translation from English to Yoruba using a transformer model. *International Journal of Innovative Science and Research Technology (IJISRT), 9*(7), 826–833. https://doi.org/10.38124/ijisrt/ijisrt24jul767

Uzorka, A., & Kalabuki, K. (2025). Educational leadership in the digital Age: An exploration of technology's impact on leadership practices. *Social Sciences & Humanities Open, 11*, 101581. https://doi.org/10.1016/j.ssaho.2025.101581

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Weng, Z. & Fu, Y. (2025). Generative AI in language education: Bridging divide and fostering inclusivity. *International Journal of Technology in Education (IJTE), 8*(2), 395- 420. https://doi.org/10.46328/ijte.1056

Zeng, M., et al. (2025). The influence of school principals' digital leadership on teachers' competency in integrating artificial intelligence: a systematic thematic review. Frontiers in Education. https://doi.org/10.3389/feduc.2025.1655967