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## Integration of Artificial Intelligence in English Language Curriculum Planning at the Early Childhood Education Level

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### Abstract

The integration of Artificial Intelligence (AI) into English language curriculum planning at the early childhood education level presents transformative opportunities for pedagogical innovation and personalized learning. This study explores the extent, strategies, and implications of incorporating AI tools and technologies into curriculum design within Enugu State, Nigeria. Drawing on qualitative data from curriculum developers, early childhood educators, and education policymakers, the research examines how AI can enhance language acquisition, support differentiated instruction, and foster learner engagement. The findings reveal that while awareness of AI's potential is growing, its practical application remains limited due to infrastructural challenges, teacher preparedness, and policy gaps. However, successful pilot programs demonstrate that AI-powered platforms such as speech recognition tools, adaptive learning systems, and interactive storytelling applications can significantly improve vocabulary development, pronunciation accuracy, and reading fluency among young learners. The study advocates for a strategic framework that includes professional development, stakeholder collaboration, and policy reform to facilitate sustainable AI integration. By aligning technological innovation with developmental appropriateness and cultural relevance, Enugu State can pioneer a model for AI-enhanced early childhood English education across sub-Saharan Africa. The article concludes with recommendations for scalable implementation and future research directions.

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## Introduction

In the 21st-century educational landscape, Artificial Intelligence (AI) is rapidly emerging as a transformative force, reshaping how curricula are designed, delivered, and assessed. Prasad and Singh (2022), Umeh (2022), and Williams and Eze (2023) noted that in early childhood education, where foundational skills in language and communication are formed, AI offers promising avenues for enhancing learning experiences and outcomes. English language acquisition at this stage is critical, as it lays the groundwork for future academic success and global competence. In Enugu State, Nigeria, the integration of AI into English language curriculum planning remains a relatively unexplored frontier, despite growing interest in educational technology across the region (Olaleye & Salami, 2024).

This study investigates the potential for embedding AI tools and methodologies into the planning and implementation of English language curricula for early learners in Enugu State. It considers how intelligent systems such as natural language processing applications, adaptive learning platforms, and speech recognition technologies can support personalized instruction, early literacy development, and inclusive learning environments. The research also examines the readiness of educators, the availability of infrastructure, and the alignment of policy frameworks to support such integration. By focusing on the unique socio-cultural and educational context of Enugu State, the article aims to provide actionable insights for curriculum developers, policymakers, and educators seeking to modernize early childhood education through AI. Ultimately, the integration of AI in curriculum planning is not merely a technological upgrade but a strategic shift toward more responsive, equitable, and future-oriented education.

## Statement of the Problem

According to Adegbite and Nwafor (2023), Ezeani (2023), and Nwachukwu and Obi (2024), despite the growing global emphasis on integrating Artificial Intelligence (AI) into education, early childhood curriculum planning in Enugu State remains largely traditional, particularly in the area of English language instruction. The absence of AI-driven tools and methodologies in curriculum design limits opportunities for personalized learning, early literacy development, and adaptive instruction tailored to diverse learner needs. Moreover, educators often lack the training and resources to incorporate AI effectively, while policymakers have yet to establish clear frameworks to guide its integration (Musa & Bello, 2023). This disconnect between technological advancement, and curriculum practice poses a significant challenge to preparing young learners for a digitally driven future (Adigun et al., 2025; Ewa, 2024; Nkolika, 2025). Without strategic intervention, Enugu State risks falling behind in leveraging AI to enhance foundational language skills during the most critical stage of cognitive development.

## Purpose of the Study

The purpose of this study is to examine the integration of Artificial Intelligence in English language curriculum planning at the early childhood education level in Enugu State. Specifically, the research aims to identify existing gaps, assess the readiness of educators and institutions, and explore the potential of AI tools to support language

acquisition among young learners. By analyzing stakeholder perspectives and current practices, the study seeks to develop a context-sensitive framework for AI adoption in curriculum planning. Ultimately, the research intends to provide actionable recommendations for policymakers, curriculum developers, and educators to foster innovative, inclusive, and future-oriented English language instruction in early childhood settings.

### Research Questions

1. To what extent is Artificial Intelligence (AI) currently integrated into English language curriculum planning at the early childhood education level in Enugu State?
2. What are the perceptions of early childhood educators and curriculum planners in Enugu State regarding the use of Artificial Intelligence (AI) in English language instruction?
3. What infrastructural, pedagogical, and policy-related factors influence the integration of AI in early childhood English language curriculum planning in Enugu State?

### Research Hypotheses

1. **H<sub>1</sub>:** There is a low level of integration of Artificial Intelligence in English language curriculum planning at the early childhood education level in Enugu State.
2. **H<sub>2</sub>:** Early childhood educators and curriculum planners in Enugu State have a positive perception of AI as a tool for enhancing English language instruction.
3. **H<sub>3</sub>:** Infrastructural limitations, lack of teacher training, and absence of supportive policies significantly hinder the integration of AI in early childhood English language curriculum planning in Enugu State.

## Methodology

### Design

This study adopted a descriptive survey research design to investigate the integration of Artificial Intelligence (AI) in English language curriculum planning at the early childhood education level in Enugu State. The design enabled the collection of data from a broad range of stakeholders to understand current practices, perceptions, and challenges.

### Sample

The sample comprised 120 participants, including early childhood educators, curriculum planners, and education administrators selected from public and private institutions across Enugu State. A stratified random sampling technique was used to ensure representation across urban and rural settings.

### Instrument

A structured questionnaire titled AI Integration in Early Childhood English Curriculum Questionnaire (AIEC-

ECQ) was developed by the researchers. The instrument contained both closed and open-ended items organized into sections addressing demographic information, current AI usage, perceived benefits, challenges, and recommendations.

### Validity

Content validity was established through expert review by three specialists in educational technology and curriculum studies. Their feedback informed revisions to ensure clarity, relevance, and alignment with the study's objectives.

### Reliability

The reliability of the instrument was determined using the Cronbach Alpha method, yielding a coefficient of 0.82, indicating high internal consistency.

### Procedures for Data Collection and Analysis

Data were collected through direct administration of the questionnaire, with assistance from trained research assistants. Responses were coded and analyzed using descriptive statistics (mean, frequency, percentage) and inferential statistics (Chi-square and ANOVA) to test the research hypotheses. The Statistical Package for the Social Sciences (SPSS) version 25 was used for analysis.

### Results

Findings were interpreted in relation to the research questions and contextual realities of Enugu State. The data collected were analyzed using descriptive and inferential statistics to address the research questions and test the hypotheses. Below is a summary of the findings:

Table 1. Extent of AI Integration in English Language Curriculum Planning

Level of Integration	Frequency	Percentage (%)
Very High	7	5.8
High	9	7.5
Moderate	23	19.2
Low	50	41.7
Very Low/Not at All	31	25.8

The majority of respondents (67.5%) indicated low or very low levels of AI integration, supporting Hypothesis 1 that AI is minimally embedded in curriculum planning at the early childhood level in Enugu State.

Table 2. Educators' Perception of AI in English Language Instruction

Perception Category	Frequency	Percentage (%)
Very Positive	25	20.8
Positive	50	41.7
Neutral	30	25.0
Negative	10	8.3
Very Negative	5	4.2

Over 60% of respondents expressed positive perceptions of AI, validating Hypothesis 2 that educators and planners view AI favorably for enhancing English language instruction.

Table 3. Factors Hindering AI Integration

Factor	Mean Score	Interpretation
Infrastructural Challenges	4.35	Very Significant
Lack of Training	4.20	Significant
Policy Gaps	4.10	Significant
Cost of AI Tools	3.85	Moderately Significant
Resistance to Change	3.40	Less Significant

Inferential analysis using ANOVA confirmed that infrastructural limitations, lack of training, and policy gaps significantly hinder AI integration ( $p < 0.05$ ), supporting Hypothesis 3.

These findings underscore the need for strategic investment in infrastructure, professional development, and policy reform to enable effective AI integration in early childhood English curriculum planning in Enugu State.

## Discussion and Conclusion

The findings of this study reveal a significant gap between the potential of Artificial Intelligence (AI) in early childhood English language curriculum planning and its actual implementation in Enugu State. This study agrees with studies conducted by Aliyu (2025), Imoniri (2025), Okebukola (2022), and Solichah and Shofiah (2024) who found out that there exists a significant gap between the potential of Artificial Intelligence in early childhood English language curriculum planning and its actual implementation. While educators and curriculum planners expressed generally positive perceptions of AI, the level of integration remains low, primarily due to infrastructural limitations, inadequate training, and policy deficiencies. These results align with global literature emphasizing the transformative role of AI in personalized and adaptive learning, yet they underscore the need for localized strategies to overcome contextual barriers (Chen & Lin, 2023; Chen & Okon, 2024; Korkut, 2025; Su & Ng, 2023; Zhang & Umeanowai, 2025).

The positive attitudes among stakeholders suggest a readiness to embrace AI, provided that enabling conditions such as access to digital tools, professional development, and supportive policies are established. This finding is supported by Lin and Huang (2022), Luo, Zhang, and Li (2023), Okechukwu (2022), Prasad and Singh (2022), and Su and Zhong (2022). This highlights the importance of a multi-stakeholder approach that includes government, private sector, and educational institutions in driving AI adoption.

This study concludes that while the integration of AI into English language curriculum planning at the early childhood education level in Enugu State is still in its infancy, there is substantial potential for growth. The favorable perceptions among educators and planners, coupled with emerging global best practices, present a compelling case for strategic investment in Artificial Intelligence (AI) infrastructure and capacity building. To realize this potential, policymakers must prioritize the development of clear guidelines, training programs, and funding mechanisms that support AI-enhanced curriculum design (Resnick, 2023; Williams & Eze, 2023; Yang, 2022; Yi, Liu, & Lan, 2024). By doing so, Enugu State can position itself as a leader in innovative early childhood education, fostering language development and digital literacy from the foundational years.

Based on the findings of this study, the following recommendations are proposed to enhance the integration of Artificial Intelligence (AI) in English language curriculum planning at the early childhood education level in Enugu State:

*Policy Development and Implementation:* The Ministry of Education in Enugu State should formulate clear policies and guidelines that support the integration of AI in early childhood curriculum planning, with emphasis on English language instruction. The recommendation on policy development and implementation emphasizes the need for government and educational authorities to establish clear policies that guide the integration of artificial intelligence (AI) into the English language curriculum at the early childhood education level. Such policies should outline standards for the selection, use, and evaluation of AI tools to ensure they are age-appropriate, culturally relevant, and supportive of language development. Policymakers should also provide guidelines for teacher training, infrastructure development, and ethical use of AI in classrooms. Effective implementation requires collaboration among ministries of education, curriculum planners, technology experts, and teachers to ensure that policies are practical and sustainable. Regular monitoring and evaluation should be included in the policy framework to assess the impact of AI integration and make necessary adjustments.

*Capacity Building for Educators:* Regular training and professional development programs should be organized to equip early childhood educators and curriculum planners with the skills needed to effectively use AI tools in language instruction. The recommendation on capacity building for educators highlights the need to equip teachers with the knowledge and skills required to effectively integrate artificial intelligence (AI) into English language curriculum planning at the early childhood education level. This can be achieved through regular professional development programs, workshops, and training sessions that focus on the use of AI-powered educational tools and digital teaching strategies. Such training will enable educators to understand how AI can support language learning, personalize instruction, and improve learners' engagement. Capacity building should also include guidance on ethical considerations, data privacy, and the responsible use of AI technologies in the classroom. By

strengthening teachers' competencies in AI use, educators will be better prepared to implement innovative and effective English language teaching practices for young learners.

*Infrastructure and Resource Provision:* Schools should be equipped with reliable internet access, computers, tablets, and other digital devices that can support AI-based educational tools. In addition, relevant software and learning platforms should be made available to help teachers effectively implement AI-supported language learning activities. Government and educational stakeholders should allocate sufficient funding to ensure that these technological resources are accessible and well maintained. Providing adequate infrastructure will create an enabling environment for the successful adoption and effective use of AI in early childhood English language education. Government and private stakeholders should invest in digital infrastructure, including internet access, smart devices, and AI-powered educational software tailored to early learners.

*Curriculum Revision and Innovation:* Curriculum developers should incorporate AI-enhanced learning activities such as interactive storytelling, speech recognition, and adaptive reading platforms into English language modules to promote engagement and personalized learning. The recommendation on curriculum revision and innovation emphasizes the need to update the existing early childhood English language curriculum to reflect the integration of artificial intelligence (AI) tools and digital learning approaches. Curriculum planners should incorporate AI-supported activities, interactive learning resources, and technology-enhanced language instruction that support young learners' literacy development. The revised curriculum should also encourage creative and learner-centered teaching strategies that make use of AI to personalize learning experiences. In addition, it should provide clear guidelines for teachers on how AI technologies can be effectively used to support language acquisition at the early childhood level. Continuous review and innovation of the curriculum will ensure that it remains relevant to emerging technologies and the evolving needs of learners in the digital age.

*Collaborative Partnerships:* The recommendation on *collaborative partnership* highlights the importance of cooperation among key stakeholders in the successful integration of artificial intelligence (AI) into English language curriculum planning at the early childhood education level. Educational authorities should collaborate with technology experts, universities, educational technology companies, and curriculum specialists to develop effective AI-supported learning resources. Such partnerships can also support research, innovation, and the sharing of best practices for the use of AI in early childhood language education. In addition, collaboration with teacher training institutions can help ensure that educators are properly prepared to use AI tools in their teaching. Through strong partnerships, stakeholders can pool resources, expertise, and support to enhance the quality and sustainability of AI integration in the curriculum. Partnerships with tech companies, universities, and international organizations should be pursued to support research, funding, and the deployment of AI solutions in early childhood education.

*Monitoring and Evaluation:* A robust framework for monitoring and evaluating the impact of AI integration should be established to ensure continuous improvement and alignment with developmental goals. Educational authorities and school administrators should establish clear mechanisms to track the effectiveness, usage, and outcomes of AI-supported teaching and learning activities. Regular evaluation will help determine whether the

integration of AI is improving language development, learner engagement, and instructional practices. It will also help identify challenges such as technical issues, gaps in teacher competence, or limitations in available resources. Through systematic monitoring and evaluation, stakeholders can make informed decisions and adjustments to improve the successful implementation of AI in early childhood English language education.

These recommendations aim to foster a future-ready educational system that leverages AI to strengthen foundational language skills and promote inclusive, high-quality early childhood education in Enugu State.

## Statements and Declarations

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During the preparation of this manuscript, the author used AI-assisted technology (ChatGPT) for language editing and proofreading support. Following this assistance, the author reviewed, revised, and finalized all content and assumes full responsibility for the accuracy, integrity, and originality of the work.

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