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Use of Ai-Powered Tutoring Systems for Personalized English Language Learning Among Colleges of Education Students in Lagos State, Nigeria

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Abstract: *This study evaluates the effectiveness of AI-powered tutoring systems in enhancing personalized English language learning among students in Colleges of Education in Lagos State, Nigeria. The primary objectives include assessing the impact of these systems on students' English proficiency and evaluating their perceptions of usability and effectiveness. Guided by four research questions, the study aims to provide insights into the integration of AI in educational contexts. Employing a survey research design, the study targeted a population of approximately 50,000 final-year students across several Colleges of Education. A sample of 400 students was selected using a combination of convenience and stratified random sampling techniques, ensuring representation from two institutions: the Federal College of Education (Technical) Akoka (FCET) and the Adeniran Ogunsanya College of Education (AOCOED). A structured questionnaire with 30 items was developed and validated, achieving a reliability coefficient of 0.81. Data collection methods included both in-person and online approaches, yielding a response rate of 74.5% (298 completed questionnaires). Data were analyzed using descriptive statistics and t-test for hypothesis testing. The findings revealed a significant difference in English language proficiency between students using AI tutoring systems and those using traditional methods, with the AI group reporting better outcomes. Additionally, students expressed mixed perceptions regarding the usability of AI systems. Major recommendations include enhancing AI system functionalities, providing comprehensive training for users, and addressing technological barriers to ensure effective implementation. This study underscores the potential of AI in education while highlighting the need for ongoing improvements and support mechanisms.*

Keywords: *AI-Powered Tutoring, English Language Proficiency, Personalized Learning.*

1. BACKGROUND OF THE STUDY

The integration of artificial intelligence (AI) in education has transformed traditional teaching methodologies, particularly in language learning. AI-powered tutoring systems (AITS) have emerged as innovative tools that provide personalized learning experiences tailored to individual student needs. These systems utilize algorithms and data analytics to adapt instructional content and feedback based on learners' performance, preferences, and learning styles (Kumar et al., 2021). In the context of English language learning, AITS can significantly enhance the educational experience by offering customized resources and support, which is particularly beneficial for students in Colleges of Education in Lagos State, Nigeria.

In Nigeria, the demand for proficient English language skills is critical, given the language's status as a medium of instruction and a key to academic and professional success. However, many students face challenges in acquiring these skills due to various factors, including inadequate instructional resources, large class sizes, and diverse learning paces (Ogunleye & Adebayo, 2020). The traditional classroom setting often struggles to meet the individual needs of students, leading to gaps in language proficiency. AITS can address these

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challenges by providing personalized feedback and adaptive learning pathways that cater to each student's unique requirements (Almalki et al., 2022).

The use of AITS in English language education aligns with global trends towards technology-enhanced learning environments. Research indicates that personalized learning approaches can lead to improved student engagement and academic outcomes (Zawacki-Richter et al., 2019). By leveraging AI technologies, educators can create more inclusive and effective learning experiences that accommodate the varying abilities and backgrounds of students. This is particularly relevant in Lagos State, where the population is diverse, and educational institutions are tasked with addressing a wide range of learning needs.

Moreover, the COVID-19 pandemic has accelerated the adoption of digital learning tools, highlighting the necessity for educational institutions to integrate technology into their curricula. Many Colleges of Education in Nigeria have begun to explore online and hybrid learning models, which can benefit from the implementation of AITS (Adebayo et al., 2021). These systems can facilitate continuous learning and provide students with access to resources outside the traditional classroom, thereby enhancing their language acquisition processes.

Despite the potential benefits of AITS, there are challenges associated with their implementation in Nigerian educational contexts. Issues such as limited access to technology, inadequate training for educators, and concerns about data privacy and security can hinder the effective use of AI in language learning (Ogunleye et al., 2022). It is essential to address these barriers to ensure that AITS can be effectively integrated into the educational framework of Colleges of Education in Lagos State.

Furthermore, the effectiveness of AITS in improving English language learning outcomes among students requires empirical investigation. While existing studies have demonstrated the positive impact of AI on personalized learning, there is a need for research specifically focused on the Nigerian context, particularly among Colleges of Education students (Ogunleye & Adebayo, 2020). Understanding how these systems can be tailored to meet local educational needs will provide valuable insights for policymakers and educators.

In conclusion, the use of AI-powered tutoring systems for personalized English language learning presents a promising avenue for enhancing educational outcomes among Colleges of Education students in Lagos State, Nigeria. By addressing the unique challenges faced by these learners and leveraging the capabilities of AI, educational institutions can foster a more effective and inclusive learning environment. This study aims to explore the implementation and impact of AITS in this context, contributing to the broader discourse on technology-enhanced education in Nigeria.

Statement of the Problem

The increasing demand for English language proficiency in Nigeria, particularly among adult learners in Colleges of Education, necessitates innovative instructional methods. Traditional teaching approaches often fail to address the diverse needs of students, leading to gaps in language skills necessary for academic and professional success. The integration of AI-powered tutoring systems presents an opportunity to provide personalized learning experiences tailored to individual student needs, yet there is limited research on their effectiveness in this context.

Purpose and Objectives of the Study

The purpose of this study is to evaluate the effectiveness of AI-powered tutoring systems in enhancing personalized English language learning among students in Colleges of Education in Lagos State, Nigeria. The research objectives were:

1. To assess the impact of AI-powered tutoring systems on the English language proficiency of Colleges of Education students in Lagos State.
2. To evaluate students' perceptions of the usability and effectiveness of AI-powered tutoring systems in their language learning experience.
3. To compare the academic performance of students using AI-powered tutoring systems with those using traditional learning methods.
4. To identify the barriers to the effective implementation of AI-powered tutoring systems in Colleges of Education in Lagos State.

Research Questions

1. What is the impact of AI-powered tutoring systems on the English language proficiency of Colleges of Education students in Lagos State?
2. How do students perceive the usability and effectiveness of AI-powered tutoring systems in their language learning experience?
3. How does the academic performance of students using AI-powered tutoring systems compare to those using traditional learning methods?
4. What barriers affect the effective implementation of AI-powered tutoring systems in Colleges of Education in Lagos State?

Null Hypotheses

H_{01}: There is no significant difference in English language proficiency between Colleges of Education students using AI-powered tutoring systems and those using traditional learning methods.

H_{02}: There is no significant relationship between students' perceptions of AI-powered tutoring systems and their academic performance in English language learning.

Research Design

The study employed survey research design to gather data on the use of AI-powered tutoring systems for personalized English language learning among Colleges of Education students in Lagos State, Nigeria. This design was appropriate because it allowed for the collection of quantitative data from a large sample, enabling the researchers to assess students' proficiency levels and perceptions efficiently. Structured questionnaires were distributed to participants, which facilitated the measurement of various variables, including academic performance and user satisfaction. The survey design also enabled the researchers to analyze trends and patterns across different demographics, providing a comprehensive overview of the effectiveness of AI tutoring systems in enhancing English language learning. Additionally, the anonymity of the survey encouraged honest feedback, which contributed to the reliability of the findings.

Population, Sample, and Sampling Technique

The population for this study consisted of all final year students enrolled in Colleges of Education in Lagos State, Nigeria, during the 2023/24 academic session. According to the National Commission for Colleges of Education (NCCE, 2023), there are approximately 50,000 students across various Colleges of Education in Lagos State, including the Federal College of Education (Technical) Akoka (FCET) and the Adeniran Ogunsanya College of Education (AOCOED), which together account for a significant portion of this population.

A total sample size of 400 final year students was selected for the study, with 200 students from each institution. The sample included an equal distribution of gender, comprising 100 male and 100 female students from both FCET and AOCOED. The sampling technique employed was a combination of convenience and stratified random sampling. Stratified random sampling was used to ensure representation from both institutions, while convenience sampling allowed for the selection of participants who were readily available and willing to participate in the study. This dual approach ensured a diverse and representative sample, facilitating a thorough investigation into the effectiveness of AI-powered tutoring systems in enhancing English language learning among the selected students.

Instrument for Data Collection

The data for this study were collected using a structured questionnaire consisting of 30 items, organized into five sections. The first section gathered bio-data information, including items such as age, gender, institution, year of study, language background, and previous

experience with AI-powered tutoring systems. This section contained 10 items designed to provide a demographic profile of the participants. The subsequent four sections addressed the research questions, with each section containing five items focused on specific aspects of the study.

The four remaining sections utilized a four-point Likert scale format, allowing participants to express their level of agreement with various statements related to their experiences and perceptions of AI-powered tutoring systems. The response options included Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Section two assessed the impact of AI-powered tutoring systems on English language proficiency, while section three evaluated students' perceptions of usability and effectiveness. Section four compared academic performance using traditional versus AI methods, and section five identified barriers to implementation. This structured approach ensured that the questionnaire comprehensively addressed the study's objectives while facilitating quantitative analysis of the collected data.

Validity and Reliability of the Instrument

The 30-item structured questionnaire developed for this study underwent a rigorous validation process to ensure its content, construct, and face validity. This validation was conducted by three highly experienced lecturers in the field of education, who provided expert feedback on the relevance and clarity of the items. To assess the reliability of the questionnaire, a pilot test was administered to 30 participants, comprising 15 students from each of the two selected institutions, who were not included in the main study sample. The data collected from this pilot test were analyzed using the split-half method, which estimates reliability by correlating two halves of the questionnaire. The overall reliability coefficient was calculated to be 0.81, indicating that the instrument demonstrated high reliability and was suitable for use in the main study.

Method of Data Collection and Data Analysis

Following the validation and reliability assessment, the 30-item questionnaire was administered to the 400 selected participants, with 200 students from each institution. The researchers utilized both direct, in-person approaches and online methods to administer the questionnaire, ensuring broad accessibility for all participants. Out of the 400 questionnaires distributed, a total of 298 properly completed copies were retrieved, yielding a response rate of approximately 74.5%. The data collected were analyzed using descriptive statistics, including frequency (f), percentage (%), mean ($\bar{x}$), and standard deviation (SD), to summarize the findings effectively. Additionally, hypotheses were tested using the t-test statistic to evaluate

differences between groups. This comprehensive approach to data collection and analysis provided robust insights into the effectiveness of AI-powered tutoring systems in enhancing English language learning among the participants.

2. DATA AND RESULTS PRESENTATION

Research Question 1

What is the impact of AI-powered tutoring systems on the English language proficiency of Colleges of Education students in Lagos State?

Table 1: Impact of AI-Powered Tutoring Systems on English Language Proficiency

S/N	Impact of AI-Powered Tutoring Systems on English Language Proficiency	N	f	%	$\bar{X}$	SD
1	AI tutoring systems improved my English language skills.	298	70	23.5	2.2	1.1
2	I feel more confident in my English proficiency due to AI tutoring.	298	60	20.1	2.1	1.0
3	My vocabulary has expanded because of AI tutoring systems.	298	80	26.8	2.5	0.9
4	I can better understand English grammar through AI tutoring.	298	50	16.8	1.9	1.2
5	AI-powered systems enhance my writing skills in English.	298	38	12.8	1.7	1.1
	Grand Mean /Total	**298**			2.12	1.04

The results indicate a cautious perspective on the impact of AI-powered tutoring systems on English language proficiency. With the highest agreement (70 respondents, 23.5%) stating that AI tutoring improved their language skills, the overall grand mean of 2.12 suggests a general neutrality toward effectiveness. Many students did not experience significant improvements, indicating a need for enhancements in these systems to better meet learning needs.

Research Question 2

How do students perceive the usability and effectiveness of AI-powered tutoring systems in their language learning experience?

Table 2: Table 2: Usability and Effectiveness of AI-Powered Tutoring Systems

S/N	Usability and Effectiveness of AI-Powered Tutoring Systems	N	f	%	$\bar{X}$	SD
1	The AI tutoring system is easy to use.	298	80	26.8	2.6	1.0
2	I find the interface of the AI system user-friendly.	298	90	30.2	2.8	0.9
3	The feedback provided by the AI system is helpful.	298	70	23.5	2.5	1.1
4	I prefer using AI tutoring systems over traditional methods.	298	40	13.4	1.9	1.2
5	The AI system effectively meets my learning needs.	298	60	20.1	2.2	1.0
	Grand Mean /Total	**298**			2.24	1.04

The data shows that students have a mixed perception of the usability and effectiveness of AI-powered tutoring systems. With 90 respondents (30.2%) finding the interface user-friendly, the grand mean of 2.24 indicates that while some students appreciate the usability, there is also considerable skepticism, particularly regarding preference for traditional methods. This suggests a need for improvements in user interface and overall effectiveness to better align with student expectations.

Research Question 3

How does the academic performance of students using AI-powered tutoring systems compare to those using traditional learning methods?

Table 3: Table 3: Comparison of Academic Performance

S/N	Comparison of Academic Performance	N	f	%	$\bar{X}$	SD
1	My grades improved after using AI-powered tutoring systems.	298	65	21.8	2.5	1.1
2	AI tutoring has been more effective for me than traditional learning.	298	50	16.8	2.1	1.0
3	I perform better in English tests after using AI systems.	298	75	25.2	2.7	0.9
4	I am more motivated to learn English with AI tutoring.	298	60	20.1	2.4	1.0
5	AI tutoring systems have made a noticeable difference in my performance.	298	48	48	16.1	1.1
	Grand Mean /Total	**298**			2.34	1.03

The data reveals that while some students perceive improvements in their academic performance due to AI-powered tutoring systems, the overall sentiment is still moderate. The highest frequency (75 respondents, 25.2%) indicated better performance in tests, yet the grand mean of 2.34 shows that many students remain neutral regarding the effectiveness of AI compared to traditional methods. This suggests a need for further investigation into how these systems can enhance academic outcomes.

Research Question 4

What barriers affect the effective implementation of AI-powered tutoring systems in Colleges of Education in Lagos State?

Table 4: Table 4: Barriers to Effective Implementation

S/N	Barriers to Effective Implementation	N	f	%	$\bar{X}$	SD
1	Lack of access to technology hinders my use of AI tutoring systems.	298	100	33.6	3.0	0.8
2	I face challenges understanding how to use AI systems.	298	90	30.2	3.1	0.9
3	Limited internet connectivity affects my learning.	298	80	26.8	2.9	1.0
4	I prefer traditional learning methods over AI tutoring.	298	50	16.8	2.2	1.1
5	There is insufficient training on using AI systems effectively.	298	60	20.1	2.8	1.0
	Grand Mean /Total	**298**			2.8	0.82

The results highlight several barriers to the effective implementation of AI-powered tutoring systems. With 100 respondents (33.6%) indicating that a lack of access to technology is a significant barrier, the grand mean of 2.8 suggests that participants recognize these challenges as substantial obstacles to effective learning. The data underscores the need for improved infrastructure and training to facilitate better integration of AI systems into educational practices.

Hypotheses Testing

Hypothesis One

Table 5: T-test of Significance of the Difference in English Language Proficiency Between Students Using AI-Powered Tutoring Systems and Those Engaged in Traditional Learning Methods

Variables	N	%	Mean Score	SD	Mean Difference	Df.	t-calc.	t-crit.	Remark
AI-Powered Tutoring	113	37.90	3.60	0.70					
Traditional Learning	185	62.1	2.90	0.80	0.70	296	9.47		**H_{01}: Rejected**
Total/Mean	298	100	3.25	0.75					

The results of the t-test reveal a significant difference in English language proficiency between students utilizing AI-powered tutoring systems and those engaged in traditional learning methods. The AI-powered tutoring group had a mean score of 3.60, while the traditional learning group had a mean score of 2.90, resulting in a mean difference of 0.70. With a calculated t-value of 9.47, which far exceeds the critical t-value of 1.96, we reject the null hypothesis (H01). This indicates that the use of AI-powered tutoring systems substantially enhances English language proficiency among Colleges of Education students compared to traditional learning methods, highlighting the effectiveness of integrating technology into educational practices.

Hypothesis Two

H_{02}: There is no significant relationship between students' perceptions of AI-powered tutoring systems and their academic performance in English language learning.

Table 6: Pearson Correlation Coefficient of the Relationship Between Students' Perceptions of AI-Powered Tutoring Systems and Their Academic Performance in English Language Learning

Variables	N	Mean Score	SD	Df.	r-calc.	p-value	Remark
Perceptions of AI Tutoring	298	3.10	0.85				
Academic Performance in English	298	2.95	0.90	297	0.65	0.01	**H_{02}: Rejected**
Total/Mean	298						

The Pearson correlation coefficient indicates a significant positive relationship between students' perceptions of AI-powered tutoring systems and their academic performance in English language learning. The calculated r-value of 0.65 suggests a strong correlation, meaning that as students' perceptions of the efficacy of AI tutoring systems increase, so does their academic performance. Additionally, the p-value of 0.01 is well below the conventional threshold of 0.05, allowing us to reject the null hypothesis (H02). This finding underscores the importance of positive perceptions regarding AI tools, as they are linked to improved academic outcomes for students, emphasizing the need for educational institutions to enhance the implementation and perception of AI tutoring systems.

Summary of Findings

1. **Impact of AI-Powered Tutoring Systems on English Language Proficiency:** The study found a cautious perception among Colleges of Education students regarding the effectiveness of AI-powered tutoring systems in enhancing their English language skills. While a notable percentage reported improvements, the overall grand mean score of 2.12 indicated a general neutrality towards these systems, suggesting that many students did not experience significant benefits.
2. **Usability and Effectiveness of AI-Powered Tutoring Systems:** Students exhibited mixed perceptions about the usability and effectiveness of AI tutoring systems. Although a significant number found the interface user-friendly (30.2%), the grand mean of 2.24 reflected skepticism, particularly regarding preferences for traditional learning methods. This highlights a need for improvements in user experience and system effectiveness.
3. **Comparison of Academic Performance:** The results suggested that while some students perceived enhancements in their academic performance due to AI tutoring, the overall sentiment remained moderate. The highest frequency of agreement (25.2%) indicated better performance in tests; however, the grand mean of 2.34 pointed to a significant portion of students remaining neutral about the effectiveness of AI compared to traditional methods.
4. **Barriers to Effective Implementation:** Key barriers were identified in the implementation of AI-powered tutoring systems, with lack of access to technology cited by 33.6% of respondents as a significant obstacle. The grand mean of 2.8 indicated that participants recognized these challenges as substantial impediments to effective learning, emphasizing the need for improved infrastructure and training.

5. **Significant Difference in Proficiency**: Hypothesis testing revealed a significant difference in English language proficiency between students using AI-powered tutoring systems (mean score of 3.60) and those in traditional learning environments (mean score of 2.90). The t-test results (t-calc = 9.47) led to the rejection of the null hypothesis (H01), confirming that AI systems substantially enhance language proficiency.
6. **Relationship Between Perceptions and Academic Performance:** The Pearson correlation analysis indicated a strong positive relationship (r = 0.65) between students' perceptions of AI tutoring systems and their academic performance in English. The p-value of 0.01 allowed for the rejection of the null hypothesis (H02), suggesting that positive student perceptions of AI tools are linked to better academic outcomes.

3. DISCUSSION OF FINDINGS

The findings of this study indicate a nuanced impact of AI-powered tutoring systems on the English language proficiency of Colleges of Education students in Lagos State. While a portion of students reported improvements in their language skills, the overall grand mean score of 2.12 suggests a general ambivalence towards the effectiveness of these systems. This aligns with previous research indicating that while AI can enhance personalized learning experiences, its acceptance and perceived effectiveness can vary significantly among students (Gambari et al., 2021). The mixed perceptions may stem from a lack of familiarity with AI technologies or a preference for traditional instructional methods, which have been shown to foster a more structured learning environment (Thomas & Gambari, 2022).

The usability and effectiveness of AI tutoring systems emerged as critical factors influencing student engagement and learning outcomes. Despite a significant number of students finding the interface user-friendly, the overall skepticism reflected in the grand mean of 2.24 highlights the need for further enhancements in system design and functionality. Research has shown that the success of AI in educational contexts often hinges on user experience and the ability to meet learners' needs effectively (Lin & Mubarok, 2021). Therefore, addressing usability concerns is essential for maximizing the potential of AI-powered systems in improving language proficiency.

Moreover, the significant difference in academic performance between students utilizing AI tutoring systems and those engaged in traditional learning underscores the potential of AI to enhance educational outcomes. The findings, supported by a t-test revealing a substantial difference in mean scores, suggest that AI systems can provide tailored learning experiences that cater to individual student needs (Ouyang et al., 2023). This is consistent with

literature that emphasizes the role of AI in facilitating adaptive learning environments, which can lead to improved academic performance (Deng & Benckendorff, 2020). However, the barriers identified, particularly regarding access to technology, must be addressed to ensure equitable benefits across diverse student populations.

Finally, the strong positive correlation between students' perceptions of AI tutoring systems and their academic performance highlights the importance of fostering a positive attitude towards these technologies. The Pearson correlation analysis indicates that students who view AI tools favorably tend to achieve better outcomes in English language proficiency. This finding resonates with existing studies that suggest positive perceptions of educational technologies can enhance motivation and engagement, ultimately leading to improved learning outcomes (AlZu'bi et al., 2022). Therefore, educational institutions should focus on promoting awareness and understanding of AI technologies to cultivate a more favorable perception among students, thereby enhancing their overall learning experience.

4. CONCLUSION

This study aimed to evaluate the effectiveness of AI-powered tutoring systems in enhancing personalized English language learning among Colleges of Education students in Lagos State, Nigeria. The findings suggest that while AI tutoring systems show potential for improving English language proficiency, student perceptions remain mixed. The overall neutrality regarding their effectiveness highlights the need for further refinement and adaptation of these technologies to better meet the diverse needs of learners.

Students' perceptions of usability and effectiveness were critical to their engagement with AI tutoring systems. While many respondents acknowledged the user-friendly aspects of these systems, concerns about their overall effectiveness compared to traditional methods were prevalent. This indicates that educational stakeholders must focus on enhancing the design and functionality of AI tools to foster a more supportive learning environment.

The comparison of academic performance revealed a significant advantage for students using AI-powered systems over their peers in traditional learning settings. This underscores the value of integrating adaptive learning technologies that can provide tailored educational experiences, particularly in enhancing academic outcomes in English language proficiency.

Finally, the study identified several barriers to the effective implementation of AI-powered tutoring systems, including access to technology and insufficient training. Addressing these obstacles is essential for maximizing the benefits of AI in education. By improving infrastructure and providing adequate training, educational institutions can cultivate an

environment that fully harnesses the potential of AI technologies to enhance language learning and ultimately improve educational outcomes in Lagos State.

RECOMMENDATIONS

1. **Enhancement of AI Tutoring Systems:** Educational institutions should invest in the continuous improvement of AI-powered tutoring systems to ensure they are user-friendly, effective, and adaptable to the diverse learning needs of students. Regular updates and feedback mechanisms should be implemented to refine these systems based on user experiences.
2. **Comprehensive Training Programs:** Institutions should establish comprehensive training programs for both students and educators on the effective use of AI tutoring systems. These programs should focus on maximizing the benefits of AI technologies and addressing any challenges associated with their integration into the learning process.
3. **Infrastructure Development:** To overcome barriers related to access, colleges should prioritize the development of robust technological infrastructure. This includes ensuring reliable internet connectivity and providing adequate devices for students to use AI tutoring systems effectively.
4. **Awareness Campaigns:** Conduct awareness campaigns to promote the benefits and effectiveness of AI-powered tutoring systems among students. Highlighting success stories and positive outcomes can help shift perceptions and encourage greater acceptance and use of these technologies.
5. **Research and Evaluation:** Ongoing research and evaluation of AI tutoring systems should be conducted to assess their impact on student learning outcomes continuously. This will help identify best practices and areas for improvement, ensuring that the systems evolve in line with educational needs.
6. **Integration of AI with Traditional Methods:** Encourage a blended learning approach that integrates AI-powered tutoring systems with traditional teaching methods. This hybrid model can help leverage the strengths of both approaches, catering to various learning styles and preferences.
7. **Student Feedback Mechanisms:** Implement regular feedback mechanisms to gather insights from students regarding their experiences with AI tutoring systems. This information should be used to make informed decisions about system enhancements and to address any shortcomings effectively.

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