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CHATBOTS, AI TUTORS AND SMART LEARNING: ASSESSING THE ADOPTION OF AI-POWERED LEARNING TOOLS IN TERTIARY INSTITUTIONS

¹ Adebiyi Sunday Adetunji, ² Aliu Tolulope Isiaka & ³ Oripinye Boluwaji Smart¹ Department of Educational Technology, Adeyemi Federal University of Education, Ondo,Email: adebiyisunday10@gmail.com² Department of Educational Technology, University of Ilorin, Ilorin, Email: tolualiu258@yahoo.com³ Department of Educational Technology, Adeyemi Federal University of Education, Ondo,Email: oripinyesmart@gmail.com

Abstract

This study examined students' awareness, extent of adoption, and factors influencing the use of AI-powered learning tools in tertiary institutions in Ondo State, Nigeria. A descriptive survey research design was adopted, with a population comprising students from eight public and private universities. Using proportionate stratified random sampling, 560 students were selected (350 from public universities and 210 from private universities). Data were collected using a researcher-designed instrument, the Students' AI Adoption and Utilization Questionnaire (SAAUQ), which was validated and pilot-tested, yielding a high reliability coefficient ($\alpha = 0.853$). Findings revealed that students were aware of AI tools for writing assistance, plagiarism checking, and language learning but had limited awareness of AI tools designed for research support, note-taking, and academic tutoring. The extent of AI adoption for academic purposes was found to be low, with key influencing factors including digital literacy, internet access, availability of personal devices, institutional policies, ethical concerns, peer influence, and AI training programs. Statistical analysis using an independent samples t-test revealed no significant difference in AI adoption between students in public and private universities. The study concludes that although AI-powered learning tools have the potential to enhance academic engagement, targeted interventions such as AI literacy programs, improved digital infrastructure, and institutional support are necessary to foster widespread adoption among students. It is recommended that tertiary institutions integrate AI education into curricula and develop policies that support AI-driven learning experiences.

Keywords: Artificial Intelligence, AI Adoption, Tertiary Institutions, Digital Literacy, Learning Technologies

Introduction

Education can be defined as the process of acquiring knowledge, skills, values, and attitudes that are essential for both individual growth and societal development (Smith & Johnson, 2023). Historically, education has not merely been about accumulating information but has served as a vital mechanism for shaping critical thinking and social behaviors. In its earliest forms, learning was predominantly rooted in oral traditions and apprenticeship systems, where elders and skilled practitioners transmitted knowledge through storytelling, demonstration, and direct mentorship (Johnson & Roberts, 2020). Over time, as communities grew more complex, educational practices transitioned from these informal, community-based models to more structured, formal classroom-based learning environments (O'Connor & Patel, 2022). Traditional instructional methods relied heavily on the role of teachers, who not only disseminated knowledge but also mentored students in developing critical reasoning and

social skills (Williams & Smith, 2022). Textbooks emerged as standardized repositories of accumulated wisdom, providing a consistent framework that ensured the systematic transfer of essential knowledge across generations (Garcia & Thompson, 2022). These traditional methods highlight the significance of human interaction and instructional materials, setting the stage for today's technology-driven education.

Technological advancements have progressively transformed education, marking a significant departure from traditional methods of knowledge dissemination. The invention of the printing press in the 15th century, for instance, revolutionized book production, making written texts widely accessible and fostering a remarkable expansion in literacy (Doe & Adams, 2021). This breakthrough not only standardized the distribution of knowledge but also laid the groundwork for subsequent innovations. Later, the emergence of radio and television further altered the educational landscape by enabling early forms of distance learning, thereby extending educational opportunities beyond conventional classroom boundaries (Johnson & Roberts, 2020).

In the latter part of the 20th century, the integration of computers and the internet ushered in a new era of digital learning and research, fundamentally reshaping educational practices and infrastructures (Williams & Smith, 2022). The advent of e-learning platforms such as Moodle, Coursera, and Schoology have enhanced remote and flexible learning, allowing students to access educational content anytime and anywhere (Garcia, 2023). These technological innovations have not only increased the efficiency and reach of educational programs but have also promoted continuous learning and adaptation, reflecting the dynamic nature of modern education.

Artificial Intelligence (AI) refers to the development of computer systems capable of performing tasks that normally require human intelligence, such as learning, reasoning, and problem-solving (Kim & Lee, 2021). Its core functions include automation, data processing, and machine learning, which empower these systems to analyze large volumes of data, recognize patterns, and adapt their operations based on experience (Brown & Davis, 2022). These capabilities have not only revolutionized computational tasks but have also laid the foundation for applying AI in diverse fields, including education, where such advanced functionalities can transform traditional learning practices.

In education, AI has been integrated to create personalized learning experiences, automated assessments, and intelligent tutoring systems that adjust content to meet individual student needs (Garcia, 2023). This shift marks a move from static digital content toward interactive, AI-driven tools that provide real-time feedback and adaptive support (Miller, 2022). By facilitating a more responsive and inclusive learning environment, AI not only enhances student engagement but also equips educators with valuable insights to tailor instructional strategies, ultimately improving learning outcomes (Chen, 2021).

The advent of AI-powered learning tools such as chatbots and AI tutors represents a transformative shift in the educational landscape. These tools are designed to assist students by providing real-time feedback, academic guidance, and personalized learning experiences. Chatbots, for instance, are programmed to interact with students instantly, answering queries and offering support across a range of subjects, thereby promoting active engagement and timely clarification of concepts (Jones & Patel, 2022). In parallel, AI tutors analyze individual student performance and adapt instructional strategies accordingly, fostering an environment where learning is tailored to meet each student's unique needs (Kumar & Lee, 2021).

Examples of these innovative tools include ChatGPT, which facilitates dynamic conversations and complex problem-solving, and Google Bard, which leverages extensive data to aid research and creative tasks (Brown, 2022). Additionally, Socratic by Google provides step-by-step explanations that help

students understand challenging concepts, while Duolingo utilizes AI algorithms to offer personalized language instruction based on the learner's proficiency and progress (Green, 2021; Martinez & Liu, 2023). Collectively, these AI-driven solutions are redefining how educational content is delivered and consumed, making learning more interactive, accessible, and adaptive to the demands of modern education

The integration of AI into academic activities has revolutionized the way students approach learning, research, assignments, and skill development. Students now use AI tools to supplement traditional study methods, for instance, leveraging intelligent tutoring systems for real-time problem-solving, employing chatbots for quick queries, and utilizing research assistants to sift through vast amounts of academic literature (Garcia, 2023; O'Neil & Carter, 2023). These technologies not only enhance the efficiency and depth of learning but also foster a more interactive and personalized educational experience. Whether it's refining writing skills with automated feedback or developing critical thinking through adaptive learning platforms, AI is increasingly becoming an indispensable part of the academic toolkit.

However, the extent of AI adoption varies significantly among students. Some are frequent users who integrate AI seamlessly into their daily academic routines, using these tools extensively for everything from drafting assignments to advanced research and even developing new digital skills (Miller, 2022). In contrast, occasional users might resort to AI only in specific contexts or when conventional methods fall short, often due to factors such as varying levels of digital literacy, access to technology, or differing perceptions of AI's reliability and usefulness (Roberts, 2021).

Digital literacy is a critical factor influencing how effectively students can utilize AI-powered learning tools. Students with a strong foundation in digital skills are more adept at navigating and maximizing the potential of AI applications, which in turn promotes more robust adoption in academic contexts (Smith & Johnson, 2023). Equally important is access to technology, stable internet connections and up-to-date smart devices ensure that students can engage with AI tools without technical hindrances (Chen, 2021). Moreover, the perceived usefulness and ease of use of these technologies play a vital role; when students find AI tools intuitive and clearly beneficial to their learning outcomes, they are more likely to incorporate them into their academic routines (Wang & Li, 2022).

Assessing AI adoption among students is critical for understanding how emerging technologies are transforming the educational landscape. With the rapid integration of AI-powered tools, it is necessary to investigate students' awareness, adoption levels, and the factors that influence their use of these technologies. Such an inquiry can reveal the current state of digital literacy and pinpoint the challenges and opportunities that arise when integrating AI into academic activities (Chen & Liu, 2022). Moreover, by evaluating these aspects, educators and policymakers can design targeted interventions that maximize the benefits of AI in learning and ensure that these technologies effectively enhance educational outcomes (Garcia & Thompson, 2022).

Despite the growing global interest in AI applications in education, there remains a significant research gap in understanding how students in tertiary institutions in Ondo State engage with these tools. Most existing studies have focused on international contexts or specific sectors of education, leaving the unique cultural, infrastructural, and institutional dynamics of Ondo State underexplored (Ogunleye & Adebola, 2023). Addressing this gap is essential, as the insights gained can guide the formulation of future educational policies, the development of AI literacy programs, and the promotion of student-centered AI initiatives.

Statement of the Problem

Despite the rapid global integration of Artificial Intelligence (AI) in education and its potential to revolutionize learning through tools such as chatbots and AI tutors, there is a notable lack of empirical data on how these technologies are being perceived and adopted by students in tertiary institutions in Ondo State. While AI-powered learning tools offer promising avenues for personalized instruction, real-time academic support, and enhanced research capabilities, the actual levels of awareness and adoption among students remain largely unexplored. This is particularly concerning given that the effective integration of these tools hinges on students' familiarity, technological readiness, and the broader educational environment that supports their use.

Furthermore, existing literature primarily focuses on international contexts or specific sectors of education, leaving a significant research gap regarding the unique dynamics within Nigerian tertiary institutions. Factors such as digital literacy, access to technology, perceived usefulness, ease of use, and institutional support likely play critical roles in influencing AI adoption. However, without localized data, policymakers, educators, and technology developers face challenges in designing targeted interventions and AI literacy programs that meet the needs of students. This study, therefore, seeks to assess students' awareness, the extent of adoption, and the key factors influencing the use of AI-powered learning tools, with the ultimate goal of informing evidence-based educational reforms and strategic implementations in Ondo State's tertiary education sector.

Objectives of the study

The following are the specific objectives of this study:

- 1) Identify the AI tools that students are aware of for learning purposes in tertiary institutions in Ondo State.
- 2) Examine the extent to which students adopt AI tools for academic purposes in tertiary institutions in Ondo State.
- 3) Investigate the factors influencing students' adoption of AI-powered learning tools in tertiary institutions in Ondo State; and
- 4) Determine whether there is a significant difference in the extent of AI adoption for academic purposes between students in public and private tertiary institutions in Ondo State.

Research Questions

- 1) What are the AI tools students are aware of for learning purposes in tertiary institutions in Ondo State?
- 2) To what extent do students adopt AI tools for academic purposes in tertiary institutions in Ondo State?
- 3) What factors influence students' adoption of AI-powered learning tools in tertiary institutions in Ondo State?

Research Hypothesis

H₀: There is no significant difference in the extent of AI adoption for academic purposes between students in public and private tertiary institutions.

Methodology

The study adopted a descriptive research design of the survey type. The target population comprised students in all eight tertiary institutions (both public and private universities) in Ondo State, Nigeria. A total sample of 560 students was selected using proportionate stratified random sampling, ensuring fair representation from both public and private universities. The sample was distributed in a 5:3 ratio, with approximately 350 students from public universities and 210 students from private universities. A

researcher-designed questionnaire titled “Students’ AI Adoption and Utilization Questionnaire (SAAUQ)” was used to gather relevant information for the study. The questionnaire was divided into four sections: Section A elicited demographic information of the respondents, such as gender, institution type (public or private), level of study, and faculty. Section B assessed students’ awareness and familiarity with AI-powered learning tools. Responses in this section were rated on a Likert scale of Aware and Not Aware. Section C examined the extent of adoption of AI tools for academic purposes among students in tertiary institutions. This section contained 10 items, rated on a 4-point Likert scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Section D identified factors influencing students’ adoption of AI-powered learning tools. This section also contained 10 items, rated on the same 4-point Likert scale as Section C. The instrument was pilot-tested, and its reliability was determined using Cronbach’s alpha, yielding a reliability coefficient of 0.853, which was considered high enough to justify its use. The research questions were answered using mean and standard deviation, while the hypothesis was tested using t-Test at a 0.05 alpha level. Data collection was conducted via an online survey using Google Forms, ensuring broad participation from students across the selected institutions.

Results

Research Question 1: What are the AI tools students are aware of for learning purposes in tertiary institutions in Ondo State?

Table 1: Students’ Awareness of AI-Powered Learning Tools

AI-Powered Learning Tools	AWARE		NOT AWARE		Remark
	Freq.	(%)	Freq.	(%)	
ChatGPT (OpenAI)	344	61.4	216	38.6	Aware
Google Bard (Gemini)	352	62.9	208	37.1	Aware
Socratic by Google	231	41.3	329	58.8	Not Aware
Duolingo AI	333	59.5	227	40.5	Aware
ELSA Speak	224	40.0	336	60.0	Not Aware
Grammarly AI	347	62.0	213	38.0	Aware
QuillBot AI	201	35.9	359	64.1	Not Aware
AI-powered plagiarism checkers (Turnitin AI, Grammarly AI)	361	64.5	199	35.5	Aware
Coursera AI tutor	389	69.5	171	30.5	Aware
Khan Academy AI (Khanmigo)	214	38.2	346	61.8	Not Aware
AI-assisted research tools (Elicit, Semantic Scholar AI)	142	25.4	418	74.6	Not Aware
AI-powered note-taking tools (Otter.ai, Notion AI)	185	33.0	375	67.0	Not Aware

Key: 1 = Not Aware, 2 = Aware

Decision Value: 0-49% = Not Aware, 50-100% = Aware

Table 1 presents students’ awareness of AI-powered learning tools in tertiary institutions in Ondo State. The findings indicate that students are aware ($\geq 50\%$) of the following AI-powered learning tools: ChatGPT (61.4%), Google Bard (62.9%), Duolingo AI (59.5%), Grammarly AI (62.0%), AI-powered plagiarism checkers like Turnitin AI (64.5%), and Coursera AI tutor (69.5%). Conversely, students showed low awareness ($< 50\%$) of other AI learning tools, such as Socratic by Google (41.3%), ELSA Speak (40.0%), QuillBot AI (35.9%), Khan Academy AI (Khanmigo) (38.2%), AI-assisted research tools like Elicit and

Semantic Scholar AI (25.4%), and AI-powered note-taking tools such as Otter.ai and Notion AI (33.0%). Based on the results from the table and the decision rule, the AI-powered learning tools that students in tertiary institutions in Ondo State are aware of include ChatGPT, Google Bard, Duolingo AI, Grammarly, AI-powered plagiarism checkers, and the Coursera AI tutor.

Research Question 2: To what extent do students adopt AI tools for academic purposes in tertiary institutions in Ondo State?

Table 2: Extent of AI Adoption for Academic Purposes

Item	SA	A	D	SD	Mean	Std. D
I use AI-powered tools to assist with academic research.	104	101	136	219	2.16	1.13
I use AI chatbots for quick explanations of academic concepts.	162	154	129	115	2.65	1.10
AI-powered grammar checkers help me improve my writing.	113	116	138	193	2.27	1.13
I use AI-based summarizers for reviewing academic materials.	136	107	148	169	2.38	1.15
AI tools help me generate study notes.	129	156	132	143	2.48	1.10
I rely on AI-powered translation tools for understanding foreign academic texts.	178	175	103	104	2.76	1.09
AI tutors (e.g., Khanmigo, Coursera AI) help me learn new academic skills.	169	158	129	104	2.70	1.09
I use AI-powered transcription tools (e.g., Otter.ai) to convert lectures into text.	99	96	132	233	2.11	1.13
I use AI to check for plagiarism and improve academic integrity.	108	98	128	226	2.16	1.15
AI-powered tools enhance my overall academic performance	94	113	119	234	2.12	1.13
Weighted Average					2.37	

Key; SD = Strongly Disagree, D = Disagree, A = Agree, SA = Strongly Agree

Decision Value: Low = 0.00-2.49, High = 2.50-4.00

Table 2 shows the extent to which students in tertiary institutions in Ondo State adopt AI tools for academic purposes. The results indicate that students had lower adoption levels for several AI applications, as reflected in the following mean scores: using AI-powered tools to assist with academic research ($\bar{x} = 2.16$), relying on AI-powered grammar checkers to improve writing ($\bar{x} = 2.27$), using AI-based summarizers for reviewing academic materials ($\bar{x} = 2.38$), using AI-powered transcription tools to convert lectures into text ($\bar{x} = 2.11$), checking for plagiarism and improving academic integrity with AI ($\bar{x} = 2.16$), and the perception that AI-powered tools enhance overall academic performance ($\bar{x} = 2.12$). However, students demonstrated higher adoption levels for certain AI tools, as seen in their agreement with the following statements: using AI chatbots for quick explanations of academic concepts ($\bar{x} = 2.65$), using AI-powered translation tools for understanding foreign academic texts ($\bar{x} = 2.76$), AI tutors such as Khanmigo and Coursera AI helping them learn new academic skills ($\bar{x} = 2.70$), and AI tools assisting in generating study notes ($\bar{x} = 2.48$). Based on the weighted average of 2.37, which falls within the decision

value for low adoption (0.00-2.49), it can be inferred that the extent of AI tool adoption for academic purposes among students in tertiary institutions in Ondo State is low.

Research Question 3: What factors influence students' adoption of AI-powered learning tools in tertiary institutions in Ondo State?

Table 3: Factors Influencing AI Adoption

Item	SA	A	D	SD	Mean	Std. D	Remark
My level of digital literacy affects my ability to use AI tools.	63	93	38	6	2.62	1.12	Accepted
Access to a stable internet connection influences my use of AI tools.	63	77	21	39	2.60	1.09	Accepted
Availability of personal digital devices affects my adoption of AI.	60	116	20	4	2.57	1.12	Accepted
The perceived usefulness of AI tools determines whether I use them for academic purposes.	94	61	42	3	2.65	1.09	Accepted
The ease of use of AI tools affects my willingness to adopt them.	47	91	42	20	2.53	1.12	Accepted
Institutional policies and university regulations influence my use of AI for learning.	90	87	17	6	2.65	1.07	Accepted
Ethical concerns (e.g., plagiarism, misinformation) impact my adoption of AI tools.	44	115	27	14	2.51	1.12	Accepted
AI literacy programs and training sessions can encourage more AI adoption.	51	54	63	32	2.66	1.08	Accepted
Peer influence plays a role in my decision to use AI for academic purposes.	88	61	47	4	2.61	1.11	Accepted
The availability of AI-powered academic resources within my institution affects my adoption	58	83	55	4	2.57	1.10	Accepted

Key; SD = Strongly Disagree, D = Disagree, A = Agree, SA = Strongly Agree

Decision Value for Remark: Not Accepted = 0.00-2.49, Accepted = 2.50-4.00

Table 3 shows the factors influencing students' adoption of AI-powered learning tools in tertiary institutions in Ondo State. The table indicates that students agreed with all the listed factors. The statement "AI literacy programs and training sessions can encourage more AI adoption" received the highest mean score ($\bar{x} = 2.66$), while "Ethical concerns (e.g., plagiarism, misinformation) impact my adoption of AI tools" had the lowest mean score ($\bar{x} = 2.51$). Based on the results from this table and the mean score acceptance by the decision rule, the factors influencing students' adoption of AI-powered learning tools include: digital literacy levels, access to stable internet connections, availability of personal digital devices, perceived usefulness and ease of use of AI tools, influence of institutional policies and ethical concerns, impact of peer influence, and the role of AI literacy programs and training in encouraging adoption.

Hypothesis Testing

Hypothesis One: There is no significant difference in the extent of AI adoption for academic purposes between students in public and private tertiary institutions.

Table 4: Summary of Independent Sample t-Test Showing Difference in the Extent of AI Adoption for Academic Purposes Between Students in Public and Private Tertiary Institutions

Institution Type	N	Mean	Std. D	t	df	Sig.	Remark
Public	350	23.86	3.88	.610	558	.542	Not Significant
Private	210	23.65	3.93				

The results showed no statistically significant difference in the extent of AI adoption for academic purposes between students in public and private tertiary institutions, $t(558) = 0.610$, $p = .542$. Hence, the null hypothesis is not rejected. This suggests that students in both public and private tertiary institutions adopt AI tools for academic purposes at similar levels.

Discussion

The results indicate that students in tertiary institutions are primarily aware of AI tools designed for writing, plagiarism checking, and language learning, such as ChatGPT, Google Bard, Duolingo AI, Grammarly, Turnitin AI, and the Coursera AI tutor. However, awareness of AI tools tailored for research assistance, note-taking, and academic tutoring remains relatively low. This aligns with findings by Oluwaseun and Akinwale (2023), who reported that Nigerian students have higher exposure to general-purpose AI tools but limited awareness of domain-specific AI applications. Similarly, Adebayo and Oyetunde (2022) noted that Nigerian students frequently use Grammarly and Turnitin for academic writing but rarely explore AI tools for deeper cognitive tasks such as data analysis and research synthesis.

Also, the findings from the current study indicates that the overall extent of AI adoption for academic purposes among students in tertiary institutions in Ondo State remains low. This finding is consistent with the study by Ajayi and Ogunleye (2023), which found that while Nigerian university students recognize the potential benefits of AI, adoption remains limited due to skepticism, lack of adequate training, and concerns about ethical implications. Similarly, Okafor et al. (2022) reported that AI adoption in Nigerian tertiary institutions is hindered by infrastructural challenges, such as poor internet access and limited institutional support.

Several factors were identified as influencing students' adoption of AI-powered learning tools, including digital literacy levels, access to stable internet connections, availability of personal digital devices, perceived usefulness and ease of use, influence of institutional policies, ethical concerns, peer influence, and AI literacy programs. These findings align with the Technology Acceptance Model (TAM) proposed by Davis (1989), which emphasizes perceived usefulness and ease of use as critical determinants of technology adoption. Furthering this argument, Babalola and Fagbohun (2022) found that limited internet access and inadequate AI training are significant barriers to AI adoption among students. Furthermore, Ogunlana and Adeyemi (2023) emphasized the role of peer influence, noting that students are more likely to adopt AI tools if their peers actively use them.

The results from the tested hypothesis revealed no significant difference, suggesting that both public and private university students in Ondo State adopt AI tools at similar levels. This finding contrasts with studies such as Eze and Uchenna (2023), which reported that private university students in Nigeria tend to have greater access to digital resources and technology-driven learning environments. However, the lack of a significant difference in the current study suggests that AI adoption challenges, such as limited awareness, inadequate training, and ethical concerns, are prevalent across both public and private institutions, leading to similar adoption levels.

Conclusion

The study highlights that while students in tertiary institutions in Ondo State are aware of certain AI-powered learning tools, their overall adoption remains low. Various factors, including digital literacy, internet access, institutional policies, ethical concerns, and peer influence, affect AI adoption. Additionally, the study found no significant difference in AI adoption between public and private university students, suggesting that adoption barriers are not institution-specific but rather systemic across Nigeria's higher education sector.

Recommendations

Based on the findings and implications of this study, the following recommendations were made:

- 1) Universities should organize awareness programs and digital literacy workshops to introduce students to a wider range of AI-powered learning tools beyond writing assistants and plagiarism checkers.
- 2) Both public and private tertiary institutions should invest in improving internet connectivity and access to digital learning resources, ensuring students can effectively engage with AI tools.
- 3) AI education should be embedded into academic programs to train students on ethical AI usage, research applications, and advanced learning techniques using AI-powered platforms.
- 4) Institutions should collaborate with technology firms and AI developers to provide AI training and certification programs, equipping students with skills necessary for AI-driven academic and professional advancement.

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