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AI IN EDUCATION: A CROSS-SECTIONAL STUDY ON TEACHERS' ATTITUDES TOWARDS AI INTEGRATION AND USAGE IN SECONDARY SCHOOLS

Elijah Tochukwu David, PhD
elijahdavid889@gmail.com

Gloria Uzoamaka Nnaemeka
gu.nnaemeka@unizik.edu.ng

Chioma Christiana Akuneme
cc.akuneme@unizik.edu.ng

Chinaza Kingsley Nwosu, PhD
kc.nwosu@unizik.edu.ng
Department of Educational Foundations, Faculty of Education,
Nnamdi Azikiwe University, Awka, Nigeria
*Corresponding Author: elijahdavid889@gmail.com

Abstract

This study investigated secondary school teachers' attitudes toward the integration of Artificial Intelligence (AI) in teaching and their actual usage of AI tools in Southeast Nigeria. Using a cross-sectional survey design, data were collected from 215 teachers in public secondary schools with two validated instruments: the Teachers' Attitudes towards AI Integration Questionnaire (Cronbach's $\alpha = .85$) and the AI Usage Questionnaire (Cronbach's $\alpha = .78$). Descriptive statistics showed that most teachers used AI tools at least weekly, with usage dominated by ChatGPT, primarily to enhance content knowledge and generate teaching materials. A moderate positive correlation ($r = .478$, $p < .001$) was found between attitudes and AI usage, indicating that more favorable attitudes were associated with greater engagement. Independent samples t-tests and ANOVA revealed no significant differences in attitudes based on gender ($d = 0.06$), subject area ($d = 0.06$), or years of teaching experience ($\eta^2 = 0.02$). These findings underscore the growing role of AI in education and highlight the need for targeted training and access to diverse AI tools to ensure effective and equitable adoption among teachers.
Keywords: artificial intelligence, teacher attitudes, AI usage, secondary education

Introduction

In recent years, there has been a growing interest in the integration of Artificial Intelligence (AI) in educational settings, and the findings have been diverse. While

numerous studies have highlighted the potential benefits of AI in enhancing teaching and learning processes (Luckin *et al*., 2016; Zhang & Aslan, 2021), others have raised concerns about the effectiveness and applicability of these technologies in real classroom environments (Williamson & Piattoeva, 2020; Selwyn, 2019). These conflicting perspectives has led to discussions about how AI can be better implemented in educational contexts (Wang *et al*., 2024) and how educators can adapt to these innovations (Tan, 2023).

However, despite the promising developments in AI technology, many teachers face significant barriers to its adoption. These barriers often include a lack of familiarity with AI tools, concerns about data privacy, and an overall uncertainty regarding how to effectively integrate these tools into their teaching practices (Eke, 2024). Several factors can influence teachers' attitudes toward AI integration, including personal beliefs about technology, prior experiences with educational innovations, and institutional support (Nja *et al*., 2023). As noted by Akram, Abdelrady, Al-Adwan and Ramzan (2022), teachers' attitudes towards technology play a crucial role in determining the success of its implementation in the classroom.

Attitudes toward AI integration can be understood through the lens of technology acceptance models, which propose that perceptions of usefulness and ease of use significantly influence technology adoption (Davis, 1989; Venkatesh, Thong & Xu, 2016). Research has shown that teachers who perceive AI tools as beneficial for enhancing their teaching and improving student outcomes are more likely to embrace these technologies (Chounta, Bardone, Raudsep & Pedaste, 2022). Conversely, those who harbor skepticism or fear about AI's implications may resist its adoption, thereby limiting its potential impact on education (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017).

The concept of attitudes toward AI integration encompasses the beliefs and feelings that educators hold regarding the use of AI in their teaching practices. As Kerschner and Ehlers (2016) noted, attitudes are crucial in determining how individuals approach new technologies. For instance, tools like language assistants or lesson-planning aids can save time and enrich lessons, appealing to teachers who value efficiency and student engagement. Teachers who view AI as a valuable asset to their instructional strategies are more likely to actively seek opportunities to incorporate it into their lessons. In contrast, those who perceive AI as a threat or a hindrance may resist its integration, leading to missed opportunities for enhancing educational outcomes (Yue *et al*., 2025).

Moreover, the rapid advancement of AI technologies presents a unique challenge for educators. As new tools and platforms emerge, teachers must continuously adapt and update their skills to remain effective in their roles. This necessity for ongoing professional development can contribute to a sense of overwhelm and reluctance to engage with AI tools (Hodges *et al*., 2020). Additionally, the varying levels of technological proficiency among educators can create disparities in how AI is perceived and utilized, further complicating the landscape of AI integration in education (Akpan *et al*., 2024). In areas like Southeast Nigeria, where internet access and technological resources can be uneven, these disparities may be even more pronounced, shaping teachers' readiness and willingness to adopt AI tools in unique ways.

Understanding the relationship between teachers' attitudes toward AI integration and their actual usage of AI tools is essential for developing effective professional development programs and support systems. Research suggests that fostering positive attitudes toward AI can significantly enhance teachers' willingness to adopt and utilize these technologies (Teo, 2011). Such attitudes not only shape teachers' own practices but

also influence how students experience and benefit from AI-supported learning, amplifying the need for targeted support. Yet, few studies have explored how teachers' attitudes toward AI in regions like Southeast Nigeria, where access to technology and training may differ, relate to their actual use of these tools, a gap this study seeks to fill (Paul & Eghe, 2023).

Furthermore, the success of AI integration in education is contingent upon addressing the various challenges teachers face. Factors such as inadequate training, lack of institutional support, and concerns about the implications of AI on teaching and learning can all contribute to negative attitudes toward AI integration. It is crucial for educational stakeholders to recognize these barriers and work collaboratively to create an environment that supports teachers in embracing AI technologies.

Theoretical Framework

The theoretical framework guiding this study is the Technology Acceptance Model (TAM), a well-established theory that explains how users come to accept and use new technologies (Davis, 1989). TAM posits that two primary factors significantly influence technology acceptance: perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which a person believes that using a particular technology would enhance their job performance, while perceived ease of use denotes the extent to which a person believes that using the technology would require minimal effort.

According to TAM, when users perceive a technology as beneficial and easy to use, they are more likely to develop a positive attitude toward it, leading to a higher intention to use the technology in practice. In educational contexts, this model provides a valuable lens to examine teachers' attitudes toward AI integration. As educators

encounter AI tools in their classrooms, understanding how their perceptions influence acceptance and usage becomes critical.

This study employs the Technology Acceptance Model to explore the relationship between teachers' attitudes toward AI integration and their actual usage of AI tools. Individual attitudes are shaped not only by perceived usefulness and ease of use but also by external factors such as training and institutional support. As teachers navigate the complexities of integrating AI, their perceptions of these tools will likely determine whether they embrace or resist such innovations.

Additionally, TAM acknowledges that acceptance of technology may vary based on individuals' experiences, beliefs, and contexts. In the case of AI integration, teachers' prior experiences with technology and the support they receive from their institutions may influence their perceptions. This underscores the need for tailored professional development that addresses these dimensions, creating a more favorable environment for technology adoption.

Research Questions

This study aims to address the following research questions:

1. What is the frequency of AI tool usage among secondary school teachers?
2. What types of AI tools are most commonly used by secondary school teachers?
3. For what purposes do secondary school teachers use AI tools?
4. How do secondary school teachers' attitudes towards AI integration correlate with their usage of AI tools as a single construct?
5. Do teachers' attitudes towards AI integration vary based on demographic variables such as gender, subject area, and years of teaching experience?

Methods

To explore teachers' attitudes toward AI integration and their usage of AI tools, this study adopted a cross-sectional survey design, gathering data from a diverse set of secondary school teachers at a single point in time. 215 educators from urban and rural public schools in Southeast Nigeria participated, selected through convenient sampling as it was more convenient for the researcher. Approval for data collection was granted by the WhatsApp group administrators, and no formal school district partnership was involved. This method enabled the researcher to collect quantitative data through Google form, setting the stage for a detailed analysis of how attitudes and usage connected among secondary school teachers.

The study adapted two carefully designed questionnaires to collect its data: the *Teachers' Attitudes Towards AI Integration Questionnaire* (TAAIQ) and the *AI Usage Questionnaire*. The first includes 11 Likert-scale items (Strongly Disagree to Strongly Agree) assessing teachers' perceptions, confidence, and concerns about AI integration, alongside demographic information such as gender, subject area, and teaching experience. Two negatively worded items are reverse scored, and a total attitude score is computed by summing all items. The second instrument gathers data on frequency and purpose of AI use, types of tools used, and number of tools, with a checklist and multiple-choice format. It also includes 12 Likert-scale items divided into three subscales: content knowledge enhancement, lesson delivery improvement, and instructional planning support. Higher scores across both instruments indicate more positive attitudes and greater use of AI in teaching. Both instruments were informed by established research (e.g., Davis, 1989; Teo, 2011). Final reliability for the full sample (N = 215) yielded a Cronbach's alpha of .722 for the TAAIQ and .910 for the AI Usage Questionnaire.

Data collection occurred online, with the questionnaires hosted on Google Forms and shared via a survey link sent to teachers' WhatsApp groups. An attached consent form was provided for participants to review before responding. This process spanned a 3-week period in April, with responses kept anonymous to protect privacy in this voluntary study. The collected data formed a comprehensive dataset, with the questionnaires crafted to reduce self-report bias as much as possible, despite the method's inherent challenges.

The analysis of the data followed a structured sequence aligned with the study's research questions. For Questions 1, 2, and 3, descriptive statistics, frequencies and percentages, revealed how frequently teachers used AI, their preferred tools, and their reasons for doing so. For Question 4, composite scores were derived by summing responses from both questionnaires, applying reverse scoring to negative attitude items like 7 and 10, followed by a Pearson correlation analysis to examine the link between attitudes and usage. For Question 5, independent samples t-tests compared attitudes by gender, while one-way ANOVA explored variations across subject areas and teaching experience. Although the cross-sectional design limited causal insights, this limitation was tempered by the study's focus on straightforward, unbiased questions.

Result

Research Question One: What is the frequency of AI tool usage among secondary school teachers?

Table 1: Frequency of AI Tool Usage Among Secondary School Teachers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	23	10.7	10.7	10.7
	Frequently	57	26.5	26.5	37.2
	Occasionally	56	26.0	26.0	63.3
	Rarely	57	26.5	26.5	89.8
	Never	22	10.2	10.2	100.0
	Total	215	100.0	100.0	

The results (Table 1) show that among 215 teachers, 26.5% used AI tools frequently (several times a week) or rarely (a few times a month), 26.0% used them occasionally (once a week), 10.7% used them daily, and 10.2% never used them. This indicates that most teachers (89.8%) use AI tools at least rarely, with frequent and occasional usage being the most common patterns. A bar chart (Figure 1) visualizes the distribution, highlighting the balanced spread across frequent, occasional, and rare usage.

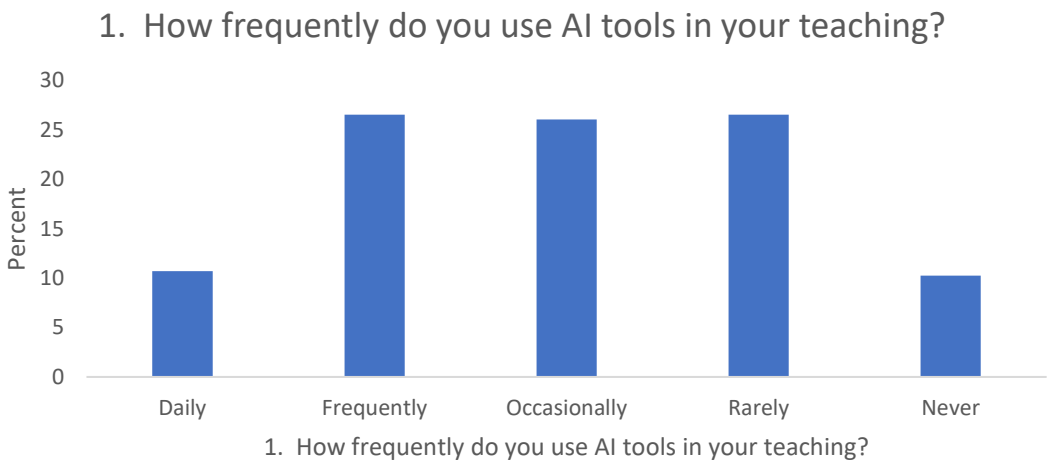

Figure 1: Bar chart showing the percentage of teachers by AI tool usage frequency.

Research Question Two: What types of AI tools are most commonly used by secondary school teachers?

Table 2: Individual AI Tools (from Google Forms):

AI Tool	Count	Percent
ChatGPT	146	67.9%
Other	60	27.9%
Grammarly	53	24.7%
AI_Lesson_Planner	42	19.5%
QuillBot	22	10.2%
Google_Bard	21	9.8%

Table 3: Number of AI Tools Used

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 tool	135	62.8	63.4	63.4
	2 tools	44	20.5	20.7	84.0
	3 tools	21	9.8	9.9	93.9

	4 tools	13	6.0	6.1	100.0
	Total	213	99.1	100.0	
Missing	System	2	.9		
Total		215	100.0		

Among 215 respondents, ChatGPT was the most commonly used tool (146 teachers, 67.9%), followed by "Other" tools (60, 27.9%), Grammarly (53, 24.7%), and AI-powered lesson planners (42, 19.5%) (Table 2). QuillBot (22, 10.2%) and Google Bard (21, 9.8%) were the least used. Additionally, the number of tools used was categorized (Table 3): 63.4% of 213 valid respondents (2 missing) used one tool, 20.7% used two, 9.9% used three, and 6.1% used four or more, indicating most teachers rely on a single tool, often ChatGPT. This highlights ChatGPT's dominance and limited multi-tool adoption.

Research Question Three: For what purposes do secondary school teachers use AI tools?

Table 4: Purposes for Using AI Tools (from Google Forms):

Purpose	**Count**	**Percent**
Enhancing content knowledge	146	67.9%
Generating teaching materials	111	51.6%
Preparing lesson plans	93	43.3%
Providing feedback	38	17.7%
Assessing student work	28	13.0%
Other	19	8.8%

Table 5: Number of AI Purposes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	13	6.0	6.1	6.1
	1 purpose	94	43.7	44.3	50.5
	2 purpose	43	20.0	20.3	70.8
	3 purposes	30	14.0	14.2	84.9
	4 purposes	32	14.9	15.1	100.0
	Total	212	98.6	100.0	
Missing	System	3	1.4		
Total		215	100.0		

Among 215 respondents, enhancing content knowledge was the most common purpose (146 teachers, 67.9%), followed by generating teaching materials (111, 51.6%)

and preparing lesson plans (93, 43.3%) (Table 4). Providing feedback (38, 17.7%), assessing student work (28, 13.0%), and other purposes (19, 8.8%) were less frequent. Additionally, the number of purposes was categorized (Table 5): of 212 valid respondents (3 missing), 44.3% used AI for one purpose, 20.3% for two, 14.2% for three, and 15.1% for four or more, with 6.1% using none, indicating focused use for most teachers but broad application for some. Both tables illustrate these patterns, highlighting the dominance of content enhancement and material generation.

Research Question Four: How do secondary school teachers' attitudes towards AI integration correlate with their usage of AI tools as a single construct?

Table 6: Pearson's Correlation between Attitudes and AI Tool Usage

Variables	***R***	**P**	***N***
TAAIQtotal vs. AIUsagetotal	.478**	<0.001	205

**. Correlation is significant at the 0.01 level (2-tailed).

The results showed a moderate positive correlation ($r = 0.478$, $p < 0.001$, $N = 205$), indicating that teachers with more positive attitudes towards AI integration tend to use AI tools more extensively. This relationship is statistically significant ($p < 0.01$), suggesting that attitudes are a meaningful predictor of AI usage, explaining approximately 22.8% of the variance in usage ($r^2 = 0.228$).

Research Question Five: Do teachers' attitudes towards AI integration vary based on demographic variables such as gender, subject area, and years of teaching experience?

Table 7: Attitudes towards AI Integration by Gender

Gender	**N**	**M**	**SD**	**t**	**Df**	**p**	**D**
Male	48	41.81	6.30	-0.37	207	.713	0.06
Female	161	42.16	5.46				

An independent samples t-test was conducted to compare attitudes towards AI integration between male ($M = 41.81$, $SD = 6.30$, $N = 48$) and female ($M = 42.16$, $SD = 5.46$, $N = 161$) teachers. Levene's test indicated equal variances ($F = 0.00$, $p = .954$). There was no significant difference in attitudes between male and female teachers, $t(207)$

= -0.37, p = .713, d = 0.06. The mean difference of -0.34 (95% CI [-2.18, 1.49]) suggests a negligible, non-significant trend where females may have slightly more positive attitudes.

Table 8: Attitudes towards AI Integration by Subject Area

Subject Area	N	M	SD	t	df	p	D
Science	101	42.26	6.23	0.45	207	.656	0.06
Art	108	41.91	5.08				

An independent samples t-test was conducted to compare attitudes towards AI integration between Science (M = 42.26, SD = 6.23, N = 101) and Art (M = 41.91, SD = 5.08, N = 108) secondary school teachers. Levene's test indicated equal variances (F = 0.00, p = .966). There was no significant difference in attitudes between Science and Art teachers, t(207) = 0.45, p = .656, d = 0.06. The mean difference of 0.35 (95% CI [-1.20, 1.90]) suggests a negligible, non-significant trend where Science teachers may have slightly more positive attitudes towards AI integration.

Table 9: Attitudes towards AI Integration by Years of Teaching Experience

Years of Experience	N	M	SD	Mean Rank	H	df	P
Less than 5 years	56	42.27	5.31	106.22	4.36	4	.360
5–10 years	80	41.25	6.53	95.96			
11–15 years	49	42.47	5.00	109.42			
16–20 years	13	43.46	4.27	120.08			
More than 20 years	11	43.73	4.36	127.00			

A one-way ANOVA was initially conducted to examine differences in attitudes towards AI integration across years of teaching experience among secondary school teachers. The homogeneity of variance assumption was met (Levene's test F(4, 204) = 0.31, p = .874), but normality was violated for the 5–10 years and 11–15 years groups (Shapiro-Wilk p < .001). Therefore, a Kruskal-Wallis test was conducted as a non-parametric alternative. There was no significant difference in attitudes across the experience levels, H(4) = 4.36, p = .360. This result aligns with the ANOVA, F(4, 204) = 0.93, p = .447, η^2 = 0.02. Teachers with more than 20 years of experience had the

highest mean rank (127.00) and mean attitude score (M = 43.73, SD = 4.36, N = 11), while those with 5–10 years had the lowest mean rank (95.96) and mean score (M = 41.25, SD = 6.53, N = 80), but these differences were not statistically significant.

Discussion of Findings

This present study examined secondary school teachers' attitudes toward the integration of Artificial Intelligence (AI) in teaching and also examined their actual usage of AI tools in Southeast, Nigeria. A number of findings emerged shedding light on secondary school teachers' attitudes towards incorporating Artificial Intelligence (AI) in teaching and also about their practical use of AI tools. Findings on the frequency of AI tool usage among secondary school teachers showed that only a small percentage of secondary school teachers use AI tools on a daily basis, while the majority of them use the AI tools at least occasionally. This finding aligns with Akpan *et al*. (2024) who noted that even though the use of AI in education is growing, regular use is still quite low, possibly due to the varying levels of technological proficiency among educators. This suggests that even though AI is recognized as beneficial, they have not been fully included regularly into teaching methods by secondary school teachers. Furthermore, the small percentage of teachers who never use AI tools suggests that targeted interventions are necessary to resolve resistance or accessibility gaps among teachers towards the use and incorporation of AI tools in teaching.

Also, our findings on the types of AI tools that are most commonly used by secondary school teachers revealed that ChatGPT is the AI tool that secondary school teachers in Southeast, Nigeria utilize the most, followed by Grammarly, AI-powered lesson planners, quillbot, googlebard etc. This suggests that AI lesson planners, for example, are not as widely used as ChatGPT, contradicting Kerschner and Ehlers' (2016) assertion that AI tools like language assistants or lesson-planning aids can enhance

instruction and save time, thereby making them desirable to educators who place a high priority on effectiveness and student engagement. Also, the dominance of ChatGPT and the low usage of other AI tools could imply that teachers are finding ChatGPT particularly effective for their teachings needs, underscoring the need for broader exposure of teachers to a variety of other AI resources.

Taking into consideration the purposes as to which secondary school teachers use AI tools, findings revealed that content knowledge and generating teaching materials are the primary purposes for AI tool usage among secondary school teachers. However, few teachers also use AI tools to prepare lesson plans, feedback provision and student assessment. Further findings revealed that secondary school teachers use AI for only one specific purpose, suggesting a targeted rather than broad and extensive integration. These findings support previous studies that emphasized the potential benefits of AI in enhancing teaching and learning processes, specifically in the generation of resources and knowledge (Luckin *et al*., 2016; Zhang & Aslan, 2021). This also implies that secondary school teachers use AI more as a tool for generating teaching materials and resources rather than for assessment or interaction.

Our results further showed that secondary school teachers' attitudes toward AI had moderate significant positive relationship with their actual AI tool usage. This shows that the more secondary school teachers are positively oriented towards AI integration into classroom teaching, the more they tend to use AI tools extensively. Further results showed that the secondary school teachers' attitudes toward AI integration are a meaningful predictor of their AI tool usage, accounting for 22.8% variances in their responses. This is considered low even though it is significant. These findings are in agreement with the study by Yue *et al*. (2025) which noted that teachers who view AI as a valuable asset to their instructional strategies are more likely to actively seek

opportunities to incorporate it into their lessons. Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich (2017) also asserted that teachers who harbor skepticism or fear about AI's implications may resist its adoption, thereby limiting its potential impact on education. This is also an indication that teachers who have more positive views about AI are more inclined to use AI tools into their lesson plans.

Furthermore, our findings on the impact of gender, subject area, and years of teaching experience on the teachers' attitudes toward AI integration revealed that they accounted for no significant differences on their attitudes toward AI tools integration in classroom teaching. These findings imply that teachers' attitudes on the integration of AI are largely consistent across teacher demographics. Also, the lack of significant differences based on gender, subject area, and years of teaching experience suggests that institutional, pedagogical, or environmental factor, rather than personal background variables may have a greater influence on views regarding AI in education.

Implications of Findings

This study's findings carry significant implications for educators, school leaders, and policymakers aiming to advance AI integration in secondary schools. Most teachers use AI tools occasionally or rarely, suggesting they recognize their value but lack confidence or familiarity to incorporate them regularly. This gap between awareness and consistent use highlights the need for practical training programs that build teachers' confidence and showcase the diverse uses of AI tools, such as lesson planning, student assessment, and personalized learning.

A small group of teachers never uses AI, likely due to limited knowledge or personal reservations. Schools should offer tailored support, addressing individual needs through workshops or one-on-one guidance to encourage these educators to explore AI's

potential. This targeted approach could help bridge the divide between non-users and their more tech-savvy peers.

The strong preference for ChatGPT among teachers reflects trust in its capabilities but points to limited awareness of other valuable AI tools, such as Grammarly or AI-powered lesson planners. Professional development initiatives should introduce teachers to a broader range of tools, emphasizing their varied applications beyond content creation, to enrich teaching practices and student engagement.

The study found a moderate link between teachers' attitudes toward AI integration and their usage, with attitudes accounting for 22% of the variation in use—a modest influence. This suggests that while positive attitudes encourage AI adoption, other factors, such as school policies or a supportive tech environment, play a substantial role. School leaders should foster settings that promote AI use, ensuring access to resources and clear guidelines that empower teachers to experiment with these tools.

No notable differences in attitudes toward AI integration emerged based on gender, subject area, or teaching experience, indicating that demographic factors do not significantly shape teachers' views. This shifts the focus to other influences, like school culture or resource availability, which schools must address to support AI adoption across all teacher groups.

Limitations and Conclusion

This study offers valuable insights into teachers' attitudes toward AI integration and usage in secondary schools in Southeast Nigeria, but it has limitations. Conducted solely in Southeast Nigeria, one of the country's six geopolitical zones, the findings may not apply to other regions with different levels of educational or infrastructural development. Teachers in less developed zones might approach AI differently, warranting further research to compare regional perspectives.

The cross-sectional design, capturing data at a single point, limits the ability to track changes in teachers' attitudes or usage over time. Future studies could adopt a longitudinal approach to uncover trends and patterns in AI adoption. Additionally, this study did not explore environmental factors, such as school resources or leadership support, which could influence AI integration. Future research should investigate these to complement the finding that demographics have little impact.

Despite these constraints, this study significantly advances understanding of AI in education. It reveals that while most teachers in Southeast Nigeria view AI positively, a gap persists between their awareness and regular use, underscoring the need for better training. ChatGPT stands out as the preferred tool, used mainly for content development, suggesting opportunities to promote other AI applications. Teachers with more positive attitudes tend to use AI more, though other factors also drive adoption. The lack of demographic differences highlights the universal potential for AI integration when barriers are addressed. These findings provide a foundation for designing support systems that empower teachers to embrace AI effectively.

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