



## Teachers' Perceptions of AI Classroom Management Tools for Enhancing Personalization and Academic Engagement of Secondary School Students in Ilorin

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**To cite this article.** T. O. Babalola, A. Usman, and O. S. Adenubi, "Teachers' Perceptions of AI Classroom Management Tools for Enhancing Personalization and Academic Engagement of Secondary School Students in Ilorin," *Blockchain, Artif. Intell. Futur. Res.*, vol. 1, no. 2, pp. 84–100, 2025.

**DOI:** <https://doi.org/10.70211/bafr.v1i2.317>

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Published online: 20 November 2025



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# Teachers' Perceptions of AI Classroom Management Tools for Enhancing Personalization and Academic Engagement of Secondary School Students in Ilorin

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Received: 25 August 2025

Revised: 8 September 2025

Accepted: 14 November 2025

Online: 20 November 2025

## Abstract

The integration of Artificial Intelligence (AI) tools in classroom management is increasingly reshaping instructional practices, particularly in secondary schools. This study investigated the perceptions of teachers in Ilorin, Nigeria, regarding the effectiveness of AI classroom management tools in enhancing academic engagement. It also examined how these tools influence student engagement, support personalized instruction, and the challenges encountered in their use. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework and the Diffusion of Innovations (DOI) theory, the study adopted a descriptive survey design. Data were collected from 150 secondary school teachers using a structured questionnaire and analyzed using descriptive statistics of mean and standard deviation. Findings show that teachers perceive AI tools as effective for engagement and personalized learning. However, concerns about inadequate technical skills, inconsistent infrastructure, and data privacy emerged as significant barriers to adoption. The study further found that while AI tools can enhance differentiated instruction and streamline classroom management, their integration remains limited by teachers' confidence and institutional readiness. Based on these findings, the study recommends targeted, context-sensitive teacher training, improved technical infrastructure, and the development of clear data governance policies. These measures are crucial for promoting greater teacher buy-in, ensuring the ethical use of AI, and developing sustained engagement with technology-enhanced learning environments.

**Keywords:** Artificial Intelligence; Classroom Management Tools; Academic Engagement; Educational Technology

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## INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force in education, offering tools that enhance teaching efficiency and personalize learning. Among its various applications, AI-powered classroom management systems are gaining recognition for their ability to assist teachers in organizing tasks, monitoring student behavior, and delivering personalized content [1], [2], [3]. These tools do not replace teachers, but rather support them by enabling more meaningful student interaction and providing tailored learning experiences. As classrooms become increasingly diverse and complex, integrating AI can help manage a variety of student needs more effectively.

Globally, the use of AI in education has been growing rapidly, reshaping traditional teaching and learning paradigms [4], [5], [6]. However, the adoption of AI in educational settings remains uneven, especially in developing countries. In Nigeria, the integration of AI tools in schools is still in its early stages, hindered by challenges such as inadequate infrastructure, low awareness, and varying levels of teacher readiness [7], [8], [9]. Ilorin, a rapidly developing educational hub, faces these challenges, including large class sizes, diverse learner needs, and limited instructional resources. Within this context, AI-powered classroom management tools could provide a solution to help teachers handle both administrative and instructional tasks more efficiently. The intersection of local educational challenges and global technological advancements makes it essential to examine teachers' perceptions of AI tools in secondary schools in Ilorin [1].

Despite the growing interest in educational technologies (EdTech), much of the existing research focuses broadly on digital tools, leaving a significant gap in understanding teachers' perceptions of AI classroom management tools specifically, especially in the context of secondary schools in Ilorin. Teachers are key to the successful adoption of educational innovations, yet their experiences, beliefs, and challenges regarding AI remain underexplored, particularly in Nigeria [6], [8], [10]. Understanding these perceptions is crucial, as teachers' acceptance and effective use of AI tools will determine whether they become valuable instructional aids or remain underutilized. Given the large class sizes typical in Nigerian secondary schools, such tools could have a particularly significant impact on managing classrooms and enhancing academic engagement.

Academic engagement is a well-established predictor of student success, and AI tools have been shown to enhance engagement by providing timely feedback, identifying struggling students, and suggesting personalized learning activities [11], [12]. Furthermore, AI's potential to support personalized learning where content and pace are tailored to each student's needs aligns with global educational priorities. In Nigeria, where learning outcomes vary significantly among students, AI could help bridge these gaps, offering a meaningful step toward more inclusive and effective teaching.

However, the introduction of AI into classroom settings raises important questions about practicality, accessibility, and teacher readiness. While some educators welcome the support AI tools offer, others express concerns about their complexity, potential misuse, and the lack of adequate training. Without clear insights into how teachers perceive these tools, efforts to implement AI in schools may fail to reach their full potential. This study aims to explore teachers' perceptions of AI classroom management tools, focusing on how these tools enhance personalization and academic engagement among secondary school students in Ilorin.

AI is transforming education globally, yet many teachers, particularly in developing regions, remain unfamiliar with its practical applications in classroom settings. AI classroom management tools offer great potential to enhance instructional delivery, student engagement, and personalized

learning, but their adoption is limited by a lack of exposure and technical understanding among educators [13], [14], [15]. In many Nigerian secondary schools, teachers often manage large and diverse classrooms without digital support, making classroom organization and individualized attention challenging. The gap between AI's potential and its actual use raises important questions about teachers' perceptions and readiness to integrate AI in their classrooms.

Concerns about the complexity, misuse, and ethical implications of AI contribute to teachers' hesitancy to adopt these tools. Without proper training or institutional support, many educators find AI tools intimidating or unnecessary, especially when their benefits are not clearly demonstrated. In a city like Ilorin, where access to innovation is uneven, introducing AI without understanding teacher perceptions may lead to low usage or resistance. This study, therefore, is essential in uncovering how secondary school teachers in Ilorin perceive AI classroom management tools, especially regarding their effectiveness in promoting personalization and academic engagement.

### *Research Questions*

The following research questions guide the study.

1. What are teachers' perceptions of the effectiveness of AI classroom management tools in enhancing academic engagement in secondary schools in Ilorin?
2. How do AI classroom management tools influence student engagement in secondary schools in Ilorin?
3. In what ways do AI classroom management tools support the personalization of instruction in secondary school classrooms?
4. What challenges do teachers face in using AI classroom management tools in secondary schools in Ilorin?

## **LITERATURE REVIEW**

The integration of AI in education offers significant opportunities to improve classroom management and personalize learning. This literature review provides an overview of AI technology in education, explores teachers' perceptions and digital competencies, examines the effectiveness of AI tools in enhancing classroom management and student engagement, and discusses the barriers to AI adoption in secondary schools.

### *Theoretical Framework*

This study is guided by two theoretical frameworks: TPACK and Diffusion of Innovations (DOI). These frameworks provide complementary perspectives for understanding how and why teachers adopt AI tools in classroom management. TPACK focuses on the intersection of technology, pedagogy, and content knowledge, emphasizing the competencies needed for effective integration of technology into teaching practices [16], [17]. It underscores that AI tools must align with curriculum goals and teaching methods to be effective. For instance, AI tools for tracking student progress require teachers to understand not only the tool's functions but also how to interpret the results for instructional improvement.

In contrast, DOI theory offers insights into the process of innovation adoption within educational institutions [18], [19], [20]. It highlights that adoption occurs in stages: knowledge, persuasion, decision, implementation, and confirmation. Teachers' perceptions of the advantages,

complexity, compatibility, and observability of AI tools influence their willingness to adopt these technologies. DOI also emphasizes the role of social systems and peer influence, as teachers often adopt innovations based on peer experiences and institutional support. Together, TPACK and DOI help explain both the capacity and the willingness of teachers to integrate AI tools into their teaching practices, particularly in contexts like Ilorin where AI adoption is still in its early stages.

### ***Overview of AI Technology in Education and Classroom Management***

Recent advancements in AI technology have introduced a range of tools designed to enhance classroom management and improve instructional efficiency. AI-powered systems assist with tasks such as grading, tracking student performance, identifying learning gaps, and personalizing content delivery [2], [5]. These tools help teachers make informed decisions, improving classroom organization and engagement. In large classrooms, AI can help manage administrative tasks, enabling teachers to focus more on teaching and less on routine duties. For example, AI tools can automate attendance tracking, monitor student behavior, and provide real-time feedback, making it easier for teachers to address individual student needs [21], [22].

AI's ability to adapt content based on student performance is particularly valuable in diverse classrooms, where students often have different learning paces and needs. Personalized learning, powered by AI, ensures that each student receives content suited to their level, enhancing motivation and reducing learning disparities [23], [24]. However, the effectiveness of these tools depends heavily on teachers' readiness to embrace them, which can be influenced by their perceptions of the technology's usefulness, compatibility with existing practices, and the support they receive.

### ***Effectiveness of AI Classroom Management Tools***

Teachers' perceptions of AI classroom management tools are crucial for their effective integration into daily instructional practices. When teachers perceive AI as useful and effective in supporting classroom management, they are more likely to incorporate it into their teaching routines. AI tools that automate routine tasks, such as attendance tracking and behavior monitoring, can help teachers maintain order and focus on instruction, thereby improving the overall classroom environment [25]. However, the effectiveness of these tools is often contingent on how well teachers understand and interpret AI-generated data. Without sufficient training, teachers may struggle to use AI effectively, reducing the potential benefits of the technology.

AI tools are especially valued for their ability to personalize learning and engage students. Features such as behavior prompts, participation tracking, and real-time feedback help teachers maintain student engagement and adapt instruction based on student performance [3], [14]. Teachers are more likely to adopt AI tools when they perceive them as flexible and adaptable to their teaching style. However, if the tools are perceived as rigid or impersonal, teachers may be less willing to integrate them into their classrooms [26]. This underscores the importance of aligning AI tools with pedagogical goals and ensuring they complement teachers' existing instructional strategies.

### ***Barriers to AI Adoption in Classroom Management***

Despite the potential benefits of AI in classroom management, several barriers hinder its widespread adoption. One significant challenge is the lack of digital fluency among teachers, particularly in under-resourced settings. Many educators are not sufficiently trained to use AI tools effectively,

and without adequate professional development, they may find these tools intimidating or unnecessary [27], [28]. Moreover, infrastructure limitations, such as unreliable internet connectivity, inconsistent power supply, and a lack of functional devices, further complicate AI adoption, especially in developing regions [29], [30]. In many schools, even when AI systems are introduced, the lack of stable infrastructure can lead to frustration and discontinuation.

Additionally, concerns about privacy and data security are major barriers to the adoption of AI tools in classrooms. Teachers may worry about how student data is collected, stored, and used, especially when AI platforms are developed by third-party vendors [31], [32]. These concerns are particularly relevant in regions like Ilorin, where data protection regulations may not be fully developed or enforced. Furthermore, teachers may resist AI adoption due to unclear benefits, lack of institutional support, or fear of misuse, which makes it crucial to address these issues through targeted interventions, transparent data policies, and ongoing professional development [33].

## METHODS

This study employed a descriptive survey design to investigate secondary school teachers' perceptions of integrating AI technology for classroom management in public secondary schools in Ilorin metropolis. This approach was chosen as it allows for a systematic assessment of teachers' real-world attitudes, practices, and experiences across a large population, thereby providing a comprehensive view of prevailing trends. A structured questionnaire was used to collect data, ensuring consistency and comparability across different schools. The study adopts a quantitative approach to identify measurable patterns in how teachers apply AI tools to enhance classroom organization, monitoring, and instructional delivery.

### *Research Design and Framework*

The study was anchored in two complementary theoretical frameworks: the TPACK framework and Diffusion of Innovations (DOI) theory. The TPACK framework, developed by Petko [34], focuses on the integration of technology, pedagogy, and content knowledge, which are essential for effective use of AI tools in education. The DOI theory, proposed by García-Avilés [35], examines how innovations, such as AI tools, spread and are adopted within educational settings. These theories guided the development of the study's research instruments and provided a theoretical foundation for understanding teachers' adoption and use of AI tools in classroom management.

### *Population and Sampling*

The target population consisted of public secondary school teachers in Ilorin who were currently using AI-based classroom management tools. The study selected six schools from the Ilorin metropolis, with a total of 246 teachers: School A (38), B (42), C (36), D (41), E (44), and F (45). A multi-stage sampling technique was employed to ensure a representative sample. In the first stage, the sample was proportionately allocated across the schools based on their teacher population. In the second stage, simple random sampling was used within each school to select participants, ensuring that all teachers had an equal chance of being included in the study. This method minimized sampling bias and increased the reliability of the findings. Based on the total population, the recommended sample size was 152 respondents, as advised by the García-Avilés [35]. The population and sample distribution are presented in Table 1.

**Table 1.** Population and Sample Distribution

No	School	Population	Proportional Sample
1	School A	38	24
2	School B	42	26
3	School C	36	22
4	School D	41	25
5	School E	44	27
6	School F	45	28
<b>Total</b>		<b>246</b>	<b>152</b>

### *Data Collection Instrument*

The primary instrument for data collection was the Teachers' Perceptions of AI Questionnaire (TPAIQ), developed specifically for this study. The TPAIQ was organized using a four-point Likert scale and consisted of five sections:

- Section A: Demographic Information (age, gender, years of teaching experience, etc.)
- Section B: Teachers' perceptions of AI-based classroom management tools
- Section C: The impact of AI tools on student engagement
- Section D: AI-driven personalization of instruction
- Section E: Challenges related to the adoption of AI in classroom settings

Respondents rated their level of agreement with each statement on a scale from Strongly Disagree (1) to Strongly Agree (4). This structure allowed for standardized responses, providing quantifiable data to assess teachers' experiences and attitudes toward AI integration.

The questionnaire was designed to measure key constructs aligned with the TPACK framework, such as technological knowledge, pedagogical strategies, and content integration, as well as constructs from the DOI theory, including perceived ease of use, perceived usefulness, and readiness to adopt AI tools.

### *Validation and Reliability*

The TPAIQ underwent a rigorous validation process to ensure its relevance and alignment with the research objectives. Educational research and measurement experts reviewed the questionnaire to assess its clarity, relevance, and alignment with the key themes under investigation. Initially, the questionnaire contained 27 items, but following expert feedback, some items were revised or removed to improve clarity and relevance. The final instrument demonstrated strong face, content, construct, and criterion validity.

To assess the reliability of the TPAIQ, a pilot test was conducted with 40 randomly selected teachers from a school not included in the study. The split-half method was employed, where the questionnaire was divided into two halves, and the scores from both halves were compared. The Spearman-Brown prophecy formula was applied to calculate the reliability coefficient, which was found to be 0.72, indicating high internal consistency. This result confirmed that the TPAIQ is a reliable tool for assessing teachers' perceptions of AI in classroom management.

### *Data Analysis*

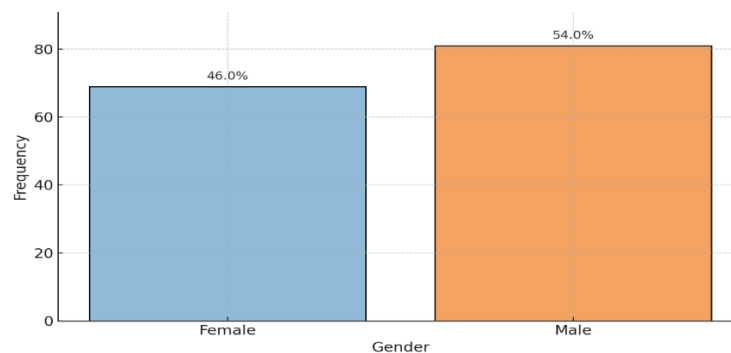
Data collected from the completed questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequency counts, percentages, means,

and standard deviations, were used to analyze the research questions and summarize demographic information. A weighted average was applied to interpret the responses, providing a balanced assessment of agreement levels across items. This approach helped to identify trends in teachers' perceptions and highlight areas requiring further attention. Out of the 162 questionnaires distributed, 150 were completed correctly and used for analysis. Seven were excluded due to incomplete responses, and five were not returned.

## RESULTS AND DISCUSSION

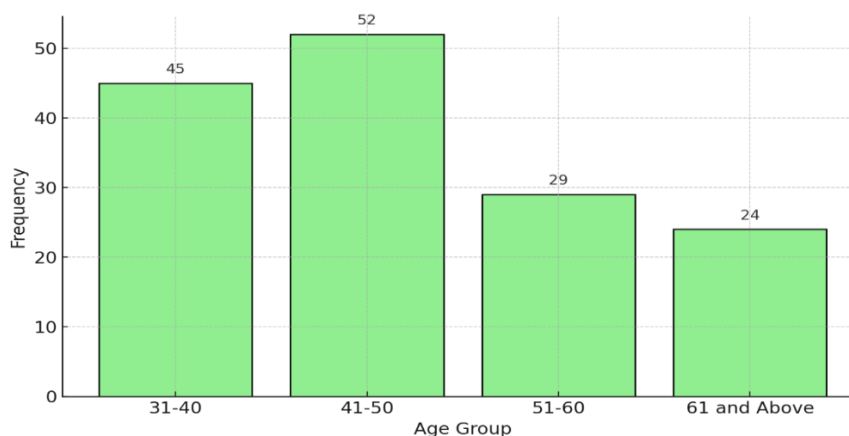
### *Demographic Characteristics*

This section provides a detailed summary of the respondents' demographic profiles, with a particular emphasis on their gender and age distribution. Understanding these demographic patterns helps frame the research findings within the realities of the population under study. Such demographic context is important for guiding institutional strategies, shaping relevant policies, and developing targeted support systems that address the unique needs of various categories of teachers in secondary schools. The breakdown is presented below.



**Figure 2.** Distribution of Respondents Based on Gender

In the analysis of gender, the distribution of respondents indicates a slightly higher participation rate among male teachers compared to their female counterparts. Out of the total 150 respondents, 81 were male, representing 54%, while 69 were female, accounting for 46% of the sample. This suggests a modest gender imbalance in favor of males among the teachers who participated in the study. However, the distribution remains relatively balanced.



**Figure 3.** Distribution of the Respondents Based on Age (n = 150)

In the analysis for age, the distribution of respondents shows that the majority of participating teachers fall within the 41–50 age group, which accounts for 34.7% of the sample. This is closely followed by the 31–40 age group, at 30%, indicating that most respondents are in their mid-to-late professional careers. The 51–60 age group represents 19.3%, while those aged 61 and above make up 16% of the total respondents.

### *Descriptive Analysis*

This section presents a table of items developed to explore the first research question, which focuses on teachers’ perceptions of the effectiveness of AI classroom management tools. The responses were analyzed using descriptive statistics, with particular attention to the mean scores, as presented in [Table 2](#).

**Table 2.** Effectiveness of AI Classroom Management Tools (n = 150)

No	Statements	Mean	Std. Deviation	Remarks
1	AI tools improve classroom management and organization.	2.4593	1.05453	High
2	AI tools assist teachers in maintaining order and discipline in the classroom.	2.3953	.99888	Low
3	The use of AI tools enhances the overall classroom environment.	2.3721	1.00200	Low
4	AI tools improve teacher productivity by automating routine classroom tasks.	2.4709	1.02691	High
5	The integration of AI tools has led to more effective lesson planning and delivery.	2.4244	1.03585	Moderate
Weighted Average			2.42	

The analysis of teachers’ perceptions regarding the effectiveness of AI classroom management tools reveals a moderately positive stance. As shown in Table 2, the weighted average score of 2.42 suggests that while teachers generally recognize the potential of AI tools, their views remain mixed. Items with slightly higher mean scores, such as the belief that AI improves classroom organization (M = 2.46) and automates routine tasks (M = 2.47), reflect stronger agreement. However, lower mean scores were observed for statements about maintaining discipline (M = 2.40) and enhancing the classroom environment (M = 2.37), indicating less certainty in these areas.

This section presents a table that includes the items designed to explore the second research question, which focuses on how AI classroom management tools influence student engagement. The responses were analyzed using descriptive statistics, particularly the mean scores, as displayed in [Table 3](#).

**Table 3.** Influence of AI Tools on Student Engagement (n = 150)

No	Statements	Mean	Std. Deviation	Remarks
1	AI tools have a positive impact on student engagement during lessons.	2.7703	.97917	High

No	Statements	Mean	Std. Deviation	Remarks
2	AI technologies help in improving student learning outcomes.	2.7645	.96578	High
3	The use of AI tools supports personalized learning and caters to the individual needs of students.	2.6134	.95919	Low
4	AI-based tools allow for real-time assessment and feedback to students.	2.4826	1.01000	Low
5	The implementation of AI tools has improved the quality of student-teacher interactions.	2.6395	.97685	Low
Weighted Average			2.65	

The analysis of responses to the second research question reveals that teachers generally believe AI tools have a positive influence on student engagement. With a weighted average of 2.65, most respondents agreed that these tools enhance student participation and learning outcomes. The highest ratings were given to items stating that AI improves engagement during lessons ( $M = 2.77$ ) and supports better academic performance ( $M = 2.76$ ). However, teachers were more reserved about AI's role in providing real-time feedback and improving student-teacher interaction, both of which received lower mean scores (2.48 and 2.64).

This section includes a table highlighting the items developed to investigate the third research question, which focuses on how AI classroom management tools support the personalization of instruction. The analysis used descriptive statistics, with mean scores used to interpret patterns in teachers' responses, as presented in [Table 4](#).

**Table 4.** AI-Supported Personalization of Instruction (n = 150)

No	Statements	Mean	Std. Deviation	Remarks
1	AI tools allow for more personalized learning experiences tailored to individual students' needs.	2.6395	.97685	High
2	AI-based learning systems can better track student progress and provide targeted interventions.	2.5610	.96998	Low
3	AI technologies help in customizing learning materials to suit the diverse abilities of students.	2.6134	.95919	High
4	The use of AI tools enables teachers to provide differentiated instruction.	2.5610	.97896	Low
5	AI-based systems provide meaningful feedback that promote personalized learning growth.	2.5727	1.00172	Low
Weighted Average			2.58	

The analysis of responses to the third research question suggests that teachers hold a generally positive view of AI tools in supporting personalized instruction, though the level of agreement varies across specific aspects. With a weighted average of 2.58, responses slightly exceed the midpoint, indicating moderate support for the role of AI in adapting learning to individual student needs. Teachers agreed most strongly that AI enables more personalized learning experiences ( $M = 2.64$ ) and helps customize learning materials to match student abilities ( $M = 2.61$ ). However, lower mean scores were recorded for AI's role in tracking progress, providing targeted interventions, and facilitating differentiated instruction, each around 2.56.

This section provides a summary of the items used to explore the fourth research question, which focuses on the challenges teachers face in developing digital skills. Responses were analyzed using descriptive statistics, with particular attention to mean scores, to identify trends and insights. The results are presented in [Table 5](#).

**Table 5.** Barriers to the Adoption of AI in Classroom Management (n = 150)

No	Statements	Mean	Std. Deviation	Remarks
1	Teachers face difficulties in learning how to use AI tools effectively.	2.6742	.92501	Low
2	Limited access to necessary resources (hardware, software, internet) hinders effective use of AI tools.	2.7703	.99394	High
3	There is resistance from students and teachers to adopting AI technologies in the classroom.	2.7384	.93281	High
4	Privacy and data security concerns deter teachers from using AI tools.	2.7703	.98031	High
5	Maintenance and updating of AI tools pose challenges for schools.	2.6384	.91355	Low
Weighted Average			2.71	

The analysis of the fourth research question reveals that teachers encounter several significant barriers to adopting AI tools in classroom management. With a weighted average of 2.71, the overall responses reflect a notable level of concern regarding practical and systemic challenges. The highest mean scores were associated with issues such as limited access to essential resources (M = 2.77), resistance from both students and teachers (M = 2.74), and privacy or data security concerns (M = 2.77), indicating these as the most pressing obstacles. While difficulties in learning how to use AI (M = 2.67) and challenges related to maintenance and updates (M = 2.64) were rated slightly lower, they remain relevant concerns.

### **Discussion**

The findings of this study offer valuable insights into the integration of AI tools in secondary schools, particularly in enhancing classroom management, student engagement, and personalized instruction. By examining the perceptions of teachers in Ilorin, the study contributes to the ongoing discourse about how AI can be meaningfully applied in resource-constrained educational contexts. The discussion is organized around key themes drawn from the research objectives: teachers' views on the effectiveness of AI tools, their influence on student engagement, the role of AI in personalizing instruction, and the barriers to AI adoption.

The results suggest that while teachers in Ilorin recognize the potential of AI classroom management tools, they perceive these tools as only moderately effective in enhancing academic engagement. Teachers highlighted the benefits of AI features such as automated attendance, behavior monitoring, and participation tracking, which helped improve classroom organization and instructional delivery. This aligns with the TPACK framework, which underscores the importance of integrating technology in a way that complements pedagogy and content knowledge. However, teachers expressed discomfort with tools that required unfamiliar data interpretation skills or lacked adaptability to their teaching context. These concerns were particularly evident in resource-limited settings, where teachers felt that the tools did not fully align with their pedagogical practices or the

specific needs of their classrooms. This finding resonates with the work of Tusquellas et al. [36] and Zaim et al. [37], who found similar patterns in other contexts, but our study emphasizes how local challenges, such as limited access to professional development, temper the otherwise positive perceptions of AI.

The application of the DOI theory provides further insights into why positive perceptions of AI tools did not always translate into confident adoption. While many teachers acknowledged the potential of AI for personalizing learning and streamlining administrative tasks, their willingness to implement these tools varied based on their exposure to AI, peer influence, and institutional support. Teachers in the persuasion and decision stages of adoption often lacked the necessary training and institutional backing to fully implement AI in their classrooms. This finding expands on Scherer et al. [38], which emphasized the importance of teachers' individual readiness but did not fully account for the systemic challenges faced in low-resource settings. Our study highlights that the perceived effectiveness of AI tools is not just a matter of the tools themselves, but is also shaped by the broader institutional and infrastructural context in which they are deployed.

Regarding student engagement, the study found that AI tools had a significant impact on maintaining students' attention and increasing participation. Many teachers reported that features such as real-time feedback, adaptive questioning, and progress tracking were effective in fostering greater student involvement in lessons. This finding supports the TPACK framework, which emphasizes the role of technology in promoting meaningful learning experiences when integrated with effective teaching practices. Unlike previous studies, which have discussed the potential of AI without local context, this research provides concrete examples of how AI can enhance classroom interaction, particularly in large, under-resourced classrooms. Teachers noted that AI tools allowed them to identify disengaged students more quickly and provided targeted interventions that would have been difficult to achieve in larger classes with limited resources.

The study also adds to the literature by demonstrating how AI tools support the personalization of instruction. Teachers reported that AI was effective in adapting learning content to students' individual needs, helping to manage the diverse learning paces of students, especially in overcrowded classrooms. This finding aligns with the TPACK framework, which advocates for the use of technology to enhance pedagogical strategies and improve content delivery. However, teachers also pointed out challenges related to ensuring that AI-generated content remained aligned with curriculum goals and addressed students' developmental needs. Unlike studies that generally celebrate AI's potential for personalization, this research provides a more nuanced understanding by considering how contextual factors such as overcrowding and time constraints affect the effectiveness of personalized AI tools. Teachers expressed concerns that while AI helped with inclusivity, it was difficult to ensure that personalized instruction was meaningful and aligned with the broader educational goals.

Furthermore, the study demonstrates that AI tools support content differentiation by offering various learning materials tailored to students' preferences, such as visual aids, text summaries, and interactive simulations. Teachers appreciated that AI reduced the burden of repetitive tasks, allowing more time for individualized support. However, the study also found that some AI tools focused too narrowly on speed and correct answers, which could lead to shallow engagement with the material. This observation echoes Aridan et al. [39], who warned against over-personalization that prioritizes speed over depth of learning. Unlike previous studies that have overlooked the emotional and cognitive aspects of personalization, this research emphasizes the importance of

designing AI tools that balance academic progress with students' emotional and cognitive development.

The findings also highlight significant barriers to the adoption of AI tools in classroom management. The most pressing challenges were teachers' limited digital competencies and the lack of reliable infrastructure. Many teachers lacked the technical skills needed to fully utilize AI tools, especially those requiring real-time data analysis. This supports the findings of Bianchini et al. [40], who identified a lack of confidence in technology as a major barrier to AI adoption. However, this study goes further by highlighting the importance of contextualized, hands-on professional development. Teachers in Ilorin often lacked access to training that connected AI tools with local pedagogical practices. This finding underscores a critical limitation of previous studies, which often focused on general skill deficits without considering the systemic and infrastructural constraints that shape teachers' ability to engage with technology.

In addition to the digital competency gap, infrastructural challenges, such as inconsistent power supply and unreliable internet connectivity, were significant barriers to AI adoption. This finding corroborates Kim et al. [41], who noted that poor infrastructure often leads to the abandonment of AI tools in schools. Teachers in Ilorin expressed frustration with frequent technical disruptions, which led to a lack of trust in AI tools and, in some cases, reluctance to use them. Furthermore, concerns about privacy and data security emerged as a significant issue, particularly in the absence of clear data protection policies. This finding adds to the literature by revealing how privacy concerns, which are often discussed in abstract terms, play out in practice, particularly in contexts where data governance policies are weak or nonexistent.

In conclusion, this study provides a comprehensive understanding of how AI tools are perceived and utilized in secondary schools in Ilorin. While teachers recognize the potential of AI for enhancing classroom management and student engagement, the successful adoption of these tools depends on a combination of teacher readiness, institutional support, and infrastructure development. By linking the TPACK and DOI frameworks with the practical realities of teaching in a developing context, this study adds depth to the existing literature and highlights the importance of context-specific strategies for AI adoption in education. Future efforts to implement AI in classrooms should focus on addressing these barriers through targeted professional development, improving infrastructure, and ensuring the alignment of AI tools with local pedagogical goals.

## CONCLUSION

This study highlights the growing interest in AI classroom management tools among secondary school teachers in Ilorin, yet it reveals that adoption is still inconsistent. Teachers acknowledge the potential of AI to enhance instructional personalization, streamline classroom management, and alleviate workload, particularly through automating routine tasks such as attendance tracking and behavior monitoring. These tools allow teachers to focus more on student-centered activities, presenting promising opportunities for future integration. However, real-world limitations, such as inadequate digital infrastructure, limited access to training, and concerns about data privacy, continue to hinder widespread adoption. Without adequate guidance or institutional support, many teachers perceive AI as an additional burden rather than a helpful resource, especially given the steep learning curve associated with new technologies. Despite these barriers, a growing number of teachers are experimenting with AI to support personalized learning and behavioral monitoring, suggesting its potential. However, the isolated use of these tools is insufficient to create systemic

change. The study underscores that AI should not replace teachers, but rather act as a supportive partner in the classroom. To fully realize AI's potential, the way forward must involve a holistic approach strategic investments in teacher training, infrastructure, and policies are essential to create an environment where educators feel empowered rather than overwhelmed. For Ilorin's education system to harness AI effectively, providing ongoing support for teachers is critical.

Moving forward, it is crucial for educational stakeholders to implement strategies that address the identified challenges. Schools should invest in teacher buy-in through evidence-based demonstrations of AI's impact, integrating AI tools into interactive teaching strategies that emphasize human interaction alongside technology. Personalized learning paths enabled by AI should be further explored, with accessible interfaces and continuous technical support to make customization easier for teachers. Furthermore, reliable infrastructure upgrades and the establishment of in-house technical support are necessary to ensure AI tools function optimally. Continuous, context-based professional development should be prioritized, integrating AI usage into daily teaching tasks with regular check-ins to build teacher confidence. Lastly, addressing data privacy concerns through clear and transparent policies is essential for building trust and ensuring ethical AI adoption. In conclusion, while the potential for AI in education is recognized, its successful integration in Ilorin's secondary schools depends on a collaborative effort to address infrastructural limitations, improve teacher training, and ensure ethical practices. Through these efforts, AI can become a valuable tool in supporting personalized education and improving classroom management.

## LIMITATIONS

This study has several limitations. First, the reliance on self-reported data may introduce biases, as teachers might provide socially desirable responses. Second, the focus on Ilorin limits the generalizability of the findings to other regions with different educational contexts or infrastructure. Third, the use of a quantitative approach through questionnaires may not fully capture the depth of teachers' experiences, and qualitative methods could provide richer insights. Additionally, the sample size of six schools may not reflect the full diversity of teaching environments in Ilorin. Finally, the study did not explore broader systemic factors such as curriculum alignment, administrative support, or government policies, which are crucial for AI adoption. Further research is needed to address these gaps.

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## AUTHOR CONTRIBUTION

All authors contributed equally to the conception and design of the study, as well as to all other sections of the manuscript. T.O.B. led the conceptualization and was primarily responsible for writing the introduction, results, discussion, conclusion, and recommendations, in addition to overseeing data collection and manuscript revisions. A.U. contributed to gathering related studies and writing the literature review and abstract. O.S.A. focused on writing the methodology and coordinating data collection with participants. F.J.E. contributed to the conceptualization, instrument validation, and final editing of the manuscript.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors declared that this study was prepared, researched, written, and edited without the assistance of AI techniques.

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