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# Exploring Teachers' Attitudes Toward the Integration of Artificial Intelligence in Classroom Teaching: Perceived Opportunities and Challenges at Secondary Level

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## ABSTRACT
This quantitative study investigates secondary school teachers' attitudes toward incorporating artificial intelligence (AI) into the classroom, with a focus on perceived opportunities and challenges. A structured questionnaire was distributed to a stratified random sample of 280 teachers from both urban and rural high schools. The data was analyzed using both descriptive and inferential statistics. Regarding AI's potential to enhance professional support and instruction, the results revealed a moderate degree of agreement. However, teachers also mentioned a number of significant challenges, primarily related to ethical-pedagogical issues and technical challenges. There were gender differences, with female teachers perceiving more opportunities and challenges, even though overall attitudes toward AI integration did not differ significantly by gender. However, perceptions were significantly influenced by location; compared to their rural counterparts, urban teachers reported more positive attitudes and fewer challenges. The findings emphasize the necessity of professional development, infrastructure development, and localized AI integration strategies, particularly in rural areas, to bridge the accessibility gaps in secondary education AI adoption.

## Introduction
Artificial intelligence (AI) has been incorporated into educational settings more frequently in secondary education, where technology adoption is increasingly seen as a catalyst for improving learning outcomes and instructional practices. Applications of artificial intelligence (AI), such as chatbots, intelligent tutoring systems, automated grading tools, and personalized learning platforms, are transforming the classroom by offering personalized instruction, real-time feedback, and efficient administrative support (Holmes et al., 2024). It is critical to understand how secondary school teachers perceive and adapt to AI-based tools in light of these advancements in order to guarantee successful integration and long-term innovation in education.

Teachers play a crucial role in the adoption and use of new technologies as the primary drivers of instructional change. Research indicates that their attitudes toward AI are influenced by a number of factors, including perceived utility, usability, ethical considerations, and institutional support. Positive attitudes are often the outcome of AI's capacity to reduce teachers' workload, boost student engagement, and support

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differentiated instruction. AI-powered platforms with adaptive learning pathways, for instance, have been demonstrated to benefit both advanced and struggling students, allowing teachers to focus on facilitation rather than memorization (Luckin et al., 2023). These opportunities demonstrate AI as a tool that complements, not replaces, the role of the instructor in the classroom.

However, despite these seeming benefits, there are still significant problems and challenges. Concerns regarding algorithmic bias, digital equity, data privacy, and the potential dehumanization of education are frequently raised by educators (Williamson & Eynon, 2024). Specifically, insufficient training and professional development in AI-related pedagogy leads to a gap between the availability of technology and its real classroom application (Ng, 2023). Teachers are also worried about their independence being taken away from them and their increasing reliance on opaque systems whose decision-making processes are hard to understand or question (Zhang & Nouri, 2025). These problems highlight the importance of establishing clear ethical guidelines and fostering teacher trust in order to regulate the use of AI in the classroom.

Experience, self-efficacy, and contextual factors all influence teachers' attitudes toward integrating AI, according to recent empirical research (Lee et al., 2024). As academic content becomes more specialized and student needs become more varied in secondary education, it becomes crucial to align AI tools with curriculum goals and classroom realities (Hwang et al., 2023). If there is not enough alignment, teachers may be against the integration of AI because they perceive it as a disruption rather than an advancement.

This study aims to explore secondary school teachers' perceptions of the use of AI in the classroom, with an emphasis on the perceived advantages and challenges. The study intends to inform technology developers, policymakers, and educational leaders about the elements that support and impede effective AI integration in classrooms by collecting teacher perspectives. Understanding these attitudes is essential in the rapidly evolving field of 21st-century education in order to bridge the gap between innovative technology and pedagogical practice.

## Literature Review

### Concept of AI in Education

Artificial Intelligence in Education, which encompasses generative AI tools, intelligent tutoring, automated assessment, and adaptive learning systems, has seen tremendous advancements. According to Kyrpa et al. (2024) and Velander et al. (2024), the shift from early conversational systems like ELIZA to advanced generative AI, which includes chatbots and adaptive platforms, has altered instructional practices. The goals of these technologies are to streamline assessment, automate repetitive tasks, personalize learning, and provide teachers with useful insights (Mello et al., 2023; Limna et al., 2022; Tuomi, 2018).

Among the many advantages that AIEd offers are enhanced teacher productivity, dynamic learning engagement, personalized learning experiences, and reduced administrative burden. Instead of replacing instructional strategies, the emphasis is on improving them (Flogie & Krabonja, 2023). Artificial intelligence (AI) is revolutionizing education by enhancing instructional methods, customizing learning experiences, and streamlining administrative tasks.

Intelligent tutoring systems that support differentiated instruction, automated tests, and AI-powered solutions that offer tailored feedback can all adapt to the needs of each individual student. AI assists educators in identifying learning gaps and making well-informed decisions about instruction by analyzing vast amounts of data. Additionally, AI can assist

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with lesson planning, content creation, and even classroom management, giving teachers more time to focus on student participation and critical thinking activities. Although there are ethical, data privacy, and teacher readiness concerns, it is widely acknowledged that incorporating AI has the potential to improve educational outcomes and make teaching more effective and efficient (Wang et al., 2021).

**Integrating AI in Teaching-Learning Process**

For educational systems around the world, the incorporation of artificial intelligence (AI) into the teaching-learning process offers a revolutionary prospect. By providing individualized learning experiences, enhancing instructional strategies, and increasing administrative efficiency, artificial intelligence (AI) has the potential to completely transform classroom practices. But in addition to these advantages, integrating AI presents serious infrastructure, ethical, and educational readiness issues.

Personalized learning is one of the most exciting prospects for integrating AI. In order to provide tailored educational materials, AI-powered systems are able to evaluate students' learning preferences, performance information, and development in real time. This enables educators to meet the individual needs of every student, enabling them to progress at their own rate. Chatbots and virtual assistants are examples of intelligent tutoring systems that can give students immediate feedback, respond to their questions, and help them outside of class hours. Additionally, AI can automate repetitive processes like attendance and grading, freeing up teachers' time for more engaging and innovative instruction (Bai et al., 2021).

Professional development and instructional support present yet another significant opportunity. AI can help educators find pedagogical gaps, propose content enhancements, and create data-driven lesson plans. It improves educational outcomes by facilitating early intervention and ongoing assessment for at-risk students (Chen & Li, 2024). Additionally, AI makes learning more efficient and engaging by facilitating access to adaptive testing, open educational resources, and immersive learning environments like virtual and augmented reality.

AI integration in education is not without its difficulties, though. Among the main issues are those related to infrastructure and technology. Many schools lack the essential infrastructure, such as dependable internet connectivity, modern hardware, or qualified technical support, particularly those in rural or underdeveloped areas. Different regions and educational systems have different opportunities for implementing AI due to the digital divide (Zawacki-Richter et al., 2023).

Concerns about pedagogy, ethics, and emotions present another major obstacle. Concerns regarding algorithmic bias, the depersonalization of learning, and the privacy of student data are brought up by the use of AI (Al Abdullatif, 2024). Emotional intelligence, empathy, and the teacher-student bond are important human components of education that could be compromised by an over-reliance on AI. Teachers might find it difficult to strike the correct balance between automated help and human interaction (Dovgyi et al., 2024).

Additionally, a key factor in the successful integration of AI is teacher readiness and attitudes. Due to ignorance or a fear of being replaced, many educators believe they are undertrained or are reluctant to use AI tools. To give teachers the digital literacy, ethical awareness, and pedagogical abilities they need to successfully incorporate AI in the classroom, organized professional development programs are desperately needed (Sun et al., 2023).

There are many chances to improve educational access, equity, and quality through the use of AI in the teaching-learning process. It can facilitate innovative teaching methods,

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expedite educational administration, and support individualized instruction. Policymakers and leaders in education must, however, address the related issues by making infrastructural investments, guaranteeing moral protections, and providing educators with specialized training in order to fully realize these advantages. AI won't be able to contribute significantly and sustainably to education in the future until then.

**Teachers' Attitudes Toward AI**

**Merits**

Teachers recognize several advantages of AI integration:

Time Savings & Efficiency: AI streamlines planning, grading, and administration, freeing educators to focus on pedagogy.

Adaptive Learning Support: AI tools tailor instruction, accommodate diverse learner needs, and enhance engagement (Chiu et al., 2023).

Positive General Attitudes: High school educators in recent studies have a predominantly positive view of AI, even learning independently in many cases (Konecki, Baksa & Konecki, 2024).

**Demerits**

Despite optimism, teachers express genuine worries:

Ethical Issues: Concerns about data privacy, algorithmic bias, academic integrity, and erosion of critical thinking are prevalent (Cotton, Cotton & Shipway, 2023).

Loss of Pedagogical Control: Fear of being overshadowed by opaque systems and excessive reliance on technology.

Need for Training & Support: A lack of structured professional development undermines confidence in AI application.

**Research Objectives**

To examine secondary school teachers' perceptions of the opportunities presented by Artificial Intelligence (AI) integration in classroom instruction

To identify the perceived challenges faced by secondary school teachers regarding the integration of AI in the teaching-learning process.

To explore differences in teachers' attitudes, opportunities, and challenges toward AI integration based on gender and locality.

**Research Questions**

What are secondary school teachers' perceptions of the opportunities offered by AI integration in instructional enhancement and professional development?

What technical, ethical, and pedagogical challenges do teachers perceive in the integration of AI in secondary-level education?

Does teachers' attitude toward AI integration vary significantly by gender and locality among secondary level students?

**Methodology**

Examining secondary school teachers' perceptions of the opportunities and challenges of integrating artificial intelligence (AI) into the classroom, this study used a quantitative survey design. The four sections of the structured questionnaire—demographic information, perceived opportunities (professional support, instructional enhancement), perceived challenges (technical barriers, ethical concerns), and general attitudes, were created based on literature and expert review. A five-point Likert scale was used to gauge

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responses. 280 secondary school teachers from both public and private institutions made up the target population, which was selected through stratified random sampling. After obtaining institutional permissions, data were gathered in both paper and online formats. SPSS was utilized for the analysis of both descriptive and inferential statistics. Throughout the study, ethical principles such as informed consent and confidentiality were rigorously upheld.

**Table 1**
Perceived Opportunities, Challenges and Teachers' Attitudes Toward the Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| AI Aspect | Sub-Category of AI | Teachers | Mean Value | Standard Deviation |
|---|---|---|---|---|
| Perceived Opportunities | Instructional Enhancement | 280 | 3.72 | .674 |
| | Professional Support and Development | 280 | 3.78 | .621 |
| Perceived Challenges | Technical and Infrastructural Barriers | 280 | 3.79 | .605 |
| | Ethical, Emotional, and Pedagogical Concerns | 280 | 3.74 | .567 |
| Overall Attitude Toward AI Integration | | 280 | 3.62 | .642 |

The mean values and standard deviations for teachers' opinions about the opportunities, difficulties, and general attitudes surrounding the use of artificial intelligence (AI) in the teaching-learning process at the secondary level are shown in Table 1. In terms of perceived opportunities, there was moderate agreement regarding AI's potential to assist teaching, with Professional Support and Development receiving the highest mean score (M = 3.78, SD = 0.621) and Instructional Enhancement coming in second (M = 3.72, SD = 0.674). Technical and Infrastructural Barriers received the highest rating (M = 3.79, SD = 0.605) among challenges, followed by Ethical, Emotional, and Pedagogical Concerns (M = 3.74, SD = 0.567). A moderately positive tendency was observed in the general attitude toward AI integration (M = 3.62, SD = 0.642).
According to these findings, teachers are aware of the educational and professional advantages of AI, but they are still wary because of the perceived difficulties, especially the ethical and technical constraints.

**Table 2**
Gender Wise Comparison of Perceived Opportunities Regarding Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| Opportunities | Gender | Teachers | Mean Value | Std. Deviation | t-Value | Sig. Level |
|---|---|---|---|---|---|---|
| Instructional Enhancement | Male | 140 | 3.59 | .595 | -3.28 | .001 |
| | Female | 140 | 3.85 | .724 | | |
| Professional Support and Development | Male | 140 | 3.65 | .541 | -3.60 | .000 |
| | Female | 140 | 3.91 | .668 | | |

A comparison of perceived opportunities for integrating Artificial Intelligence (AI) into the secondary teaching-learning process by gender is shown in Table 2. In both opportunity subcategories, the findings show statistically significant differences between male and female teachers. Compared to male teachers (M = 3.59, SD = 0.595), female teachers

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reported higher mean scores for instructional enhancement (M = 3.85, SD = 0.724), with a significant t-value of -3.28 (p =.001). Similarly, with a highly significant t-value of -3.60 (p =.000), female teachers once more showed stronger agreement (M = 3.91, SD = 0.668) than their male counterparts (M = 3.65, SD = 0.541) for Professional Support and Development.

These results point to potential gender-based differences in attitudes toward the adoption of educational technology, as female teachers appear to see more potential benefits from AI integration in terms of professional development and instructional enhancements.

**Table 3**

Gender Wise Comparison of Perceived Challenges Regarding Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| Challenges | Gender | Teachers | Mean Value | Std. Deviation | t-Value | Sig. Level |
|---|---|---|---|---|---|---|
| Technical and Infrastructural Barriers | Male | 140 | 3.68 | .556 | -3.01 | .003 |
| | Female | 140 | 3.89 | .633 | | |
| Ethical, Emotional and Pedagogical Concerns | Male | 140 | 3.67 | .515 | -2.02 | .045 |
| | Female | 140 | 3.80 | .608 | | |

Table 3 compares the perceived difficulties of integrating artificial intelligence (AI) into secondary education by gender. In both challenge subcategories, the data shows notable gender differences. With a statistically significant t-value of -3.01 (p =.003), female teachers reported a higher mean score (M = 3.89, SD = 0.633) for Technical and Infrastructural Barriers than did male teachers (M = 3.68, SD = 0.556). Similarly, female teachers scored higher (M = 3.80, SD = 0.608) than male teachers (M = 3.67, SD = 0.515) in the category of Ethical, Emotional, and Pedagogical Concerns, with a significant t-value of -2.02 (p =.045).

These findings imply that female educators are more aware of the ethical and technical difficulties associated with integrating AI, suggesting that gender-responsive training and support in AI-related educational policies may be necessary.

**Table 4**

Gender Wise Comparison of Teachers' Attitudes toward Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| Gender | Teachers | Mean Value | Std. Deviation | t- Value | Sig. Level |
|---|---|---|---|---|---|
| Male | 140 | 3.61 | .629 | -.430 | .668 |
| Female | 140 | 3.64 | .657 | | |

A comparison of secondary school teachers' opinions regarding the use of artificial intelligence (AI) in the teaching-learning process by gender is presented in Table 4. Male teachers had an average attitude score of 3.61 (SD = 0.629), while female teachers had a slightly higher mean score of 3.64 (SD = 0.657). However, the t-value of -0.430 and a significance level of p =.668 show that there was no statistically significant difference between the two groups according to the independent samples t-test. This implies that attitudes regarding the use of AI in the classroom are comparatively similar for male and female educators. Gender does not seem to play a significant role in influencing teachers' general attitudes, despite a few slight variations in mean scores.

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These results suggest that gender-based differentiation in terms of attitudinal readiness can be avoided in the design of future AI-related training and policy implementation.

**Table 5**

Locality Wise Comparison of Perceived Opportunities Regarding Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| Opportunities | Gender | Teachers | Mean Value | Std. Deviation | t-Value | Sig. Level |
|---|---|---|---|---|---|---|
| Instructional Enhancement | Rural | 139 | 3.29 | .584 | -13.90 | .000 |
| | Urban | 141 | 4.15 | .446 | | |
| Professional Support and Development | Rural | 139 | 3.39 | .556 | -13.11 | .000 |
| | Urban | 141 | 4.16 | .413 | | |

A locality-by-locality comparison of perceived opportunities for integrating artificial intelligence (AI) into secondary education is shown in Table 5. The results show notable distinctions between teachers in rural and urban areas. The mean score for Instructional Enhancement was 3.29 (SD = 0.584) for rural teachers and 4.15 (SD = 0.446) for urban teachers. The difference was statistically significant, with a t-value of -13.90 and p <.001. Similarly, there was a significant difference (t = -13.11, p <.001) between rural and urban teachers' mean scores for Professional Support and Development, with rural teachers scoring 3.39 (SD = 0.556) and urban teachers scoring 4.16 (SD = 0.413).

These findings imply that urban educators see more opportunities for integrating AI, most likely as a result of improved exposure, accessibility, and infrastructure. The results emphasize the necessity of focused interventions to close the educational gap in AI between urban and rural areas.

**Table 6**

Locality Wise Comparison of Perceived Challenges Regarding Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| Challenges | Gender | Teachers | Mean Value | Std. Deviation | t-Value | Sig. Level |
|---|---|---|---|---|---|---|
| Technical and Infrastructural Barriers | Rural | 139 | 4.17 | .450 | -13.56 | .000 |
| | Urban | 141 | 3.41 | .489 | | |
| Ethical, Emotional and Pedagogical Concerns | Rural | 139 | 4.09 | .402 | -13.40 | .000 |
| | Urban | 141 | 3.38 | .479 | | |

A comparison of perceived difficulties in integrating artificial intelligence (AI) into secondary education is shown by locality in Table 6. The findings show that teachers in rural and urban areas differ statistically significantly. With a t-value of -13.56 and p <.001, rural teachers reported a higher mean score of 4.17 (SD = 0.450) for Technical and Infrastructural Barriers than urban teachers, who reported a mean of 3.41 (SD = 0.489). Similarly, with a t-value of -13.40 and p <.001, rural teachers reported a lower mean of 3.38 (SD = 0.479) in terms of Ethical, Emotional, and Pedagogical Concerns than urban teachers, who scored an average of 4.09 (SD = 0.402).

These notable variations imply that teachers in rural areas encounter greater difficulties integrating AI, most likely as a result of a lack of exposure, a lack of resources, and a lack of professional development. The findings highlight the necessity of providing focused

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assistance in rural regions.

**Table 7**
Locality Wise Comparison of Teachers' Attitudes toward Integration of Artificial Intelligence in Teaching Learning Process at Secondary Level

| Gender | Teachers | Mean Value | Std. Deviation | t- Value | Sig. Level |
|---|---|---|---|---|---|
| Rural | 139 | 3.2239 | .52247 | -13.09 | .000 |
| Urban | 141 | 4.0160 | .48913 | | |

The attitudes of secondary school teachers regarding the incorporation of artificial intelligence (AI) into the teaching-learning process are compared by locality in Table 7. The results indicate a statistically significant difference in the attitudes of teachers in rural and urban areas. Urban teachers reported a higher mean attitude score of 4.02 (SD = 0.49), whereas rural teachers reported a lower mean of 3.22 (SD = 0.52). This difference is highly significant, as indicated by the t-value of -13.09 at a significance level of $p < .001$. This implies that, in contrast to their rural counterparts, urban educators have a more positive outlook on the integration of AI. The discrepancy might result from more opportunities for professional growth in urban environments, improved infrastructure, and increased exposure to technology.

On the other hand, because they have less access to AI resources and training, teachers in rural areas might be reluctant. These findings demonstrate the necessity of implementing focused interventions in rural areas to close the digital and attitude gaps.

**Main Findings**

**Perceived Opportunities**

Teachers were somewhat in agreement that AI presents a lot of opportunities, particularly for instructional improvement (M = 3.72) and professional support and development (M = 3.78).

In both subcategories, female teachers felt they had a lot more opportunities than male teachers ($p < .01$).

Teachers in urban areas reported significantly greater views of AI-related opportunities than those in rural areas, with statistically significant differences in professional support and instructional enhancement ($p < .001$).

**Perceived Challenges**

The biggest obstacles found were pedagogical, emotional, and ethical issues (M = 3.74) as well as technical and infrastructure hurdles (M = 3.79).

In both areas, female teachers reported substantially more difficulties than male teachers ($p < .05$).

Compared to urban teachers, rural teachers reported substantially more difficulties, particularly in the areas of ethics and technology ($p < .001$).

**Attitude toward AI Integration**

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Overall, teachers' attitudes toward AI were moderately positive (M = 3.62).
Overall attitude was not significantly impacted by gender (p =.668), suggesting that male and female perceptions were generally equal.
With strong statistical significance (p <.001), urban teachers showed a significantly more positive attitude (M = 4.02) than rural teachers (M = 3.22).

**Conclusions**

Although infrastructure, ethical risks, and pedagogical changes continue to be concerns, educators acknowledge the value of AI in assisting instruction and professional development.
Teachers who are female and live in cities tend to be more upbeat about the integration of AI, both in terms of perceived readiness and opportunities.
Teachers in rural areas have a lower general attitude toward the use of AI in the classroom because they are disproportionately impacted by ethical concerns and infrastructure constraints.
Despite obstacles, the majority of teachers' positive attitudes indicate that they are prepared to integrate AI, so long as the required support systems are in place.

**Recommendations**

**Use Targeted Infrastructure Investment:**

Funding for AI-related technology infrastructure in underserved and rural schools should be given priority in order to guarantee equitable AI integration. This entails offering modern gadgets, dependable high-speed internet access, and the required AI-compatible software.

**Create Teacher Training:**

Create thorough training materials with an AI focus that are adapted to different levels of digital literacy. Targeting underdeveloped and rural areas where teachers may not have as much access to cutting-edge technology, the program can help teachers become more competent, self-assured, and independent in their use of AI tools for classroom management, instruction, and assessment.

**Encourage female educators:**

During AI adoption initiatives, actively include female educators in trainer and leadership roles. They can motivate colleagues and promote inclusive implementation strategies because of their generally more upbeat and flexible attitude toward educational innovation.

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