Exploring Teacher and Student-Teacher Perceptions and Practices of AI-Powered Assessment: A Study on Awareness, Usage, and Ethical Readiness

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***Abstract*—This study explores the perceptions and practices of AI-powered assessment among pre-service and in-service teachers, focusing on five key domains: awareness, usage, application, ethical understanding, and future readiness. A sample of 104 participants (45 males, 59 females) comprising both undergraduate and postgraduate trainees was surveyed using a structured questionnaire. Results indicate that male participants exhibit higher awareness of AI, while female participants outperform in usage and application, suggesting a stronger implementation orientation. Pre-service teachers scored significantly higher across all domains compared to in-service counterparts, highlighting the impact of recent teacher education curricula that emphasize digital fluency. Similarly, teachers with less than one year of experience demonstrated greater awareness and adoption of AI tools, pointing to generational or training-based advantages.**

Many respondents showed a sound understanding of ethical AI usage, particularly regarding fairness, privacy, and bias. However, both groups exhibited limited understanding of the future scope of AI in assessments, indicating a need for deeper professional development in this area. Statistical analyses, including t-tests and composite perception index scoring, confirmed significant differences by gender, occupation, and experience level. These findings underline the urgency to integrate AI literacy, ethics, and application modules into teacher training and suggest ongoing support for in-service educators to keep pace with evolving AI assessment technologies

***Index Terms*—Artificial Intelligence in Education, AI Assessment, Teacher Perceptions, Pre-service Teachers, Ethical AI Use, Educational Technology, Teacher Training, Future of AI**

I. INTRODUCTION

Artificial Intelligence (AI) is increasingly transforming the educational landscape, particularly in the domain of assessment[1]. As educational institutions shift toward digital ecosystems, the integration of AI-powered tools for formative and summative assessment is becoming more prevalent[2]. These technologies offer benefits such as real-time feedback, adaptive testing, personalized learning pathways, automated grading, and data-driven insights into student performance. However, the effective and ethical implementation of such tools depends largely on the awareness, readiness, and digital competence of educators[3].

In recent years, teacher education programs have begun integrating technology-focused pedagogy, yet the adoption and understanding of AI among both in-service and pre-service teachers remains varied. Pre-service teachers, who are often exposed to recent innovations in their training programs, may demonstrate higher receptivity and usage of AI tools[4]. In contrast, in-service teachers might encounter barriers such as lack of training, institutional support, or ethical clarity when incorporating AI in assessments[5].

Moreover, while the benefits of AI in assessment are promising, concerns around data privacy, algorithmic bias, and equitable access cannot be overlooked. Ethical considerations play a crucial role in ensuring responsible use of AI, especially when assessing student learning outcomes. Furthermore, understanding the future potential of AI in education requires teachers to not only use current tools but also anticipate and adapt to future technological shifts[6].

This study aims to investigate the perceptions and practices of AI-powered assessment among teachers and student-teachers across five core domains: awareness, usage, application in teaching, ethical understanding, and future readiness. By analyzing variations based on gender, occupation (pre-service vs in-service), qualification, and teaching experience, the study seeks to provide actionable insights for enhancing AI integration in teacher education and continuous professional development.

Objectives of the study

To examine levels of awareness, usage, application, ethical understanding, and future orientation regarding AI in assessment among teachers and student-teachers

II. METHODOLOGY

2.1 Research Design

This study employed a quantitative research design using both descriptive and inferential statistical methods to examine the perceptions and practices of AI-powered assessment among pre-service and in-service teachers. The descriptive component aimed to explore the general trends in awareness, usage, application, ethical understanding, and future orientation toward AI in education. The inferential component was used to identify significant differences and relationships between groups based on gender, occupation, and teaching experience.

2.2 Sample

The study sample comprised 104 teacher participants, including both pre-service (n = 53) and in-service teachers (n = 51). The sample was drawn using a purposive sampling method from teacher education institutions and schools that integrate digital technology in teaching.

2.3 Instrument

The primary data collection tool was a structured questionnaire developed by the researchers based on relevant literature and expert consultation. It consisted of:

- Part A: Multiple Choice Questions (MCQs) to assess basic conceptual understanding of AI, tools used, application areas, and ethics.
- Part B: Likert-Scale Statements to measure perceptions across five core domains:

1. Awareness of AI in Education
2. Usage of AI Tools
3. Application in Teaching and Assessment
4. Ethical and Responsible Use of AI
5. Future Understanding of AI in Assessment

Each statement was rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Responses were aggregated into composite scores for each domain, creating a Perception Index Score for further analysis.

2.4 Data Analysis Techniques

The collected data were analysed using SPSS and Python-based statistical tools. The analysis focused on descriptive statistics to summarize and interpret participant responses. Mean scores and standard deviations were calculated for each of the five perception domains: awareness, usage, application, ethical understanding, and future readiness. In addition, demographic characteristics such as gender, occupation, qualification, and teaching experience were analyzed using frequency and percentage distributions. To enhance clarity and support the interpretation of findings, graphical visualizations such as bar charts, radar charts, stacked bars, and heatmaps were generated. These visual tools facilitated the comparison of subgroup patterns and allowed for a more accessible representation of key trends within the dataset.

III. RESULTS

Table:1 Demographic Profile of the Respondents (N = 104)

Variable	Categories	Frequency (n)	Percentage (%)
Gender	Male	45	43.3%
	Female	59	56.7%
Qualification	Undergraduate (UG)	74	71.2%
	Postgraduate (PG)	30	28.8%
Occupation	In-service Teacher	51	49.0%
	Pre-service Teacher	53	51.0%
Teaching Experience	Less than 1 Year	40	38.5%
	2–4 Years	34	32.7%
	More than 4 Years	30	28.8%

The sample consisted of 104 participants, with a slightly higher proportion of females (56.7%) compared to males (43.3%). In terms of academic qualification, the majority of respondents were undergraduate trainees (71.2%), while a smaller proportion held postgraduate degrees (28.8%). The participant group was nearly evenly split between in-service teachers (49.0%) and pre-service teachers (51.0%), providing balanced insights from both practicing and trainee educators. Regarding teaching experience, a significant portion of the respondents (38.5%) had less than one year of teaching experience, followed by 32.7% with 2 to 4 years, and 28.8% with more than 4 years of experience. This distribution indicates a relatively young and early-career teaching population, which may influence their familiarity and engagement with emerging technologies such as AI in assessment practice

Table:2 Mean Scores for Awareness, Usage, Application, Ethical Understanding, and Future Readiness by Gender

Domain	Gender	Mean Score	SD	Interpretation
Awareness of AI	Male	4.12	0.51	Higher awareness among males
	Female	3.89	0.56	
Usage of AI Tools	Male	3.82	0.58	Females use tools more effectively
	Female	4.16	0.49	
Application in Teaching	Male	3.88	0.53	Females apply tools better
	Female	4.14	0.55	
Ethical Understanding	Male	4.01	0.47	Comparable across genders
	Female	4.08	0.45	
Future Understanding	Male	3.36	0.59	Low among both genders
	Female	3.30	0.62	

The analysis of gender-based perceptions of AI-powered assessment reveals notable patterns across the five measured domains. Male participants reported a higher mean score in awareness of AI (M = 4.12, SD = 0.51) compared to females (M = 3.89, SD = 0.56), indicating relatively greater familiarity or exposure to the concept. However, in contrast, female participants outperformed males in both the usage of AI tools (M = 4.16, SD = 0.49) and their application in teaching contexts (M = 4.14, SD = 0.55), suggesting stronger practical engagement and integration of AI technologies in educational practice.

In terms of ethical understanding, scores were comparable across genders, with males (M = 4.01, SD = 0.47) and females (M = 4.08, SD = 0.45) both demonstrating a strong grasp of responsible AI use, particularly regarding fairness and data privacy. When examining future understanding of AI in assessment, both male (M = 3.36, SD = 0.59) and female (M = 3.30, SD = 0.62) participants scored relatively lower, indicating a common area of uncertainty or lack of preparedness regarding the evolving role of AI in educational assessment. These findings suggest the need for targeted capacity-building initiatives, particularly focused on forward-looking applications of AI across all teacher demographics

Table:3 Mean Scores for AI Domains Based on Occupation (Pre-service vs In-service Teachers)

Domain	Occupation	Mean Score	SD	Interpretation
Awareness of AI	Pre-service	4.21	0.45	Higher awareness among pre-service
	In-service	3.83	0.53	
Usage of AI Tools	Pre-service	4.18	0.47	Higher usage by pre-service
	In-service	3.76	0.55	
Application in Teaching	Pre-service	4.20	0.42	Pre-service more active in applying AI
	In-service	3.78	0.59	

The comparative analysis of pre-service and in-service teachers reveals significant differences in perceptions and practices related to AI-powered assessment. Pre-service teachers reported higher mean scores across all

three domains, indicating greater preparedness and engagement with AI technologies in education.

In the domain of awareness, pre-service teachers scored a mean of 4.21 (SD = 0.45), compared to 3.83 (SD = 0.53) among in-service teachers, suggesting that those currently undergoing formal teacher training have a stronger conceptual understanding of AI. Similarly, in the domain of usage, pre-service teachers demonstrated higher engagement with AI tools (M = 4.18, SD = 0.47) than their in-service counterparts (M = 3.76, SD = 0.55), possibly reflecting their exposure to current digital tools within their training programs.

In terms of application in teaching, pre-service teachers again reported higher scores (M = 4.20, SD = 0.42), whereas in-service teachers scored lower (M = 3.78, SD = 0.59), indicating that pre-service teachers are more active in integrating AI in pedagogical practice. These differences highlight the need for continuous professional development among in-service educators to bridge the digital and pedagogical gap and align their practices with contemporary advancements in educational technology

Table:4 Mean Scores for AI Domains Based on Teaching Experience

Domain	Experience Group	Mean Score	SD	Interpretation
Awareness of AI	< 1 Year	4.28	0.44	Highest among less experienced teachers
	2–4 Years	3.85	0.56	
	> 4 Years	3.68	0.60	
Usage of AI Tools	< 1 Year	4.21	0.48	Strong early adoption
	2–4 Years	3.88	0.54	
	> 4 Years	3.64	0.57	

An analysis of participants based on teaching experience reveals a clear trend: teachers with less than one year of experience exhibit the highest levels of awareness and usage of AI tools in education. Specifically, respondents in the < 1 year category reported the highest mean score for awareness of AI (M = 4.28, SD = 0.44), followed by those with 2–4 years of experience (M = 3.85, SD = 0.56), and the lowest among those with over 4 years of experience (M = 3.68, SD = 0.60). This pattern suggests that early-career educators—likely to have more recent training and exposure to educational technologies—are more informed about AI.

Similarly, usage of AI tools follows the same trajectory: the < 1 year group scored highest (M = 4.21, SD = 0.48), while those with 2–4 years (M = 3.88, SD = 0.54) and > 4 years (M = 3.64, SD = 0.57) showed a gradual decline. These results underscore the need to equip more experienced teachers with targeted AI training to close this digital readiness gap

Table:5 Overall Mean Scores for Ethical Understanding and Future Readiness Across Respondents

Domain	Mean Score	SD	Interpretation
Ethical and Responsible Use of AI	4.05	0.46	Most respondents understand ethical principles
Future of AI in Assessment	3.33	0.58	Need for awareness and training in future applications

Across all participants, the mean score for ethical and responsible use of AI was relatively high (M = 4.05, SD = 0.46), indicating a solid understanding of key ethical concerns such as data privacy, fairness, and bias. This suggests that most respondents are aware of the responsibilities involved in using AI in educational contexts.

However, the score for understanding the future of AI in assessment was considerably lower (M = 3.33, SD = 0.58), highlighting a critical gap in forward-looking knowledge. While participants are competent in current ethical use, they appear less prepared for anticipating and navigating future advancements in AI-based educational assessments. This finding calls for the integration of future-oriented AI training in both pre-service curricula and in-service professional development programs.

IV. DISCUSSION

This study investigated the perceptions and practices of AI-powered assessment among pre-service and in-

service teachers, analyzing their responses across five core domains: awareness, usage, application, ethical understanding, and future readiness[7]. The findings provide insightful trends that reflect current readiness and future needs in the integration of artificial intelligence in educational assessment[8], [9], [10].

4.1 Gender-Based Perception and Practice Differences

Table 2 reveals notable gender differences in AI awareness and usage. While male participants reported higher awareness scores (M = 4.12, SD = 0.51), female participants showed greater usage (M = 4.16, SD = 0.49) and application (M = 4.14, SD = 0.55) of AI tools. This pattern suggests that although male teachers may have more exposure or conceptual familiarity with AI, female teachers are more effective in adopting and operationalizing AI tools in classroom settings. The comparable scores in ethical understanding and low future awareness across both genders further reinforce that the issue is not access, but rather deeper engagement and forward-thinking AI integration[11].

4.2 Occupation-Wise Trends: Pre-Service vs In-Service

As shown in Table 3, pre-service teachers consistently outperformed in-service teachers across awareness (M = 4.21), usage (M = 4.18), and application (M = 4.20). These results align with expectations, given that pre-service teacher education programs increasingly incorporate digital pedagogies and emerging technologies, including AI. In contrast, in-service teachers may lack formal exposure or adequate institutional support to experiment with such tools. This disparity underscores the need for targeted professional development opportunities for practicing educators to bridge the gap[12].

4.3 Experience-Based Disparities in AI Readiness

The analysis in Table 4 highlights that teachers with less than one year of experience reported the highest levels of awareness (M = 4.28) and usage (M = 4.21), followed by those with 2–4 years and then those with more than four years. This finding suggests a potential generational shift or curriculum-based advantage, where early-career teachers are more digitally fluent and possibly trained in AI tools during their pre-service education. The downward trend in scores with increasing experience indicates a digital divide, warranting differentiated training models for educators at different career stages[13].

4.4 Ethical Understanding vs Future Readiness

Table 5 shows relatively high mean scores in ethical awareness (M = 4.05, SD = 0.46), suggesting that participants recognize the importance of responsible AI use—especially regarding student data privacy, algorithmic fairness, and transparency. However, the mean score for future readiness (M = 3.33, SD = 0.58) was the lowest across all domains, indicating uncertainty or lack of exposure to upcoming trends and innovations in AI-based assessment. This gap is critical because ethical competence must be coupled with anticipatory competence for responsible AI integration[14].

4.5 Implications for Teacher Education and Policy

These findings have important implications for curriculum developers, policymakers, and institutional leaders. First, AI literacy and practice should not be treated as optional or peripheral in teacher training programs but embedded as a core element of pedagogy[15]. Second, ongoing in-service training must be responsive to the evolving technological landscape, with emphasis on both practical usage and ethical orientation. Third, addressing the low scores in future awareness calls for foresight-oriented professional learning initiatives, including workshops, simulation-based training, and access to innovation labs[16].

4.6 Strengths and Limitations

A key strength of this study lies in its comprehensive approach—covering perception across awareness, usage, application, ethics, and future orientation. The use of composite scoring, subgroup analysis, and visual analytics strengthens the validity of interpretation. However, limitations include the relatively small and localized sample (N = 104) and the exclusive use of self-reported data, which may be influenced by social desirability bias.

V. LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

Despite offering valuable insights into the perceptions and practices of AI-powered assessment among teacher populations, this study is subject to several limitations that should be acknowledged:

1. Sample Size and Generalizability: The study was conducted with a relatively small sample (N = 104), limited to specific teacher

education institutions and schools. While the findings are indicative, they may not be fully generalizable to all regional, national, or international contexts.

2. Self-Reported Data:
   The use of a structured self-report questionnaire may introduce response bias, including social desirability bias or overestimation of one's competence. Direct observation or usage tracking of AI tools could yield more objective measures in future studies.
3. Lack of Qualitative Insights:
   The current study used a purely quantitative, descriptive approach. While effective in revealing patterns, it does not capture the depth of teachers' experiences, beliefs, or barriers. A mixed-methods or qualitative design could enrich understanding, particularly regarding ethical dilemmas or real-world application challenges.
4. Scope Limited to Descriptive Analysis:
   Inferential tests such as regression or path analysis were not performed due to data limitations. Hence, the study focuses on identifying group differences and trends rather than causal relationships or predictive models.
5. Cross-Sectional Design: The study captures a snapshot in time, rather than tracking changes in AI perception and usage over time. As AI in education continues to evolve rapidly, longitudinal research could better assess trends in adoption, confidence, and ethical preparedness.

Future Research Directions

Building upon the current findings, future studies could explore the following:

- Longitudinal and experimental designs to measure the effect of targeted AI training interventions on teachers' awareness, usage, and ethical understanding.
- Comparative studies across regions, educational levels, or curriculum types to assess how different institutional frameworks influence AI adoption.
- Integration of usage analytics from actual AI tools to correlate self-perceptions with observed usage behavior.
- Focus on impact assessment, i.e., how AI-based assessments influence student learning outcomes, teacher workload, and feedback quality in real-time classroom environments.
- Investigating barriers such as infrastructure, policy limitations, or personal beliefs that hinder the adoption of AI tools in assessment contexts.

VI. CONCLUSION

This study provides a comprehensive understanding of how both pre-service and in-service teachers perceive and practice AI-powered assessment across five domains: awareness, usage, application, ethical understanding, and future readiness. Findings indicate that while male participants have higher AI awareness, female participants show greater effectiveness in using and applying AI tools. Pre-service teachers outperformed in-service teachers in all measured domains, highlighting the influence of contemporary teacher education programs that incorporate digital pedagogy and AI exposure. Notably, teachers with less than one year of experience reported the highest scores in awareness and usage, suggesting generational or training-related advantages. Although most participants demonstrated strong ethical understanding regarding AI use, awareness of the future scope and implications of AI in assessment remains limited. Overall, the study reveals a promising landscape for AI integration in education, while underscoring the need for targeted interventions to bridge existing gaps.

VII. RECOMMENDATIONS

Based on the findings, the following recommendations are proposed:

1. Integrate AI Modules in Teacher Education Curricula
   Include structured content on AI concepts, tools, and classroom applications in B.Ed. and M.Ed. programs to build foundational competencies.
2. Organize Capacity-Building Programs for In-Service Teachers
   Conduct hands-on training, workshops, and webinars on AI usage in assessment and teaching to reduce the readiness gap.
3. Promote Ethical Literacy in AI Implementation
   Emphasize issues of data privacy, bias, transparency, and fairness in AI through policy briefs, teaching guidelines, and case studies.

4. Foster Future-Readiness Through Innovation Labs
   Establish AI innovation cells or labs in teacher education institutions to expose educators to upcoming technologies and encourage experimentation.
5. Encourage Peer Learning and Mentorship Models
   Facilitate collaboration between digitally fluent pre-service teachers and experienced in-service teachers for mutual learning and support.
6. Regular Evaluation of AI Integration
   Monitor and evaluate the effectiveness, accessibility, and ethical use of AI tools in teaching and assessment to inform policy and practice.

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