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Teachers' perspectives on pedagogical challenges of AI integration in English language teaching

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ABSTRACT

Artificial intelligence (AI) tools are rapidly being integrated into English language teaching (ELT). However, limited empirical evidence exists regarding the pedagogical challenges teachers encounter during classroom implementation. This study investigates whether demographic variables influence ELT teachers' perceptions of AI effectiveness and related pedagogical challenges. A quantitative survey design was employed, involving 200 ELT teachers with prior AI exposure. Data were collected using a validated Likert-scale instrument (α=0.81) and analyzed using independent samples t-tests, one-way ANOVA with Tukey post hoc analysis, and Chi-square (χ^2) tests. Results revealed significant gender differences in perceived effectiveness (t=2.504, p=0.044) and pedagogical challenges (t=2.627, p=0.018), with female teachers reporting higher mean scores. Locality differences were significant only for perceived effectiveness (F=4.610, $p<0.05$), particularly between urban and rural teachers. No significant associations were found for age (χ^2=12.830, $p>0.05$) or teaching experience (χ^2=4.266, $p>0.05$). Educational level taught was significantly associated with perceived effectiveness (χ^2=13.816, $p<0.05$). The findings suggest that AI integration challenges are largely systemic, even though perceptions of effectiveness vary across contexts.

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1. INTRODUCTION

Artificial intelligence (AI) is increasingly being used in education. Many schools and universities are adopting AI-based tools to improve teaching and learning. In English language teaching (ELT), tools such as Grammarly, Duolingo, and ChatGPT are becoming common [1]. These tools support grammar correction, vocabulary development, writing improvement, and pronunciation practice [2]. They also provide instant feedback and adaptive learning opportunities. AI tools can support teachers in many ways. They help manage large classes and assist students with different learning needs [3]. Automated writing tools improve language accuracy. Speech-recognition applications support pronunciation practice. These features suggest that AI can enhance traditional teaching methods. However, integrating AI into ELT is not always easy. Many teachers lack proper training. Some face technical problems or limited institutional support. Others are unsure how to align AI tools with curriculum goals. Ethical concerns are also present [4]. Teachers worry about data privacy and over-dependence on AI.

In some cases, AI tools are technologically advanced but not fully suitable for classroom realities. Research on AI in education is growing rapidly [5]. However, most studies focus on technological features or student outcomes. Fewer studies examine teachers' real classroom experiences. Even fewer explore the pedagogical challenges teachers face during implementation. In addition, teachers are often treated as a single group. Differences based on gender, locality, age, teaching experience, or educational level are rarely examined in depth [6]. This creates a clear research gap. Without understanding these demographic differences, policy recommendations may become too general. Teacher training programs may also fail to address specific classroom contexts [7]. There is a need for empirical evidence that examines how teacher characteristics influence both perceived effectiveness of AI tools and related pedagogical challenges [8], [9]. Therefore, this study investigates how demographic variables affect ELT teachers' perceptions of AI effectiveness and the challenges they encounter. Statistical analysis is used to compare different teacher groups. The aim is to provide context-sensitive evidence for improving AI integration in ELT. As AI continues to expand in education, understanding teacher-level challenges is essential for responsible and effective implementation.

2. REVIEW OF RELATED LITERATURE

AI is increasingly used in education. It supports teaching, learning, and assessment. AI tools such as intelligent tutoring systems, automated grading, and adaptive learning platforms are now common in schools and colleges [8], [9]. These tools use machine learning and natural language processing to provide personalized learning and quick feedback to students [10]. Adaptive systems adjust lesson content and pace based on learner performance, which helps teachers support students with different learning needs [11]. However, the use of AI in education also raises concerns. Many teachers lack proper training to use AI tools. Ethical issues such as data privacy and over-dependence on technology are also reported. Successful use of AI depends on how well it matches teaching goals and how ready teachers are to use it in classrooms [12]. These issues highlight the need for more research on responsible and effective AI use in education.

Adapting AI tools for ELT requires careful planning and teacher involvement. AI tools such as grammar checkers, language apps, and chatbots can support reading, writing, speaking, and listening skills. However, these tools must be used in line with lesson objectives and learner needs. Teachers play a key role in selecting suitable AI tools and deciding how and when to use them in the classroom. Proper training helps teachers understand the strengths and limits of AI tools [13]. Without guidance, AI may be used only for basic tasks and not for meaningful learning. Effective adaptation also depends on access to digital resources and institutional support [14]. When AI tools are thoughtfully integrated, they can enhance learner engagement, support personalized learning, and improve overall language instruction [15].

In ELT, AI tools help improve language skills and student engagement. Language learning apps such as Duolingo and Babbel use games and adaptive systems to make learning interactive and personalized [16]. Writing tools like Grammarly and Turnitin provide instant feedback on grammar and writing, helping students improve their language accuracy [17]. Speech recognition tools such as Google Speech-to-Text and ELSA Speak support speaking and listening skills. These tools allow learners to practice pronunciation and receive immediate feedback [18], [19]. However, the success of these tools depends on how well teachers integrate them into lessons and align them with curriculum goals.

Despite their benefits, AI tools create several challenges for teachers. Many teachers report a lack of training and confidence in using AI effectively [20]. In some cases, AI tools do not match students' learning needs or classroom realities, reducing their usefulness. Ethical concerns such as data privacy, bias in AI systems, and fear of replacing teachers also affect AI adoption [21]. Technical problems like poor internet access and high costs further limit AI use, especially in less-resourced schools. Teacher readiness plays a key role in AI integration. Teachers need new skills to plan lessons, assess learning, and manage AI-supported classrooms. For teachers with limited experience in educational technology, these changes can be difficult. This shows the need for regular training and institutional support.

In summary, AI has strong potential to improve ELT through personalized learning and quick feedback. However, effective use depends on teacher readiness, ethical awareness, and proper support. Most previous studies focus on AI tools or student outcomes [21]. Very few studies explore teachers' challenges and experiences in using AI in ELT classrooms. This study addresses this gap by examining the pedagogical challenges faced by English language teachers while using AI tools. It also analyses how factors such as gender, locality, age, teaching experience, and level of education taught influence teachers' perceptions and practices [16], [22]–[24].

Based on the identified research gap and the need to understand how demographic factors influence AI integration in ELT, this study formulates the following research questions. These questions aim to

examine whether teacher characteristics are related to their perceptions of AI tools and the pedagogical challenges they experience. The study addresses the following research questions:

- Does gender influence teachers' perceptions of AI tools in ELT?
- Does locality (urban or rural) affect the pedagogical challenges teachers face while using AI?
- Is there an association between teachers' age and their pedagogical challenges in AI use?
- Is teaching experience related to challenges in using AI tools?
- Does the level of education taught influence teachers' challenges in using AI tools?

By answering these questions, the study seeks to support effective, inclusive, and practical integration of AI in ELT.

3. METHOD

3.1. Research design

This study adopted a quantitative survey research design to examine the pedagogical challenges faced by ELT teachers in integrating AI tools. A structured questionnaire was employed to collect standardized data regarding teachers' perceptions of AI effectiveness, ease of use, and pedagogical challenges. The quantitative approach enabled statistical comparison across demographic variables including gender, locality, age, teaching experience, and level of education taught. The design was appropriate for identifying patterns, group differences, and associations among variables using inferential statistical techniques.

3.2. Participants and sampling

The study included 200 English language teachers working at primary, secondary, tertiary institutions, and private language centers. Participants were drawn from urban, semi-urban, and rural areas to ensure contextual diversity. Of the 200 participants, 95 (47.5%) were male and 105 (52.5%) were female. Regarding locality, 100 teachers (50.0%) were from urban areas, 57 (28.5%) from semi-urban areas, and 43 (21.5%) from rural areas. In terms of age, the largest group was teachers aged 25-34 (n=68, 34.0%), followed by 35-44 (n=54, 27.0%), under 25 (n=39, 19.5%), 45-54 (n=28, 14.0%), and 55 and above (n=11, 5.5%). Teaching experience was distributed as: less than 5 years (n=71, 35.5%), 5-10 years (n=74, 37.0%), and more than 10 years (n=55, 27.5%). Finally, the primary level of teaching was reported as primary (n=42, 21.0%), secondary (n=78, 39.0%), tertiary (n=57, 28.5%), and private language institute (n=23, 11.5%).

3.2.1. Sample size

The sample size of 200 was considered adequate for inferential statistical analysis. According to methodological recommendations for multivariate analysis, a minimum of 5–10 respondents per questionnaire item is recommended to ensure statistical stability [25], [26]. With 20 perception items in the instrument, a minimum of 100–200 participants were appropriate. Furthermore, for detecting medium effect sizes in independent samples t-tests and one-way ANOVA, a sample exceeding 150 participants is generally considered sufficient to achieve acceptable statistical power (0.80) at $\alpha=0.05$ [26], [27]. Therefore, the sample size was deemed statistically appropriate for the analytical procedures employed in this study.

3.2.2. Sampling technique

Purposive sampling was employed to ensure that participants had prior exposure to or experience with AI tools in ELT. Since the study specifically examined AI-related pedagogical challenges, it was necessary to include only teachers who had engaged with AI tools in instructional settings [28]. Random sampling could have included teachers without AI experience, which would not align with the research objectives. Participants were included in the study if they were currently teaching English language courses and had prior experience using AI tools such as ChatGPT, Grammarly, or other AI-based language platforms in their teaching practice. Only those who were willing to participate voluntarily were considered. Participants were excluded if they were not teaching English language subjects, had no prior exposure to AI tools in instructional settings, or submitted incomplete questionnaire responses. These inclusion and exclusion criteria ensured that the data collected were relevant, accurate, and aligned with the objectives of the study. After confirming normality assumptions through appropriate statistical tests, parametric analyses were conducted to examine group differences.

3.3. Instrumentation

The data collection instrument was a researcher-designed scale titled "pedagogical challenges in using AI tools for English language teaching." The instrument was developed based on a review of relevant literature and consisted of two main sections. The first section collected demographic information, including

gender, age group, teaching experience, educational level taught, and locality. The second section contained 20 items measuring teachers' perceptions across three dimensions, all rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree):

- Perceived effectiveness of AI tools (6 items): this subscale assessed teachers' beliefs about the pedagogical benefits of AI. Example items include: "AI tools provide personalized learning experiences for students", "AI tools are effective in improving students' vocabulary and grammar skills", and "AI tools enhance student engagement and motivation in the classroom."
- Ease of use (5 items): this subscale measured the perceived usability and practicality of AI tools. Example items include: "the user interface of AI tools is intuitive and easy to navigate", "I find it easy to integrate AI tools into my existing lesson plans", and "AI tools are compatible with the devices and software I use in my classroom."
- Pedagogical challenges (9 items): this subscale identified barriers to AI integration. Example items include: "I lack adequate training to use AI tools effectively in my teaching", "AI tools do not align well with my curriculum goals", and "I am concerned about the ethical implications of using AI tools (e.g., data privacy, algorithmic bias)."

A pilot study was conducted with 105 ELT teachers to assess the instrument's clarity, reliability, and validity. The overall reliability coefficient (Cronbach's alpha) was 0.81, indicating strong internal consistency. Subscale reliability values were also acceptable: perceived effectiveness (α=0.82), ease of use (α=0.78), and pedagogical challenges (α=0.85). Construct validity was confirmed through exploratory factor analysis, which yielded a Kaiser-Meyer-Olkin (KMO) measure of 0.79 and a significant Bartlett's test of sphericity ($p<0.001$), supporting the factorability of the correlation matrix. Content validity was established through expert review, resulting in a content validity index (CVI) of 0.89 and criterion-related validity was confirmed through significant correlation with an established instrument ($r=0.76$, $p<0.01$) [29].

3.4. Data collection and analysis

Data were collected through an online questionnaire distributed via email and professional platforms such as TESOL forums and LinkedIn. Participation was voluntary, and informed consent was obtained from all respondents. Anonymity and confidentiality were maintained. Ethical approval was obtained from the relevant institutional ethics committee prior to data collection. Descriptive statistics (mean, standard deviation, frequency, and percentage) were used to summarize responses. Independent samples t-tests examined gender differences. One-way ANOVA was used to compare locality-based differences, followed by Tukey HSD post hoc analysis where appropriate. Chi-square (χ^2) tests were applied to examine associations between categorical demographic variables (age group, teaching experience, educational level taught) and AI-related dimensions. Statistical significance was set at $p<0.05$.

4. RESULTS

Prior to conducting the main analyses, the data were screened to ensure they met the assumptions of the parametric tests employed. For the independent samples t-tests and one-way ANOVA, the assumptions of normality and homogeneity of variance were assessed. Normality was examined through visual inspection of Q-Q plots and the Shapiro-Wilk test, which indicated that the data for each group were approximately normally distributed.

4.1. Is there a significant difference between male and female teachers in terms of pedagogical challenges in using AI tools for ELT?

To examine gender differences in AI tool use dimensions, the results of the independent samples t-test are presented in Table 1. The table shows a significant difference in the perceived effectiveness of AI tools between male and female teachers. Female teachers (M=36.21, SD=5.63) rated AI tools as more effective than male teachers (M=34.38, SD=4.71), with a t-value of 2.504 and p-value of 0.044. For the ease of use of AI tools, there was no significant difference. Male teachers (M=37.07, SD=5.99) and female teachers (M=36.45, SD=5.47) reported similar experiences, with a t-value of 0.769 and p-value of 0.241. In terms of pedagogical challenges, female teachers (M=38.19, SD=5.56) reported significantly more challenges than male teachers (M=36.08, SD=5.75), as shown by a t-value of 2.627 and p-value of 0.018. For overall pedagogical challenges in AI use, the difference is marginally significant, with females (M=110.85, SD=8.79) scoring higher than males (M=107.54, SD=9.90). The t-value is 2.490, and the p-value is 0.051. Female teachers generally find AI tools more effective but face more pedagogical challenges in using them. Ease of use is not a differentiating factor between genders. These findings indicate the need for targeted support and training, especially for female teachers, to reduce implementation challenges in AI-assisted ELT.

Table 1. Gender-wise comparison of pedagogical challenges in using AI tools for ELT

Dimension	Gender	n	M	SD	t	p	Remark
Perceived effectiveness of AI tools	Male	95	34.38	4.71	2.504	0.044	Significant
	Female	105	36.21	5.63			
Ease of use	Male	95	37.07	5.99	0.769	0.241	Not significant
	Female	105	36.45	5.47			
Pedagogical challenges	Male	95	36.08	5.75	2.627	0.018	Significant
	Female	105	38.19	5.56			
Overall pedagogical challenges in AI use	Male	95	107.54	9.90	2.490	0.051	Not significant
	Female	105	110.85	8.79			

Figure 1 shows gender-wise differences in AI tool use across four dimensions. Female teachers reported significantly higher scores in perceived effectiveness and pedagogical challenges compared to male teachers ($p<0.05$). This indicates that female teachers view AI tools as more effective but also experience more instructional challenges. There was no significant difference in ease of use, suggesting similar usability perceptions across genders. For overall challenges, female teachers scored slightly higher, with a marginal level of significance. Overall, gender appears to influence perceptions of effectiveness and pedagogical challenges but not ease of use.

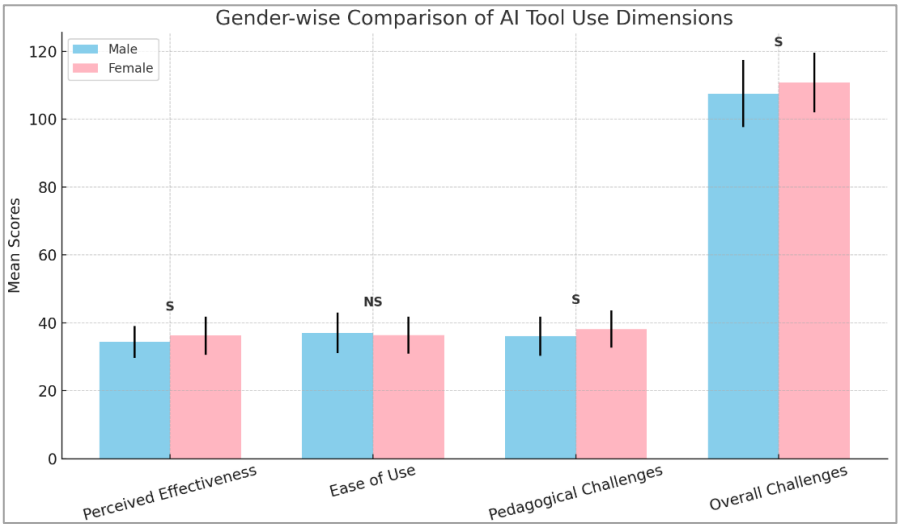

Figure 1. Gender-wise comparison of AI tool use dimensions in ELT

4.2. Is there a significant difference in pedagogical challenges faced by urban, semi-urban, and rural teachers in using AI tools for ELT?

Table 2 reveals a significant difference in the perceived effectiveness of AI tools among urban, semi-urban, and rural teachers ($F=4.610$, $p<0.05$). This suggests that teachers' views on how effective AI tools are in ELT vary by location—possibly due to differences in access to technology, training, or experience. For the other dimensions—ease of use ($F=2.151$), pedagogical challenges ($F=2.253$), and overall pedagogical challenges ($F=0.790$)—no significant differences were found ($p>0.05$). This indicates that, despite location, teachers face similar difficulties in using AI tools for teaching. These findings suggest that while perceptions of effectiveness differ, the core challenges in AI integration are shared across regions, pointing to a need for uniform support, training, and resource access for all teachers, regardless of locality.

Table 2. Area-wise comparison of pedagogical challenges in using AI tools for ELT

Dimension	Source of variation	SS	df	MS	F	Remark
Perceived effectiveness of AI tools	Between	247.752	2	123.876	4.610	Significant
	Within	5293.128	197	26.869		
Ease of use	Between	138.933	2	69.467	2.151	Not significant
	Within	6361.062	197	32.290		
Pedagogical challenges	Between	146.450	2	73.225	2.253	Not significant
	Within	6402.330	197	32.499		
Overall pedagogical challenges in AI use	Between	141.509	2	70.754	0.790	Not significant
	Within	11011.315	197	55.895		

Since the ANOVA result for perceived effectiveness was significant, Tukey HSD post hoc comparisons are explained. Tukey HSD post hoc test was conducted following a significant one-way ANOVA result for perceived effectiveness of AI Tools ($F=4.610$, $p<0.05$). Positive mean differences indicate higher perceived effectiveness for the first group listed. The post hoc analysis Table 3 indicates a significant difference between urban and rural teachers in their perceptions of the effectiveness of AI tools in ELT. Urban teachers reported significantly higher perceived effectiveness compared to rural teachers ($p<0.05$). No significant differences were observed between urban and semi-urban teachers or between semi-urban and rural teachers. This suggests that access to infrastructure, exposure to AI tools, and institutional support may influence teachers' perceptions, particularly in rural contexts.

Table 3. Post-hoc analysis of area-wise comparison of pedagogical challenges in using AI tools for ELT

Locality comparison	Mean difference	Std. Error	p-value	Remark
Urban vs semi-urban	0.94	0.61	0.276	Not significant
Urban vs rural	2.31	0.74	0.021	Significant
Semi-urban vs rural	1.37	0.69	0.104	Not significant

4.3. Is there a significant association between the age group of teachers and the pedagogical challenges they encounter in ELT?

The χ^2 analysis in Table 4 reveals no statistically significant association between teachers' age groups and any of the four dimensions related to AI use in ELT, as all calculated χ^2 values fall below the critical threshold of 15.507 ($df=8$, $p>0.05$). Specifically, the findings show consistent perceptions across age groups in terms of the perceived effectiveness of AI tools ($\chi^2=4.746$) and ease of use ($\chi^2=4.348$), suggesting that teachers, regardless of age, have similar views on how effective and user-friendly AI tools are in the classroom. Similarly, the dimensions of pedagogical challenges ($\chi^2=12.797$) and overall pedagogical challenges ($\chi^2=12.830$) also show no significant variation, indicating that issues such as curriculum integration, learner engagement, and institutional support are commonly experienced across age groups. These results suggest that age is not a determining factor in how teachers perceive or experience challenges with AI integration in ELT. The uniformity across all dimensions underscores the need for age-inclusive professional development programs. Rather than age-specific interventions, a universal approach to AI training and institutional support can more effectively equip teachers of all age groups to integrate AI tools into their teaching practice. This finding supports the design of equitable and broad-based capacity-building initiatives to foster successful AI adoption in language education.

Table 4. Chi-square test: association between age group and pedagogical challenges in using AI tools

No.	Dimension	df	χ^2	Remark
1	Perceived effectiveness of AI tools	8	4.746	Not significant
2	Ease of use	8	4.348	Not significant
3	Pedagogical challenges	8	12.797	Not significant
4	Overall pedagogical challenges in AI use	8	12.830	Not significant

4.4. Is there a significant association between teachers' years of teaching experience and the pedagogical challenges they face?

Table 5 presents the χ^2 analysis examining the association between teaching experience and AI-related dimensions. The results indicate that all calculated χ^2 values are below the critical table value (12.592) at $df=6$. This confirms that none of the associations are statistically significant ($p>0.05$), suggesting no meaningful relationship between teachers' teaching experience and their perceptions or challenges related to AI use in ELT. Perceived effectiveness of AI tools ($\chi^2=0.845$, not significant): the perception of AI tools' effectiveness is consistent across teachers with different years of experience. This implies that teaching experience does not significantly impact how effective educators believe AI tools are in supporting language instruction. Ease of use ($\chi^2=3.758$, not significant): teachers, whether novice or experienced, report similar levels of ease or difficulty in using AI tools. This indicates that usability issues, such as handling AI interfaces or incorporating them into lesson plans, are common challenges shared across experience levels. Pedagogical challenges ($\chi^2=4.266$, not significant): the data reveals that teachers, regardless of their tenure, face comparable pedagogical challenges in implementing AI. These may include aligning AI tools with curriculum goals, maintaining student engagement, or receiving institutional support. Overall pedagogical challenges ($\chi^2=4.266$, not significant): the absence of a significant association suggests that overall

difficulties in integrating AI into ELT are not shaped by how long a teacher has been in the profession. These findings underscore that teaching experience is not a determining factor in how teachers perceive or address AI-related challenges. Therefore, professional development programs on AI integration should be inclusive and designed to support both early-career and veteran teachers equally.

Table 5. Chi-square test: teaching experience and pedagogical challenges in using AI tools

No.	Dimension	df	χ^2	Remark
1	Perceived effectiveness of AI tools	6	0.845	Not significant
2	Ease of use	6	3.758	Not significant
3	Pedagogical challenges	6	4.266	Not significant
4	Overall pedagogical challenges in AI use	6	4.266	Not significant

4.5. Is there a significant association between the level of education taught by teachers and their challenges in using AI tools?

The association between educational level taught and AI-related dimensions is presented in Table 6. The results in Table 6 indicate that among the four measured dimensions, only perceived effectiveness of AI tools shows a statistically significant association with the educational level taught (χ^2=13.816, significant), suggesting that teachers' views on AI effectiveness vary by teaching context—possibly due to differences in curriculum complexity, student readiness, or access to AI-supported infrastructure. In contrast, no significant associations were found for ease of use (χ^2=3.444, not significant), pedagogical challenges (χ^2=5.191, not significant), and overall pedagogical challenges (χ^2=5.191, not significant), indicating that difficulties related to usability, integration, and instructional alignment are consistent across all educational levels. These findings imply that while perceptions of AI's benefits may differ by teaching stage—such as primary, secondary, or tertiary—core pedagogical and technical challenges are universally experienced. Therefore, AI implementation strategies in ELT should consider the contextual differences in perceived effectiveness while ensuring universally accessible training and support systems that address common pedagogical barriers across all levels of education.

Table 6. Chi-square test: educational level taught and pedagogical challenges in using AI tools

No.	Dimension	df	χ^2	Remark
1	Perceived effectiveness of AI tools	6	13.816	Significant
2	Ease of use	6	3.444	Not significant
3	Pedagogical challenges	6	5.191	Not significant
4	Overall pedagogical challenges in AI use	6	5.191	Not significant

5. DISCUSSION

This study examined how demographic and contextual variables influence ELT teachers' perceptions of AI tools and the pedagogical challenges associated with their integration. The findings reveal a critical pattern: while perceptions of AI effectiveness vary across certain demographic groups, pedagogical challenges remain largely consistent across teachers. This suggests that AI integration barriers are not primarily individual but systemic and structural in nature. The central scientific question addressed in this study was whether demographic variables significantly influence ELT teachers' perceptions and pedagogical challenges in AI integration.

5.1. Gender differences in perceived effectiveness and challenges

The results indicated significant gender differences in perceived effectiveness and pedagogical challenges. Female teachers reported higher perceived effectiveness of AI tools (t=2.504, p=0.044) while simultaneously reporting greater pedagogical challenges (t=2.627, p=0.018). This dual pattern is noteworthy. It suggests that female teachers may be more open to recognizing the instructional potential of AI but also more critically aware of its classroom complexities. Previous research has shown that female educators often demonstrate strong pedagogical orientation toward student-centered practices, which may heighten sensitivity to instructional alignment and ethical concerns [24], [30], [31]. Thus, higher reported challenges may reflect reflective pedagogical engagement rather than technological limitation. Importantly, no gender difference was found in ease of use (p=0.241), indicating that operational competence is comparable across genders [32]. This finding suggests that AI-related difficulties are less about technical proficiency and more about instructional integration, curriculum alignment, and classroom management [33]. The implication is that professional development should prioritize pedagogical application rather than basic technological training [33], [34].

5.2. Locality and structural access inequalities

Locality-based analysis revealed a significant difference only in perceived effectiveness ($F=4.610$, $p<0.05$), particularly between urban and rural teachers [35], [36]. Urban teachers rated AI tools as more effective than rural teachers. This finding aligns with broader digital divide literature, which emphasizes the role of infrastructure, institutional support, and exposure to emerging technologies in shaping technology perception [37], [38]. Teachers in urban environments are more likely to have stable internet access, institutional encouragement, and peer collaboration networks that facilitate meaningful AI integration [37], [39]. However, the absence of locality differences in pedagogical challenges suggests that once teachers engage with AI tools, they encounter similar instructional barriers regardless of geographical context [39]–[41]. This indicates that structural access influences perception more than pedagogical complexity. Therefore, addressing infrastructural disparities alone may not fully resolve integration challenges; systemic pedagogical training remains essential [42].

5.3. Age and teaching experience: challenging assumptions

Contrary to common assumptions, no significant association was found between age or teaching experience and any AI-related dimension. Age ($\chi^2=12.830$, $p>0.05$) and teaching experience ($\chi^2=4.266$, $p>0.05$) did not significantly influence perceptions or challenges. This finding challenges the stereotype that younger or less experienced teachers are inherently more adaptable to technological innovation [43]. Instead, the results suggest that AI integration represents a novel instructional shift that affects teachers across generational and experience boundaries [43]. AI literacy appears to depend more on targeted training and institutional culture than on years of service. This supports emerging research indicating that exposure, support systems, and pedagogical guidance are stronger predictors of AI readiness than demographic factors alone [44].

5.4. Educational level taught and contextual alignment

A significant association was found between educational level taught and perceived effectiveness ($\chi^2=13.816$, $p<0.05$). Teachers at higher educational levels perceived AI as more effective, possibly because AI tools align more readily with advanced language tasks such as academic writing, research support, and independent learning. Higher-level learners may also possess greater digital autonomy, allowing teachers to integrate AI more flexibly [45]. However, pedagogical challenges did not differ significantly across educational levels. This suggests that issues such as curriculum alignment, ethical concerns, assessment integration, and student dependency on AI are universal challenges across primary, secondary, and tertiary education. Therefore, AI effectiveness may vary contextually, but integration complexity remains broadly consistent [46].

5.5. Theoretical and practical implications

The findings contribute to the growing body of AI-in-education research by shifting the focus from technological capability to teacher-level pedagogical reality. The study suggests that AI adoption in ELT is influenced more by contextual and institutional variables than by individual teacher characteristics. This challenges deterministic models of technology adoption that prioritize demographic predictors and reinforces the need for systemic support structures [47]. By synthesizing the key findings, this study offers a crucial insight: while perceptions of AI effectiveness may vary across teacher groups-influenced by gender, locality, and educational level taught-the pedagogical challenges associated with AI integration remain largely systemic and reported consistently across all contexts. This distinction is critical. It suggests that the barriers to effective AI use are not primarily rooted in individual teacher characteristics like age or experience, but are instead embedded in the broader educational ecosystem. These systemic challenges include a lack of aligned curriculum, insufficient training, ethical concerns, and inadequate institutional support.

This insight shifts the focus of AI adoption strategies from addressing individual teacher deficits to strengthening institutional structures. The implication is clear: efforts to promote AI in English language education should prioritize the development of robust, context-sensitive support systems over demographic-targeted interventions. By highlighting this, the study contributes new evidence to the field, moving the conversation beyond simple acceptance or rejection of AI towards a more nuanced understanding of the institutional and pedagogical conditions required for its successful and equitable integration. From a practical standpoint, the results emphasize five key implications: i) AI professional development must emphasize pedagogical integration strategies rather than technical orientation alone; ii) infrastructure investment should particularly target rural contexts to improve perception and equitable access; iii) training programs should be inclusive across age and experience levels, avoiding assumptions about generational readiness; iv) AI tool developers should collaborate with teachers to ensure curricular alignment and usability; and v) educational policies must integrate ethical AI frameworks addressing privacy, bias, and responsible classroom usage.

This study provides empirical evidence that demographic differences influence perception more than pedagogical difficulty. By combining t-tests, ANOVA with post hoc analysis, and χ^2 tests across multiple demographic dimensions, the research offers a differentiated and statistically grounded understanding of AI integration in ELT. It moves beyond general acceptance studies and provides actionable insight for teacher education, institutional planning, and AI tool design. Overall, the findings suggest that sustainable AI integration in ELT requires systemic, context-sensitive, and pedagogically grounded strategies rather than demographic-targeted interventions alone.

6. CONCLUSION

This study investigated the pedagogical challenges faced by ELT teachers in integrating AI tools and examined whether demographic variables influenced their perceptions and experiences. Gender and locality significantly influenced perceived effectiveness of AI tools, while educational level taught also showed a significant association with perceived effectiveness. However, age and teaching experience did not significantly relate to either perceived effectiveness or pedagogical challenges. Importantly, pedagogical challenges related to curriculum alignment, instructional integration, and classroom management were consistently reported across teacher groups, suggesting that AI-related difficulties are largely systemic rather than demographic-specific. This finding demonstrates that although perceptions of AI's usefulness vary across contexts, the fundamental pedagogical challenges are common across different teaching contexts. This shifts the focus of AI integration efforts from individual teacher characteristics to the critical need for robust institutional support, targeted training, and thoughtful pedagogical planning.

The study highlights that differences among teachers are more evident in how they perceive the benefits of AI than in how they experience the challenges of implementation. These findings underscore the need for inclusive, context-sensitive professional development programs that prioritize pedagogical integration over basic technical training. Institutions must also address infrastructural disparities, particularly in rural settings, to ensure equitable AI adoption. Despite its contributions, the study has certain limitations. The use of purposive sampling limits the generalizability of findings beyond the sampled population. Data were self-reported, which may introduce response bias. The cross-sectional design also restricts the ability to examine long-term changes in AI integration practices. Additionally, the study focused on quantitative measures and did not incorporate qualitative insights that could provide deeper contextual understanding.

Future research may employ longitudinal or mixed method approaches to explore evolving teacher experiences with AI integration. Comparative studies across regions or countries could further illuminate contextual influences. Experimental studies examining the impact of targeted AI training interventions would also provide valuable evidence for strengthening teacher preparedness in AI-supported ELT environments. Overall, the findings emphasize that sustainable AI integration in English language education requires systemic support, pedagogically grounded training, and equitable access rather than demographic-based assumptions about readiness or competence.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors have no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

DATA AVAILABILITY

The data that supports the findings of this study are available from the corresponding author, [TK], upon reasonable request.

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