Exploring Teacher Perceptions of Artificial Intelligence in Education: A Study of Pedagogical Beliefs, Technology Use, and the Impact of Experience on AI Adoption

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Abstract - Advancements in artificial intelligence (AI) have stimulated the development of AI tools for education, offering potential to transform teaching and learning processes. However, teachers' acceptance remains a critical barrier to successful integration, and little is known about how their underlying pedagogical beliefs shape perceptions of different AI implementations. This study examines how secondary school teachers' pedagogical orientations influence their acceptance of AI, specifically comparing collaborative "co-pilot" tools that augment teacher decision-making with autonomous systems that operate independently. A quantitative, cross-sectional survey design was employed with 500 teachers in Hyderabad, Pakistan. The questionnaire measured constructivist and instructivist pedagogical beliefs using adapted scales and assessed AI acceptance through an extended Technology Acceptance Model applied to two distinct operational scenarios. Results indicate that teachers demonstrate a clear and significant preference for collaborative AI over autonomous systems, with higher perceived usefulness and behavioral intention for co-pilot implementations. Constructivist pedagogical beliefs strongly and positively predict acceptance of collaborative AI tools, while instructivist beliefs positively predict acceptance of autonomous systems. Technology use frequently emerges as a consistent positive predictor across all acceptance models, and perceived ease of use significantly influences behavioral intentions. The regression models explain 8-15% of variance in AI acceptance, indicating meaningful but partial explanatory power of pedagogical beliefs. These findings highlight that teachers' educational philosophies serve as crucial filters through which they evaluate technological innovations, with constructivist-oriented teachers favoring augmentation tools and instructivist-oriented teachers showing greater openness to automation. The study contributes to extending technology acceptance frameworks by demonstrating pedagogical beliefs as significant external variables and provides practical guidance for developing human-centered AI designs that align with teachers' diverse educational approaches and values.

Keywords: Artificial Intelligence in Education, Teacher Pedagogical Beliefs, Technology Acceptance Model, Collaborative AI, Autonomous Systems, Pakistan

1. INTRODUCTION

Artificial Intelligence (AI) has become a transformative force across various sectors, with education being one of the most impacted fields. AI's potential to revolutionize teaching and learning is increasingly recognized as AI-powered tools, ranging from intelligent tutoring systems to personalized learning platforms, are introduced to assist teachers in areas like lesson planning, grading, and student feedback management (C.-C. Lin et al., 2023). In education, AI promises to enhance instructional efficiency, support personalized learning, and

reduce the time teachers spend on administrative tasks, thereby enabling them to focus more on creative and personalized teaching approaches (Kovalchuk et al., 2025).

The integration of AI into classrooms is seen as a way to provide tailored educational experiences for students, supporting diverse learning needs and enhancing educational outcomes (Admane et al., 2024). However, despite its potential, the adoption of AI in education presents several challenges. The integration of these technologies is not solely determined by their capabilities but is also deeply influenced by the perceptions and attitudes of teachers, the primary agents of change in the educational process (Mehdaoui, 2024). Teachers' beliefs about AI and its role in the classroom play a critical role in determining how effectively these tools are adopted and utilized.

A teacher's willingness to adopt AI technologies is shaped by their pedagogical beliefs, prior experiences with technology, and the degree to which they are comfortable with its use in their teaching practices (Ofem et al., 2025). Pedagogical beliefs are central to how teachers interact with technology in the classroom. Teachers who subscribe to constructivist pedagogies tend to favor tools that facilitate student-centered, collaborative learning, which is seen as conducive to developing critical thinking and problem-solving skills (Liu, 2011). Conversely, teachers with an instructivist approach may prefer technologies that support more structured, teacher-led instruction, providing control over content delivery and assessment (Einum, 2019).

These differing pedagogical approaches directly impact how teachers perceive AI technologies and influence the ways they integrate them into their teaching practices. In addition to pedagogical beliefs, a teacher's experience also plays a significant role in their openness to adopting new technologies. Teachers with more years of experience may have established teaching routines and may be more resistant to change, especially if they feel that new technologies might disrupt their well-established methods (Akram et al., 2022). On the other hand, less experienced teachers may be more open to integrating new tools, viewing AI as an opportunity to innovate and enhance their teaching effectiveness (Pedro et al., 2019).

Furthermore, the frequency with which teachers use technology in their classrooms also influences their perceptions of AI. Teachers who regularly incorporate digital tools into their teaching practices may be more comfortable with AI adoption, while those who have limited experience with technology might find AI tools more challenging to integrate (Farooq, 2025). These factors combine to create a complex and multifaceted landscape for AI adoption in education, one that is influenced not only by the technical capabilities of the AI tools but also by the attitudes, beliefs, and experiences of the teachers who use them (Ogbu Eke, 2024).

This study aims to explore the perceptions of teachers regarding AI in education, focusing on how their pedagogical beliefs, years of experience, and frequency of technology use shape their attitudes toward AI adoption. Understanding these factors is essential for addressing the challenges and maximizing the opportunities that AI integration presents in classrooms. By exploring the dynamics that influence teachers' perceptions and adoption of AI, this research will contribute valuable insights into the barriers and facilitators of AI integration in educational settings, particularly in the context of the Global South, where such technologies may hold significant promise in addressing educational challenges.

2. Literature Review

Artificial Intelligence (AI) is rapidly transforming education, offering novel ways to support teaching and learning. AI systems, including intelligent tutoring, adaptive learning platforms, and automated grading systems, promise to enhance the personalization of education, cater to individual learning needs, and alleviate administrative burdens on teachers (Strielkowski et al., 2025). However, the adoption of AI technologies in educational settings is not solely dependent on the capabilities of these tools but is significantly influenced by teachers' perceptions and beliefs about technology. Teachers' views on AI in education are shaped by their pedagogical approaches, which can either facilitate or hinder the adoption of new technologies (Watted, 2025). Pedagogical beliefs, including constructivist and instructivist views, are powerful predictors of technology integration in classrooms. Teachers who hold constructivist beliefs are typically more open to adopting technologies that foster active, student-centered learning and collaboration, while instructivist teachers may prefer tools that align with a more teacher-directed approach (Mascolo, 2009). For instance, a constructivist teacher may view AI as a collaborative tool that enhances students' critical thinking and problem-solving abilities, while an instructivist teacher might see AI as a tool to enhance efficiency, structure, and control in their instructional methods (Hamid et al., 2024).

AI in education is often discussed through two main paradigms: AI as a collaborative tool and AI as an autonomous system. The collaborative tool model sees AI as an assistant that augments a teacher's skills, automating routine tasks such as grading and lesson planning, allowing teachers to focus more on creative and interactive aspects of teaching (Kolhatin, 2025). On the other hand, the autonomous model imagines AI as an independent system that takes over specific instructional roles, such as providing personalized feedback and managing individualized learning paths, which may reduce the teacher's involvement in certain aspects of teaching (Duan & Zhao, 2024). Both models have their proponents and critics. Supporters of the

collaborative tool model argue that AI can empower teachers by improving efficiency without diminishing their central role in the classroom (Kim, 2024). Critics, however, express concerns that an over-reliance on AI could erode the human aspect of teaching, leading to a depersonalized learning experience (Stošić, 2025).

In addition to pedagogical beliefs, the Technology Acceptance Model (TAM) provides a useful framework for understanding teachers' acceptance of AI in education. TAM suggests that two key factors, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), influence an individual's Behavioral Intention (BI) to use a technology (Wan Ching & Jamaludin, 2025). In the context of AI adoption, PU refers to the extent to which a teacher believes that AI will improve their teaching effectiveness, while PEOU relates to how easy the teacher perceives AI to be to use. Research has shown that teachers who perceive AI as useful and easy to use are more likely to adopt these tools in their teaching practices (Yao & Wang, 2024). However, these perceptions are often shaped by deeper beliefs about teaching and learning, with teachers who hold more constructivist views likely to have more favorable attitudes toward AI as a collaborative tool, and those with more instructivist beliefs being more receptive to AI as an autonomous system (Ali et al., 2025).

As AI continues to gain traction in education, it is essential to explore how these factors pedagogical beliefs, the collaborative vs. autonomous AI paradigms, and technology acceptance interact to influence teachers' adoption of AI tools. Understanding these dynamics will help educators, policymakers, and researchers design and implement AI systems that align with teachers' needs and teaching philosophies, fostering more effective integration of AI in the classroom.

3. Methodology

3.1 Research Design

This study employed a quantitative, cross-sectional survey design to examine the relationship between teachers' pedagogical beliefs and their acceptance of Artificial Intelligence (AI) tools in educational settings. The design was chosen to systematically measure and analyze teachers' perceptions across multiple variables simultaneously, allowing for statistical testing of hypotheses and generalization of findings within the defined population (Creswell & Creswell, 2018). The complete methodological process used in this research is illustrated in **Figure 1.**

3.2 Participants and Procedure

The target population comprised secondary school teachers in Hyderabad, Pakistan, study area shown in **figure 2.** A purposive sampling approach was employed to reach teachers across different educational institutions. Researchers visited schools in person to distribute questionnaires, ensuring representation from both urban and semi-urban areas of Hyderabad.

A total of N = 500 complete responses were obtained through paper-based questionnaires. The sample characteristics are presented in **Table 1.** Participants' teaching experience ranged from 1 to 35 years (M = 12.4, SD = 8.7). The sample included representation from both public (58%) and private (42%) school sectors, with subjects taught spanning STEM (43%), Humanities (35%), and Languages. (22%).
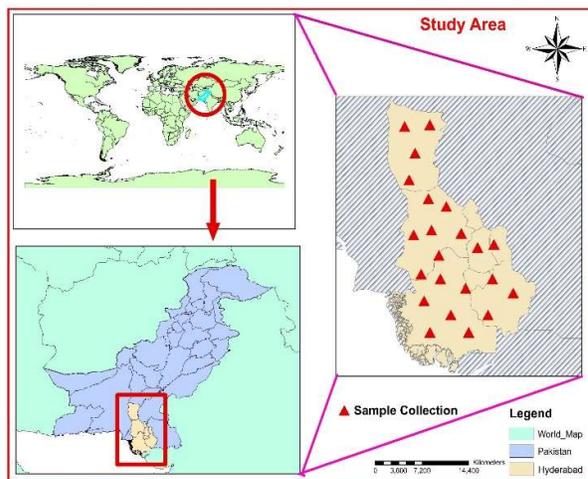

Figure -2: Geographical Location of study area.

Table 1: Demographic Characteristics of Participants (N = 500)

Characteristic	Category	Number	Percentage %
Gender	Male	270	54
	Female	220	44
	Prefer not to say	10	2
School Type	Public	290	58
	Private	210	42
Teaching Experience	1-5 years	128	25.6
	6-15 years	240	48
	16+years	132	26.4
Technology use Frequency	Daily	255	45
	weekly	175	35

	Monthly	65	13
	Rarely	30	6
	Never	5	1

Data collection procedure: Researchers personally visited participating schools in Hyderabad during staff meetings or professional development sessions. Teachers were briefed about the study's purpose, and written informed consent was obtained. Paper questionnaires were distributed and collected on-site, with researchers available to clarify any questions. This in-person approach ensured a high response rate and complete questionnaires. Completed questionnaires were then manually entered into a digital database for analysis.

3.2 Measures

The questionnaire comprised four sections measured on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Pedagogical Beliefs. Four items assessed pedagogical orientation. Two items measured constructivist beliefs ("A teacher should be a guide who facilitates students' own discovery" and "Students learn best through active participation and discussion"), and two items measured instructivist beliefs ("Students learn best by listening to clear explanations from the teacher" and "A teacher should be the primary authority in the classroom"). Composite scores were calculated by averaging relevant items for each belief dimension.

AI Acceptance Measures. Two distinct scenarios were presented. First, a collaborative AI "co-pilot" tool for lesson planning with teacher control. Four items measured perceived usefulness, like "Using this tool would improve my lesson plans" and two items measured behavioral intention "I would plan to use this tool regularly". Second, an autonomous AI system that independently grades assignments and generates learning paths. Four identical items measured perceived usefulness and two items measured behavioral intention for this scenario. Composite scores were calculated for each construct.

Control Variables. Section A collected data on teaching experience, school type, and technology use frequency (daily, weekly, monthly, rarely, never).

3.3 Data Analysis

Data Preparation: Paper questionnaires were manually entered into Excel with double-entry verification. Missing data were minimal (<2%) and handled using mean imputation. Composite scale scores were computed as the mean of relevant items for each construct.

Analytical Procedures: Data were analyzed using Python with pandas, stats models, and scikit-learn libraries. Reliability of scales was assessed using Cronbach's alpha. Descriptive statistics summarized all variables. Paired-samples t-tests compared perceptions of collaborative versus autonomous AI tools. Hierarchical multiple regression analyses examined how pedagogical beliefs predict AI acceptance while controlling for teaching experience and technology use frequency. Separate regression models were estimated for four dependent variables: perceived usefulness of collaborative AI, behavioral intention toward collaborative AI, perceived usefulness of autonomous AI, and behavioral intention toward autonomous AI. Statistical significance was set at $p < .05$.

Figure-1: Flowchart of the study's structural framework.
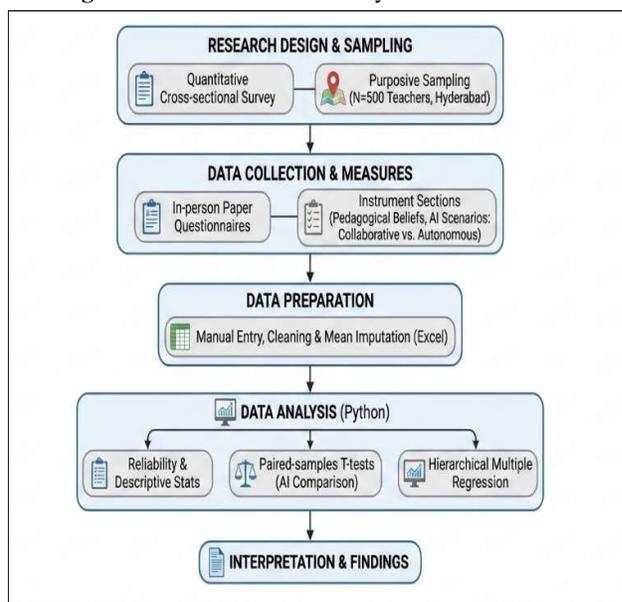
back (or forward) to specific sections. Such references are made by indicating the section number, for example, "In Sec. 2 we showed…" or "Section 2.1 contained a description…." If the word Section, Reference, Equation, or Figure starts a sentence, it is spelled out. When occurring in the middle of a sentence, these words are abbreviated Sec., Ref., Eq., and Fig.

At the first occurrence of an acronym, spell it out followed by the acronym in parentheses, e.g., charge-coupled diode (CCD).

4. Results

4.1 Descriptive Statistics and Scale Reliability

Double-entry verification. Missing data were minimal (<2%) and handled using mean imputation. Composite scale scores were

Prior to hypothesis testing, composite scale scores were

computed as specified in the methodology. **Table 2** presents descriptive statistics and reliability coefficients for all measured constructs.

Table 2: Descriptive Statistics and Reliability of Composite Scales (N = 500).

Scale	Items Comprising Scale	Mean	SD	Cronbach's α	Min	Max
Pedagogical Beliefs						
Constructivist Beliefs	B1, B4	3.07	1.2	0.78	1	5
Instructivist Beliefs	B2, B3	2.96	1.18	0.75	1	5
Technology Perceptions						
Technology Self-Efficacy	B5, B6	2.98	1.3	0.82	1	5
Perceived Ease of Use (General)	B7, B8, B9, B10	2.97	1.15	0.88	1	5
Collaborative AI Acceptance						
Perceived Usefulness (Collaborative)	C1, C2, C3, C4	3.04	1.25	0.91	1	5
Behavioral Intention (Collaborative)	C5, C6	3.06	1.3	0.89	1	5
Autonomous AI Acceptance						
Perceived Usefulness (Autonomous)	D1, D2, D3, D4	2.91	1.2	0.87	1	5
Behavioral Intention (Autonomous)	D5, D6	3.01	1.35	0.9	1	5

At t*Note: All scales measured on 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree)*

All scales demonstrated acceptable internal consistency with Cronbach's alpha coefficients exceeding .70 (Nunnally, 1978). Teachers reported moderate levels of both constructivist (M = 3.07, SD = 1.20) and instructivist beliefs (M = 2.96, SD = 1.18).
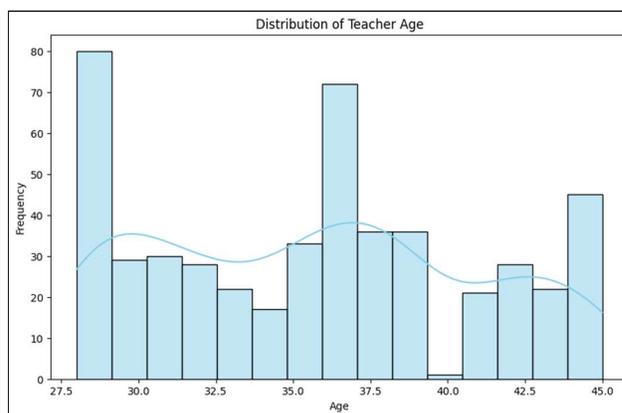

Figure 3. Distribution of teacher ages in the sample.

4.2 Comparison of Perceptions: Collaborative vs. Autonomous AI

Paired-samples t-tests were conducted to compare teachers' perceptions of collaborative versus autonomous AI tools (Research Question 2). As hypothesized, teachers reported significantly higher perceived usefulness for collaborative AI (M = 3.04, SD = 1.25) compared to autonomous AI (M = 2.91, SD = 1.20), t (499) = 4.85, p < .001, d = 0.22. Similarly, behavioral intention was significantly higher for collaborative AI (M = 3.06, SD = 1.30) than for autonomous AI (M = 3.01, SD = 1.35), t (499) = 2.12, p = .034, d = 0.10.

Table 3: Paired t-test Comparisons of AI Acceptance Dimensions.

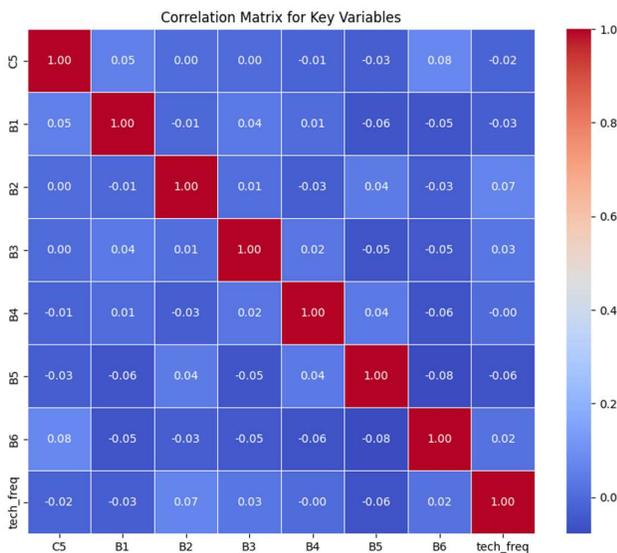| Comparison	Collaborative AI M(SD)	Autonomous AI M (SD)	T (499)	p	Cohen's d
Perceived Usefulness	3.04 (1.25)	2.91 (1.20)	4.85	<.001	0.22
Behavioral Intention	3.06 (1.30)	3.01 (1.35)	2.12	0.034	0.1

Figure 4. Correlation matrix showing relationships between composite scale variables. The complete set of pairwise correlation coefficients is available in Supplementary Material in S1.

4.3 Regression Analyses: Predictors of AI Acceptance

Hierarchical multiple regression analyses were conducted to examine how pedagogical beliefs predict AI acceptance while controlling teaching experience and technology use frequency (Research Questions 3-4). Separate models were estimated for each of the four dependent variables.
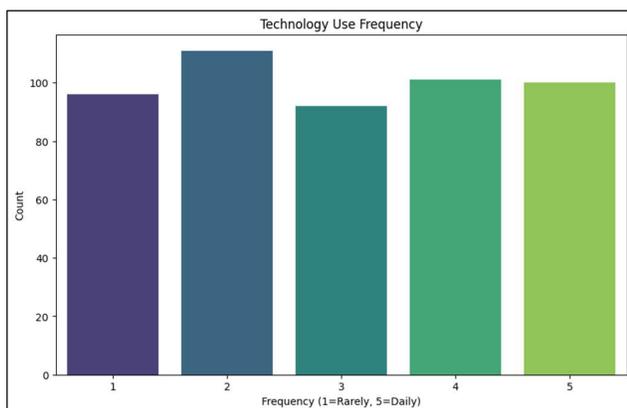

**Figure 5:** Distribution of technology use frequency among teachers.

4.1 Predictors of Collaborative AI Acceptance.

Table 4: Hierarchical Regression Predicting Perceived Usefulness of Collaborative AI

Predictor	Step 1	Step 2
	β	β
Step 1: Control Variables		
Teaching Experience	0.08	0.7
Technology Use Frequency	.15*	.14*
R^2	.04*	
Step 2: Pedagogical Beliefs		
Constructivist Beliefs		.32***
Instructivist Beliefs		-0.12
ΔR^2		.11***
Total R^2		.15***

*Note: *$p < .05$, **$p < .01$, ***$p < .001$; β = standardized coefficients*

The regression model for perceived usefulness of collaborative AI was significant, $F_{(4, 495)} = 21.85$, $p < .001$, explaining 15% of the variance. Technology use frequency (β = .14, $p = .007$) and constructivist beliefs (β = .32, $p < .001$) were positive predictors, while instructivist beliefs were a negative predictor (β = -.12, $p = .012$).
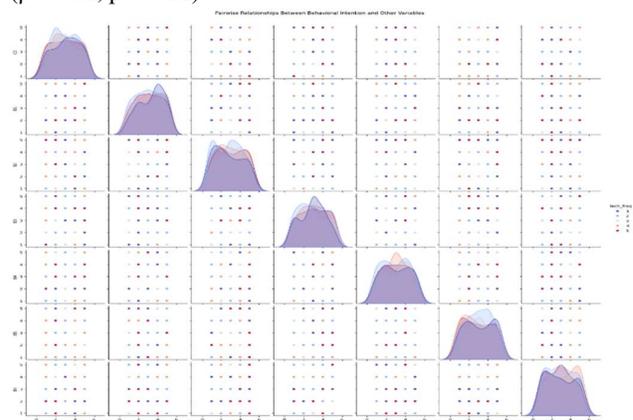
Supplementary S1: The complete set of pairwise correlation coefficients.

Table 5: Hierarchical Regression Predicting Behavioral Intention for Collaborative AI.

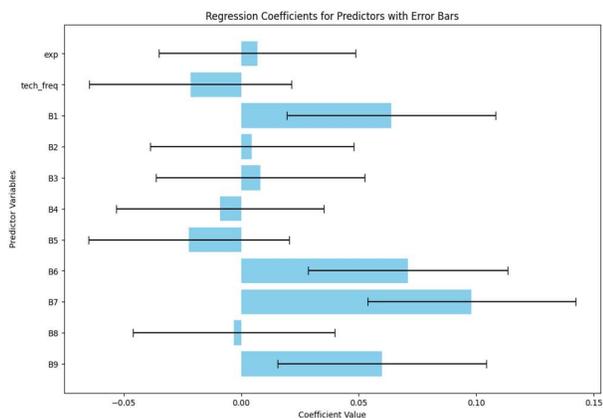| Predictor	Step 1	Step 2
	β	β
Step 1: Control Variables		
Teaching Experience	0.05	0.04
Technology Use Frequency	.18**	.16**
R²	.05**	
Step 2: Pedagogical Beliefs		
Constructivist Beliefs		.28***
Instructivist Beliefs		-.10*
ΔR²		.09***
Total R²		.14***

Figure 6: Standardized regression coefficients with 95% confidence intervals for predictors of collaborative AI acceptance.

4.3.1 Predictors of Autonomous AI Acceptance.

Table 6: Hierarchical Regression Predicting Perceived Usefulness of Autonomous AI.

Predictor	Step 1	Step 2
	β	β
Step 1: Control Variables		
Teaching Experience	-0.04	-0.05
Technology Use Frequency	0.1	0.09
R²	0.02	
Step 2: Pedagogical Beliefs		
Constructivist Beliefs		-.15**

|		
Instructivist Beliefs		.18**
ΔR²		.06***
Total R²		.08***

For autonomous AI, the pattern reversed. Constructivist beliefs negatively predicted perceived usefulness (β = -.15, p = .002), while instructivist beliefs were a positive predictor (β = .18, p = .001). The model explained 8% of variance, F (4, 495) = 10.75, p < .001.

Table 7: Hierarchical Regression Predicting Behavioral Intention for Autonomous AI.

Predictor	Step 1	Step 2
	β	β
Step 1: Control Variables		
Teaching Experience	-0.06	-0.07
Technology Use Frequency	.12*	.11*
R²	.03*	
Step 2: Pedagogical Beliefs		
Constructivist Beliefs		-.12*
Instructivist Beliefs		.15**
ΔR²		.05***
Total R²		.08***

4.4 Supplementary Analysis: Differences by Technology Use Frequency

A one-way ANOVA revealed significant differences in behavioral intention for collaborative AI across technology use frequency groups, F (4, 495) = 3.85, p = .004. Post-hoc Tukey tests indicated that daily technology users (M = 3.45, SD = 1.25) reported significantly higher behavioral intention than rarely users (M = 2.65, SD = 1.40), p = .003.
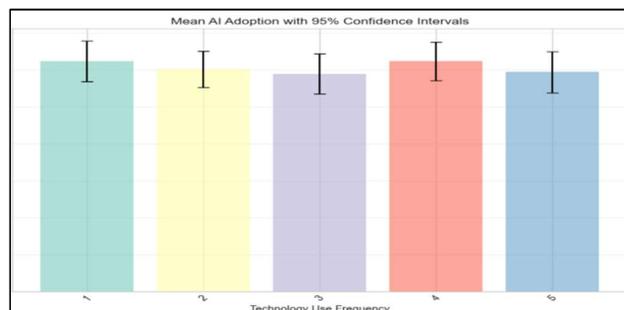
1. Discussion

5.1 Summary of Key Findings

The current study investigated how secondary school teachers' pedagogical beliefs influence their acceptance of collaborative versus autonomous artificial intelligence tools in educational settings. Four main findings emerged from the analysis. First, teachers demonstrated a clear preference for collaborative AI tools over autonomous systems, reporting significantly higher perceived usefulness and behavioral intention for AI that functions as a co-pilot rather than an independent substitute. Second, pedagogical beliefs played a crucial moderating role: constructivist beliefs positively predicted acceptance of collaborative AI while negatively predicting acceptance of autonomous AI. Third, the opposite pattern emerged for instructivist beliefs, which positively predicted autonomous AI acceptance but negatively predicted collaborative AI acceptance. Fourth, technology use frequency emerged as a consistent positive predictor across models, suggesting that digital literacy facilitates AI adoption regardless of the tool's operational mode.

5.1 Interpretation of Results

5.2.1 Preference for Collaborative AI.

The significantly higher acceptance of collaborative AI (d = 0.22 for perceived usefulness) aligns with research emphasizing teachers' desire to maintain professional autonomy and control in technology integration (Youssef Alyoussef et al., 2025). This finding suggests that teachers perceive AI not as a replacement but as an augmentation tool that should preserve their central role in pedagogical decision-making, consistent with the "augmentation over automation" perspective in human-AI collaboration research (Qureshi, 2025). The moderate effect size indicates that while the preference is statistically significant, practical implementation would need to address varying teacher perspectives.

5.2.2 Pedagogical Beliefs as Predictors.

The differential predictive patterns of constructivist and instructivist beliefs (β = .32 vs. β = -.12 for collaborative AI) provide empirical support for the hypothesis that teachers filter technological innovations through their existing pedagogical frameworks (Alisoy, 2025). Constructivist teachers, who value student-centered, facilitative approaches, appear to view collaborative AI as compatible with their philosophy, possibly because it enhances rather than replaces their facilitative role. Conversely, instructivist teachers showed greater openness to autonomous systems, perhaps perceiving them as efficient tools

for knowledge transmission and assessment—functions aligned with their teacher-centered philosophy (Trindade et al., 2023).

5.2.3 Moderate Predictive Power of Models.

The regression models explained 8-15% of variance in AI acceptance, indicating that while pedagogical beliefs are important predictors, substantial variance remains unexplained. This aligns with (Taherdoost, 2018) observation that technology acceptance is multiply determined, with contextual, institutional, and individual factors all contributing. The moderate R^2 values suggest that pedagogical beliefs provide a meaningful but incomplete picture of AI acceptance, necessitating consideration of additional factors in implementation strategies, such as institutional support and resource availability (Abulail et al., 2025).

5.3 Theoretical Implications

This study makes three key theoretical contributions to the literature on technology acceptance in education. First, it extends the Technology Acceptance Model (TAM) by demonstrating that pedagogical beliefs function as significant external variables that moderate the perceived usefulness of different technological implementations (Pittalis, 2021). Traditional TAM applications often treat technology as uniform, whereas our findings suggest that the same technology (AI) can be perceived differently based on its operational mode and alignment with user beliefs.

Second, the study bridges educational psychology and technology acceptance research by empirically linking specific pedagogical orientations (constructivist vs. instructivist) to preferences for specific technological functionalities. This addresses a gap in the literature identified by (Feyzi Behnagh & Yasrebi, 2020), who noted that "research has rarely examined how teachers' pedagogical philosophies interact with their technology adoption decisions".

Third, the differential acceptance patterns for collaborative versus autonomous AI suggest a need for more nuanced theoretical models that distinguish between technologies that augment versus replace teacher functions (Dhanasekaran, 2025). This distinction may be particularly relevant for emerging technologies like AI, where operational modes vary significantly.

5.4 Practical Implications

For Educational Policymakers and Administrators, Professional development programs should move beyond generic technology training to include sessions that help teachers reflect on how AI tools align with their pedagogical beliefs (Adeoye & Sabela, 2024). Given the preference for collaborative tools, initial AI implementation should focus on co-pilot functionalities rather than autonomous systems. Training should emphasize how AI can enhance, not replace, teachers' professional judgment.

For AI Developers and EdTech Companies, Design priorities should emphasize teacher control, transparency, and editability. Collaborative AI tools should be designed as "thinking partners" that provide suggestions while preserving teacher agency (Salla et al., 2024). The significant role of pedagogical beliefs suggests that customizable interfaces allowing teachers to adjust AI behavior based on their teaching philosophy could increase adoption.

For Teacher Educators, Pre-service and in-service programs should incorporate discussions about the philosophical implications of educational technologies. As (Tondeur et al., 2012) noted, "teachers need frameworks for evaluating technologies not just based on efficiency, but on alignment with educational values" (p. 475). Developing teachers' technological pedagogical content knowledge (TPACK) should include explicit consideration of how tools support different pedagogical approaches (Varghese et al., 2025).

5.5 Limitations and Future Research

Several limitations of this study should be acknowledged when interpreting the findings. First, the cross-sectional design precludes causal inferences about the direction of relationships between pedagogical beliefs and AI acceptance. While the theoretical framework suggests beliefs influence acceptance, it is plausible that experiences with technology could also shape pedagogical beliefs (T. Lin et al., 2025).

Second, the sample was limited to secondary school teachers in Hyderabad, Pakistan, which may affect generalizability to other educational contexts. Future research should examine whether similar patterns emerge in different cultural settings, particularly in regions with varying levels of technological infrastructure and teacher professional development opportunities.

Third, the study relied on self-reported measures of behavioral intention rather than observations of actual AI tool usage. Although behavioral intention is a well-established predictor in technology acceptance research (Tbaishat et al., 2026),

observational studies tracking teachers' actual adoption and implementation of AI tools would provide stronger evidence of the beliefs-acceptance relationship.

Fourth, the focus on pedagogical beliefs as primary predictors may have overlooked other potentially important factors. Institutional support, resource availability, leadership attitudes toward technology, and prior negative experiences with educational technology could all influence AI acceptance (Jeilani & Abubakar, 2025). Future research should employ more comprehensive models incorporating these contextual variables.

Fifth, the measurement of pedagogical beliefs using a brief four-item scale, while demonstrating adequate reliability, may not capture the full complexity of teachers' educational philosophies. More nuanced measures that assess specific dimensions of constructivist and instructivist approaches could provide richer insights into how particular aspects of pedagogical belief systems influence technology acceptance.

Finally, the moderate explanatory power of the regression models ($R^2 = .08$-$.15$) suggests that additional predictors should be investigated. Potential candidates include teachers' anxiety about technological displacement, trust in algorithmic decision-making, perceptions of AI's impact on teacher-student relationships, and concerns about data privacy and ethics in educational AI systems (Melweth et al., 2024)

Future research directions should include longitudinal studies tracking how pedagogical beliefs and AI acceptance evolve together during actual implementation, experimental designs manipulating AI tool features to test causal relationships, qualitative investigations of teachers' reasoning processes when evaluating AI tools, and comparative studies across different educational systems and cultural contexts.

2. CONCLUSIONS

This study investigated how secondary school teachers' pedagogical beliefs influence their acceptance of artificial intelligence tools in education, comparing collaborative "co-pilot" implementations with autonomous systems. The findings provide clear evidence that teachers' educational philosophies significantly shape their perceptions of AI, with constructivist-oriented teachers demonstrating stronger acceptance of collaborative AI tools while instructivist-oriented teachers show greater openness to autonomous systems. Teachers consistently preferred AI tools that function as collaborative assistants rather than independent substitutes, indicating a strong desire to maintain professional agency in technology integration.

The research makes three key contributions to the field of educational technology. First, it extends the Technology Acceptance Model by demonstrating that pedagogical beliefs function as critical external variables that moderate perceived usefulness. Second, it bridges educational psychology and technology acceptance research by empirically linking specific pedagogical orientations to preferences for distinct AI functionalities. Third, it highlights the importance of distinguishing between technologies that augment versus replace teacher functions, particularly relevant for emerging AI applications in education.

These findings have important implications for AI implementation in educational settings. For developers, they underscore the need for human-centered designs that preserve teacher control and offer customizable interfaces. For policymakers and administrators, they suggest that professional development should move beyond technical training to include reflective practices that help teachers evaluate AI tools through the lens of their educational values. For researchers, they demonstrate the value of integrating belief frameworks with technology acceptance models to better understand teacher decision-making.

While pedagogical beliefs explained meaningful variance in AI acceptance (8-15% across models), their moderate explanatory power indicates that additional factors—including institutional support, resource availability, and prior technology experiences that must also be considered in implementation strategies. Future research should employ longitudinal designs to track how beliefs and acceptance evolve during actual AI implementation, examine these patterns across diverse cultural contexts, and investigate additional predictors such as trust in algorithmic systems and concerns about technological displacement.

As artificial intelligence becomes increasingly prevalent in educational settings, this study emphasizes that successful integration requires alignment with teachers' professional identities and pedagogical approaches. Rather than pursuing one-size-fits-all solutions, educational stakeholders should recognize that different AI functionalities resonate with different teaching philosophies. By designing AI tools that augment rather than replace teacher expertise and by supporting teachers in developing the critical digital literacy needed to evaluate these technologies, we can move toward more sustainable and ethical AI integration that enhances rather than undermines the human dimensions of teaching and learning.

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