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TEACHER AI COMPETENCE AND TEACHING PERFORMANCE: THE MEDIATING ROLE OF PERCEIVED USEFULNESS AND EASE OF USE

Shakhnoza Norbaeva

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Abstract. *Purpose – This study examines how teachers' artificial intelligence (AI) competence shapes their teaching performance, and how perceived usefulness and perceived ease of use influence this relationship in practice.*

Design/methodology/approach – We adopted a qualitative, interpretivist design. We conducted semi-structured interviews with 12 participants (nine teachers and three IT coordinators) from schools, universities, and an EdTech organization in Uzbekistan. We analyzed the data using Braun and Clarke's (2006) six-phase thematic analysis.

Findings – Six themes emerged: (1) teacher AI competence as a foundational driver of adoption; (2) perceived usefulness as a motivator of AI use through time efficiency and improved lesson quality; (3) perceived ease of use as a determinant of teachers' confidence and willingness to engage; (4) contextual challenges, including limited training, weak institutional support, and infrastructural constraints; (5) a positive but conditional impact of AI on teaching performance; and (6) AI use as a signal of innovation and professional competence. These findings are synthesized into the Integrated AI Competence–Perception–Performance Model (IACPPM), which conceptualizes sustainable AI integration as a cyclical process linking competence, perception, contextual support, and performance.

Originality/value – Most AI-adoption research in education relies on quantitative, TAM-based surveys that treat perceived usefulness and perceived ease of use as direct predictors of adoption intention. This study instead provides context-rich, qualitative evidence from an under-researched emerging-economy setting, positions perceptions as psychological mechanisms linking competence to performance rather than as independent predictors, and proposes a novel conceptual model open to future quantitative validation.

Keywords: *teacher AI competence, Technology Acceptance Model, perceived usefulness, perceived ease of use, teaching performance, qualitative research, higher education, Uzbekistan.*

1. Introduction. The rapid development of artificial intelligence (AI) technologies has significantly transformed the educational landscape, reshaping how teaching and learning processes are designed and delivered. AI-powered tools such as automated assessment systems, adaptive learning platforms, and intelligent tutoring systems are increasingly integrated into classrooms to enhance instructional effectiveness and student engagement (Holmes et al., 2019; Luckin et al., 2016). As a result, teachers are now expected not only to possess subject knowledge but also to demonstrate competence in utilizing AI technologies in their teaching practice. Teacher AI competence – the ability to understand, use, and adapt AI tools to support pedagogical goals – has become a critical factor in effective technology integration. However, the successful implementation of AI in teaching does not depend solely on technical skill: teachers' perceptions of AI, particularly its usefulness and ease of use, play a crucial role in shaping their willingness to adopt and effectively use these technologies (Bond et al., 2023; Kasneci et al., 2023).

Research on AI adoption in education has grown rapidly over the past decade, encompassing systematic reviews of AI applications across teaching and learning (Ariffin & Hanafiah, 2021; Ouyang & Jiao, 2021) and broader assessments of AI's opportunities and risks for management and pedagogy (Dwivedi et al., 2021). Much of this literature, however, examines technological competence and teaching performance separately, relying largely on quantitative surveys and standardized models that may overlook teachers' subjective experiences and contextual challenges (Bond et al., 2018; Zawacki-Richter et al., 2019).

From a practical standpoint, many educational institutions invest in AI technologies but fail to realize the expected benefits because of insufficient teacher readiness and a lack of effective implementation strategies; teachers often struggle to fully use AI tools when they do not clearly see their benefits or find them difficult to use. From a theoretical standpoint, while models such as TAM emphasize perceived usefulness and ease of use, qualitative evidence on how these factors operate in real teaching contexts remains limited. Teachers face a dual challenge – developing technical competence in AI while simultaneously adapting their teaching methods to integrate these tools effectively – and without a clear understanding of how competence and perception interact, AI technologies risk being underutilized or implemented ineffectively, limiting their impact on teaching performance. In particular, limited research has investigated how teachers perceive the usefulness and ease of use of AI tools, and how these perceptions shape the relationship between AI competence and teaching performance in real classroom settings, especially in emerging-economy contexts where infrastructure, training, and institutional support differ from developed systems.

This study addresses that gap by exploring how teachers interpret their AI competence and how perceived usefulness and perceived ease of use shape their teaching performance through qualitative inquiry with teachers and IT coordinators in Uzbekistan. The guiding research question is: *How do teachers perceive the role of AI competence in shaping teaching performance, and how do perceived usefulness and perceived ease of use influence this process?* Four objectives follow: (1) to explore how teachers' AI competence influences their teaching practices and perceived effectiveness; (2) to understand how perceived usefulness and perceived ease of use shape the link between AI competence and teaching performance; (3) to identify contextual factors that influence this relationship; and (4) to develop a conceptual model explaining how these constructs jointly shape teaching performance.

The remainder of the paper proceeds as follows. Section 2 reviews the theoretical background and related literature and identifies the research gap. Section 3 describes the qualitative methodology. Section 4 presents the findings organized around six themes. Section 5 discusses the findings in relation to existing theory and proposes a conceptual model. Section 6 concludes with theoretical and practical contributions, limitations, and directions for future research.

2. Theoretical Background and Literature Review. *2.1 Theoretical framework*. This study is grounded in the Technology Acceptance Model (TAM) developed by Davis (1989), which explains technology adoption through two central beliefs: perceived usefulness (the degree to which a person believes a technology will enhance their performance) and perceived ease of use (the degree to which a person believes using it will be free of effort). According to TAM, these two beliefs shape users' attitudes toward a technology, which in turn determine actual usage behavior. TAM has been widely applied in educational research to understand how teachers and students adopt digital tools and e-learning systems (Venkatesh & Davis, 2000; Marangunić & Granić, 2015), and is particularly relevant to AI adoption, as it explains how educators evaluate the benefits and usability of AI tools before integrating them into instructional practice.

Although the original TAM provides a strong foundation for understanding technology adoption, later research has extended the model by incorporating external variables that influence perceived usefulness and perceived ease of use. Teacher competence is one such variable: teachers with higher AI competence are more likely to perceive AI tools as useful and easy to use because they have the skills to operate them effectively, which in turn increases their likelihood of integrating AI into teaching. This study extends TAM by incorporating teacher AI competence as an antecedent variable influencing teaching performance, allowing for a more comprehensive account of both technical capability and perceptual mechanisms in explaining AI adoption and its outcomes.

2.2 Teacher AI competence. Teacher AI competence refers to the combination of knowledge, skills, and abilities that enable educators to effectively integrate AI tools into pedagogical practice. It encompasses not only technical proficiency in using AI-based applications but also pedagogical awareness of how these technologies can enhance instructional design, classroom management, and student learning outcomes. Integrating AI in education increasingly requires teachers to move beyond basic digital literacy toward competencies in data interpretation, adaptive learning systems, and intelligent tutoring platforms. Teachers with higher AI competence are more likely to experiment with innovative strategies and adapt instruction to diverse student needs, whereas insufficient competence can lead to resistance, anxiety, and underutilization of available tools (Instefjord & Munthe, 2017; Tondeur et al., 2017). This underlines the importance of continuous professional development and institutional support in preparing teachers for AI-enhanced educational environments. However, competence alone may not fully explain teaching effectiveness, since cognitive perceptions also shape technology-use behavior.

2.3 Teaching performance. Teaching performance is a multidimensional construct reflecting educators' effectiveness in delivering instruction, facilitating student engagement, and achieving learning objectives, typically assessed through indicators such as instructional quality, classroom interaction, student outcomes, and overall efficiency. In the context of digital transformation, teaching performance is increasingly shaped by integrating AI systems, which can automate administrative tasks, provide real-time feedback, and enable personalized learning pathways. However, teaching performance in AI-enabled environments does not depend on access to technology alone; it depends on how effectively teachers use these tools within their pedagogical framework. Understanding the factors that enhance or hinder teaching performance in AI-enabled environments is therefore central to improving educational outcomes.

2.4 Perceived usefulness. Perceived usefulness is a central TAM construct and one of the strongest predictors of technology adoption (Davis, 1989). In educational contexts, when teachers perceive AI tools as beneficial for lesson delivery, student engagement, or assessment efficiency, they are more likely to integrate these technologies into practice.

2.5 Perceived ease of use. Perceived ease of use is considered a key determinant of both behavioral intention and perceived usefulness within TAM. Teachers are more likely to adopt AI technologies they perceive as simple and intuitive; complex systems create cognitive overload and can lead to resistance or partial adoption.

2.6 Relationship between AI competence, perceptions, and teaching performance

A growing body of literature suggests technological competence is positively associated with improved teaching performance, but this relationship is not always direct: perceived usefulness and ease of use may mediate it by shaping how effectively teachers apply their competencies in practice. Even highly competent teachers may not fully utilize AI tools if they do not perceive them as useful or easy to use, while positive perceptions can amplify the effect of competence on actual performance.

2.7 Research gap. Despite growing scholarship on AI in education, three gaps remain.

First, most studies examine AI adoption in general terms without deeply examining the specific role of teacher AI competence in shaping teaching performance. Second, prior research relies predominantly on quantitative surveys, offering limited insight into teachers' lived experiences and contextual challenges, and typically treats perceived usefulness and perceived ease of use as direct predictors of adoption behavior rather than as mechanisms linking competence to performance. Third, context-specific research is lacking in emerging educational environments, where access to AI tools, institutional readiness, and training opportunities differ substantially from developed contexts. This study addresses these gaps through a qualitative exploration of teacher AI competence, perceived usefulness, perceived ease of use, and teaching performance among teachers and IT coordinators in Uzbekistan.

3. Methodology. *3.1 Research design*

This study adopts a qualitative research design grounded in an interpretivist paradigm, which assumes that reality is socially constructed and knowledge is generated through individuals' subjective experiences (Saunders et al., 2019). This approach is appropriate given the study's aim to understand how teachers personally experience and interpret AI tools, rather than to measure or test predetermined causal relationships. Consistent with this orientation, the study did not test formal hypotheses; instead, the theoretical framework in Section 2 served as a tentative conceptual guide for data collection and analysis and was open to modification based on participants' perspectives.

3.2 Sampling and data collection. Participants were selected using purposive sampling, appropriate for identifying information-rich cases in qualitative research (Patton, 2002). The sample comprised 12 participants: nine teachers (T1–T9) and three IT coordinators (IT-1 to IT-3) from private schools, universities, and an EdTech organization in Uzbekistan, with between 3 and 10 years of experience in the education sector. Selection criteria included familiarity with educational technologies, willingness to participate, and the ability to reflect on their teaching experiences. Data were collected through semi-structured interviews of approximately 20 to 40 minutes, conducted face-to-face or online depending on availability. With participants' consent, interviews were audio-recorded and transcribed verbatim.

3.3 Data collection instrument. Interview questions were developed from the Technology Acceptance Model (Davis, 1989) and adapted from validated scales (Teo, 2011; Venkatesh & Davis, 2000; Al-Fraihat et al., 2020; Cheng, 2019; Ertmer, 1999), covering five domains: teacher AI competence, perceived usefulness, perceived ease of use, teaching performance, and challenges and barriers. Rather than using Likert-type items, the questions were converted into open-ended prompts (e.g., "In what ways do you think AI technologies help improve your teaching or student learning?") to elicit detailed narratives. Two academic experts in educational technology and qualitative methods reviewed the interview guide for content validity, and the study pilot-tested it with two teachers not included in the final sample.

Table 1. *Interview question mapping to theoretical constructs*

Construct	Number of questions	Source adapted from	Sample question
Teacher AI competence	4	Instefjord & Munthe (2017); Teo (2011)	"How confident do you feel in your ability to use AI tools effectively for teaching?"
Perceived usefulness	4	Davis (1989); Teo (2011)	"In what ways do you think AI technologies help improve your teaching or student learning?"
Perceived ease of use	3	Davis (1989); Venkatesh & Davis (2000)	"How easy or difficult is it for you to learn and operate the AI technologies you use?"
Teaching performance	4	Al-Fraihat et al. (2020); Cheng (2019)	"How has using AI affected your overall teaching performance or instructional strategies?"
Challenges and barriers	3	Ertmer (1999); UNESCO (2022)	"What challenges do you face when using AI tools in your teaching?"

3.4 Data analysis. Data were analyzed using Braun and Clarke's (2006) six-phase thematic analysis, selected for its flexible yet systematic approach to identifying patterns within qualitative data. The analysis followed an inductive logic, allowing themes to emerge from participants' accounts rather than from pre-existing categories, and proceeded iteratively, with data collection and analysis informing one another throughout the study. In Phase 1 (familiarisation), we transcribed all recordings verbatim and reviewed them repeatedly to become familiar with the data and identify initial ideas relevant to teacher AI competence, perceived usefulness, perceived ease of use, and teaching performance; we anonymized participant identities at this stage using coded labels. In Phase 2 (generating initial codes), we organized the data into meaningful segments through open, bottom-up coding of words, phrases, and sentences relevant to the research objectives. In Phase 3 (searching for themes), we clustered related codes into candidate themes. In Phase 4 (reviewing themes), we checked candidate themes against the coded extracts and the full dataset for internal coherence and distinctiveness. In Phase 5 (defining and naming themes), we refined each theme's scope and focus and clearly labeled it. Phase 6 (producing the report) involved selecting illustrative quotations and integrating the themes into the narrative presented in Section 4. We judged that data saturation was reached after the tenth interview, since no substantially new codes emerged thereafter and the final two interviews confirmed rather than extended previously identified patterns.

3.5 Validity, reliability, and ethics. Trustworthiness was supported through purposive sampling of information-rich participants, an interview guide reviewed by external experts and piloted prior to use, and triangulation of primary findings with secondary institutional sources (UNESCO, OECD, World Bank reports), reported in Section 5.2. We anonymized participant identities throughout using coded labels (e.g., T1, IT-1), and obtained informed consent before recording.

4. Findings. *4.1 Participant overview*

The sample consisted of nine teachers and three IT coordinators from private schools, universities, and an EdTech organization in Uzbekistan, with experience ranging from three to ten years. Participants varied in AI use frequency, from routine daily use in lesson preparation to limited but growing exposure. This diversity of roles and experience helped identify recurring patterns across the dataset. Table 2 summarises participant roles, organization type, and the main reported impact of AI use.

Table 2. *Participant profile*

Participant	Role	Organisation Type	Reported impact
T-1	Teacher	Private school	Improves lesson-preparation efficiency and enhances instructional quality
T-2	Teacher	Private university	Increases student engagement
T-3	Teacher	University	Supports interactive teaching methods
T-4	Teacher	Private school	Facilitates personalized learning
T-5	Teacher	University	Facilitates AI integration in classrooms
T-6	Teacher	Private university	Supports maintaining and optimizing AI-based educational systems
T-7	Teacher	University	Facilitates use of digital and AI tools for effective teaching
T-8	Teacher	Private school	Increases adoption of educational technologies
T-9	Teacher	University	Promotes data-driven decision-making
IT-1	IT coordinator	Private university	Enhances institutional performance
IT-2	IT coordinator	University	Improves access to quality education through AI

Participant	Role	Organisation Type	Reported impact
IT-3	IT coordinator	EdTech organisation	Provides data-driven teaching support using AI tools

Six overarching themes were identified from the coded interview data, described below with illustrative quotations. Teacher AI competence functioned as the central driver in the thematic structure, shaping both perceived usefulness and perceived ease of use; these perceptions in turn shaped teachers' willingness to adopt AI tools, moderated by contextual challenges, and ultimately fed into the impact on teaching performance and the signaling theme described in Sections 4.6 and 4.7.

4.2 Theme 1: Teacher AI competence. Participants displayed varying levels of AI competence, which shaped how confidently and effectively they integrated AI into teaching.

Teachers with stronger competence described AI as embedded in their daily routine: "I use AI tools to prepare my lessons and generate materials. It helps me save time and makes my teaching more efficient" (T-2). Others reported limited confidence despite awareness of available tools: "I know about AI tools, but I don't feel confident using them in my classes yet" (T-5). IT coordinators linked lower competence to insufficient training: "Many teachers are interested in AI, but they need proper training to use it effectively" (IT-1). Overall, teacher AI competence functioned as a foundational factor in AI adoption, dependent on both individual motivation and access to professional development.

4.3 Theme 2: Perceived usefulness of AI tools. Participants consistently linked perceived usefulness to time efficiency and improved lesson quality: "AI helps me prepare lesson materials much faster. I can generate ideas, exercises, and even explanations in a short time" (T-1); "Using AI allows me to create more interactive and engaging lessons for my students" (T-4). IT coordinators connected usefulness to broader modernization of teaching: "AI tools can support teachers in delivering more effective lessons and adapting to students' needs" (IT-2). However, usefulness was not perceived uniformly; some teachers reported limited relevance to their subject area: "Sometimes I try AI tools, but I don't always find them useful for my specific subject" (T-6).

Perceived usefulness thus emerged as context-dependent rather than universal, shaping willingness to adopt AI tools.

4.4 Theme 3: Perceived ease of use of AI tools. Ease of use emerged as a critical condition for sustained engagement with AI tools. Teachers favored simple, user-friendly platforms: "If the tool is easy to use, I don't hesitate to try it in my lessons. But if it looks complicated, I usually avoid it" (T-3). Technical complexity discouraged adoption even where usefulness was acknowledged: "Some AI tools are useful, but they are too complicated to understand at first. That makes it difficult for me to use them regularly" (T-6). Institutional guidance improved perceived ease of use: "When teachers receive proper guidance, they find AI tools much easier to use and become more confident" (IT-1), as did prior digital familiarity: "Since I already use different digital tools, learning AI tools was not very difficult for me" (T-2).

4.5 Theme 4: Challenges in using AI tools. Participants identified several barriers that moderated the relationship between competence, perceptions, and actual use.

Insufficient training was most frequently cited: “I think AI is useful, but I don’t have enough training to use it properly in my teaching” (T-4). Limited institutional support compounded this: “Teachers need continuous support and guidance. Without that, they may lose interest in using AI tools” (IT-2).

Infrastructural issues, such as unreliable internet access, created additional practical barriers: “Sometimes the technology itself is a problem. If the system doesn’t work properly, it discourages me from using it” (T-7). Concerns about the reliability of AI-generated content also persisted: “I always double-check what AI generates because I’m not sure if it is always correct” (T-5).

4.6 Theme 5: Impact on teaching performance. Participants reported that AI integration improved efficiency, lesson quality, and student engagement, particularly in lesson preparation and differentiation: “AI helps me prepare better lessons in less time, so I can focus more on interacting with my students” (T-3); “With AI, I can create tasks for different levels of students, which makes my lessons more effective” (T-6). Administrators linked AI use to broader pedagogical innovation: “AI encourages teachers to use new methods and makes the learning process more engaging for students” (IT-1). However, they described this impact as conditional on teacher skill rather than automatic: “AI can improve teaching, but only if the teacher knows how to use it properly” (T-5).

4.7 Theme 6: AI as a signal of innovation. Finally, participants described AI use as a signal of professional modernity and institutional quality, extending beyond its functional role. Teachers noted its effect on how they are perceived by students: “When I use AI tools in my lessons, students see me as a more modern and innovative teacher” (T-2); “Students are more interested when I use AI because they think the lesson is more advanced” (T-6). Administrators echoed this at the institutional level: “Teachers who use AI are seen as more competent and better prepared for modern education” (IT-1). However, participants cautioned that this signaling value depends on substantive, effective use rather than superficial adoption: “Using AI just for the sake of it doesn’t make teaching better. It has to be used properly” (T-5).

5. Discussion. *5.1 Interpretation*. The six themes present a coherent account of how AI competence and perceptions jointly shape teaching performance. Teacher AI competence plays a foundational role in shaping both perceived usefulness and perceived ease of use, which in turn determine the extent to which teachers integrate AI into teaching and, ultimately, its effect on performance. AI adoption in this context is not linear but a dynamic interaction among competence, perception, and contextual constraints: unlike more familiar educational technologies, AI tools require both technical understanding and cognitive acceptance from teachers. Perceived usefulness and perceived ease of use act as psychological filters linking competence to actual use: teachers are more likely to adopt AI tools when they believe these tools benefit lesson preparation, engagement, and time efficiency, and when ease of use reduces resistance and encourages experimentation. Contextual barriers – limited training, weak institutional support, and technical difficulties – can weaken this relationship even where teachers recognize AI’s potential benefits, indicating that competence alone is not sufficient unless supported by a conducive environment. Finally, AI use functions as both a pedagogical tool and a professional signal, with signaling strength depending on the depth and effectiveness of integration rather than mere adoption. Taken together, the themes suggest that the interaction between competence and perception creates a feedback loop over time: as teachers gain experience with AI tools, their confidence and perceptions improve, leading to more effective integration and better outcomes, so that AI adoption in education is best understood as an evolving process shaped by both individual and contextual factors rather than a single adoption decision.

5.2 Triangulation with secondary data. The primary findings were triangulated against institutional reports, including UNESCO's (2023) *AI Competency Framework for Teachers*, UNESCO's (2022) *ICT in Education: Policy, Pedagogy and Practice*, OECD's (2022) *Education at a Glance*, and the World Bank's (2023) report on digital transformation in education. UNESCO (2023) and OECD (2022) support Theme 1 by identifying teacher digital literacy as a key determinant of successful technology integration. World Bank (2023) evidence on instructional efficiency and engagement aligns with Theme 2, while UNESCO's (2022) emphasis on user-friendly interfaces as adoption enablers supports Theme 3. OECD's (2022) findings on insufficient professional development corroborate Theme 4, and evidence from the World Bank (2023) and UNESCO (2023) on improved lesson planning and engagement supports Theme 5. OECD (2022) observations that technology-adopting schools are perceived as more innovative support Theme 6. Secondary sources also point to a context-specific gap: AI integration in Uzbekistan's education sector remains at an early and uneven stage, reinforcing the value of qualitative, classroom-level inquiry such as this study.

5.3 Linking to the literature. The findings both confirm and extend existing theory. Consistent with the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), facilitating conditions and individual competence significantly shape technology-use behavior; this study extends that literature by showing competence functions not only as a technical skill but as a form of cognitive readiness underpinning teachers' confidence to experiment with AI. Findings on perceived usefulness support Davis (1989) and Teo (2011), while extending them by tying usefulness specifically to pedagogical outcomes – differentiation, engagement, instructional efficiency – rather than administrative convenience alone. Findings on perceived ease of use align with Davis (1989) and UNESCO (2023) on the barrier effect of complexity, while showing that institutional training and peer support shape ease of use as much as system design. The challenges theme aligns with Ertmer's (1999) first- and second-order barriers framework and UNESCO (2022), extending it by showing that such barriers moderate the competence-performance relationship rather than merely delaying adoption. The performance theme supports World Bank (2023) and Holmes et al. (2019) evidence on AI's instructional benefits, while showing this impact is conditional on competence and perception rather than automatic.

Finally, the signaling theme resonates with signaling theory (Spence, 1973) and OECD (2022), extending it to the interpersonal level of student perceptions of teacher competence, beyond institutional reputation alone. Collectively, these findings suggest AI integration in education is a socio-cognitive system shaped by competence, perception, institutional support, and context, rather than a purely technological or linear process.

5.4 The Integrated AI Competence–Perception–Performance Model (IACPPM). Building on these findings, this study proposes the Integrated AI Competence–Perception–Performance Model (IACPPM), which situates AI integration in education at the intersection of four interrelated domains: (1) *AI competence* – teachers' technical skills, digital literacy, and confidence with AI tools; (2) *perceived usefulness and ease of use* – the cognitive evaluations through which teachers assess AI's value and usability; (3) *contextual barriers* – institutional, infrastructural, and training-related factors shaping the extent of adoption; and (4) *teaching performance* – observable outcomes including lesson quality, instructional efficiency, engagement, and pedagogical innovation. The model proposes that sustainable AI integration occurs when these domains align and mutually reinforce: higher competence enhances perceived usefulness and ease of use, increasing the likelihood of effective adoption; successful adoption improves teaching performance, which in turn strengthens teachers' confidence and willingness to engage further with AI. Contextual barriers can disrupt this cycle at any point by weakening the links between competence, perception, and use, meaning sustainable integration depends as much on systemic support as on individual capability. The IACPPM thus frames AI adoption in education as an iterative, context-dependent process rather than a one-off adoption decision.

6. Conclusion. *6.1 Summary*. This study examined how teachers perceive the role of AI competence in shaping teaching performance, and how perceived usefulness and perceived ease of use influence this process, through semi-structured interviews with 12 teachers and IT coordinators in Uzbekistan, analyzed via Braun and Clarke's (2006) thematic analysis and triangulated with secondary institutional data. Six themes were identified: AI competence as a foundational adoption factor; perceived usefulness as a driver of adoption through time efficiency and lesson quality; perceived ease of use as a determinant of resistance or engagement; contextual and institutional challenges constraining integration; a positive but conditional impact on teaching performance; and AI use as a signal of innovation and professional competence. These findings underpin the proposed IACPPM, which frames sustainable AI integration as aligning teacher competence, positive perceptions, and supportive institutional conditions.

6.2 Theoretical contribution. This study makes three theoretical contributions. First, it integrates previously fragmented technology-acceptance and educational-performance literatures by showing that teacher AI competence, perceived usefulness, and perceived ease of use function as an interconnected system rather than independent predictors, extending TAM by positioning competence as a foundational driver of these perceptions in an educational setting. Second, it contributes methodologically by applying Braun and Clarke's thematic analysis to the under-researched context of AI integration in an emerging economy, surfacing context-specific factors such as limited training, infrastructural constraints, and institutional barriers.

Third, the proposed IACPPM offers a novel conceptual framework that moves beyond linear adoption models toward a dynamic, systemic account of sustainable AI integration in teaching.

6.3 Practical implications. For teachers, the findings offer guidance across three dimensions. In professional development, teachers are advised to continuously develop their AI competence and digital literacy through training and hands-on practice, to actively experiment with AI tools in lesson planning, assessment, and classroom interaction, and to view AI not as a replacement but as a supportive tool that enhances teaching effectiveness. In instructional practice, teachers should integrate AI in ways that improve lesson personalization, engagement, and efficiency, select user-friendly applications aligned with their teaching goals and subject requirements, and use AI-generated insights to adapt strategies to student needs. In perception and mindset, teachers are encouraged to focus on AI's practical benefits rather than its complexity, to overcome resistance by gradually incorporating AI into routine activities, and to recognize that AI use can enhance their professional image and credibility.

For educational institutions, the findings highlight the importance of creating an enabling environment: providing structured training programs and ongoing professional development, investing in necessary infrastructure and technical support, and encouraging a culture of innovation in which teachers feel supported as they experiment with new technologies. For policymakers and education-system stakeholders, successful AI integration requires systemic support: developing national or institutional strategies for AI-in-education implementation, ensuring equitable access to digital tools and training across regions, and aligning curricula and teacher-training programs with the demands of digital and AI-driven education. Overall, effective AI use in teaching depends not only on technology availability but also on teacher readiness, institutional support, and a positive adoption mindset.

6.4 Limitations. Several limitations should be acknowledged. The sample is geographically concentrated in Uzbekistan, which may limit generalisability to educational contexts with different levels of technological development and institutional support. The study relies on self-reported interview data, which is subject to social-desirability bias, and while efforts such as careful question design were used to mitigate this, subjective bias cannot be fully eliminated. Although thematic saturation was achieved within the sample, additional participants across different school types or experience levels could reveal further nuances. Secondary data used for triangulation were drawn largely from institutional reports rather than direct classroom-performance data or system-level analytics, and the proposed IACPPM is based on qualitative insights that require further validation through quantitative or mixed-methods research before broader generalization.

6.5 Directions for future research. Future research could pursue longitudinal designs to examine whether the improvements identified here are sustained over time or represent short-term effects of initial experimentation; compare AI adoption across primary, secondary, and higher-education contexts and subject areas; and pursue survey-based or mixed-methods validation of the IACPPM to test statistically the relationships between AI competence, perceived usefulness, perceived ease of use, and teaching performance across larger and more diverse samples.

Further work could also examine how institutional platforms and AI-powered educational systems shape accessibility, efficiency, and engagement, building toward a more generalizable, predictive account of AI adoption in education. Combining the present qualitative account with quantitative, TAM-based evidence from the same national context – such as the survey-based study of AI adoption, academic success, and career readiness among Uzbek university students by Mirza (2026) – could offer a fuller, mixed-methods picture of how AI competence and perceptions shape outcomes across both teaching and learning populations in Central Asia.

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