

Teachers' Perceptions, Adoption, and Integration of AI in Education: A Content Analysis

Sara Ayubian

Kansas State University

Vajiheh Shahsavari

Kansas State University

Nelofar Khamisani

Kansas State University

Ernestina Wiafe

Kansas State University

J. Spencer Clark

Kansas State University

Abstract

Artificial intelligence (AI) is transforming education through personalized learning, instructional support, and task automation, with teachers playing a critical role in its adoption. This content analysis synthesizes 14 studies published from 2023–2025 examining teachers' perceptions, adoption, and experiences with AI-driven technologies. Findings indicate that teachers generally hold positive but cautious attitudes toward AI, recognizing its potential to improve instructional efficiency, personalized learning, feedback, differentiation, and lesson planning. Adoption is influenced by perceived usefulness, AI literacy, institutional support, and pedagogical beliefs, while ethical concerns, uncertainty, and limited training contribute to resistance. Most studies used quantitative methods and focused on higher education, revealing a need for additional qualitative and classroom-based K–12 research. The Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) were the most common theoretical frameworks, with limited use of pedagogically focused models such as TPACK. Findings underscore the importance of teacher training, supportive institutional policies, and pedagogically grounded approaches to effective AI integration.

Keywords: Artificial intelligence; teachers' perceptions; AI adoption; content analysis

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Introduction

The significance and potential of artificial intelligence (AI) in education have been increasingly recognized (U.S. Department of Education, 2023). AI is rapidly transforming educational systems by offering automated feedback and personalized learning. As AI technologies integrate into education, teachers play a significant role in how AI technologies are adopted and integrated into their teaching practice and classroom contexts. Despite widespread recognition of AI's transformative role in education, there remains a gap in understanding how AI's rapid growth influences teaching practices (Crompton & Burke, 2023). Several efforts have been made to synthesize current knowledge through systematic literature reviews (Wang et al., 2024), meta-analyses (Li & Gu, 2023), and scoping reviews (Akhmadieva et al., 2024). However, most of these focus broadly on AI's impact on educational systems and student outcomes, rather than on pedagogical applications and AI's role in teaching practice (Chiu et al., 2023; Li & Gu, 2023). While many reviews examine AI broadly in education, fewer specifically analyze teachers' perceptions, adoption decisions, and professional needs.

This study offers a targeted content analysis of recent empirical research on how educators interpret and respond to AI technologies in the classroom. Therefore, the research questions are as follows:

1. What are teachers' perceptions of AI in school and university settings?
2. What factors influence teachers' resistance to or acceptance of AI integration?
3. What are the methodological and contextual patterns in existing research on AI and teachers?

By synthesizing recent empirical studies, this research contributes to the growing literature on artificial intelligence in education by providing a focused analysis of teachers' perceptions, adoption behaviors, and the pedagogical implications of AI integration in educational contexts.

Literature

AI in Education. The concept of AI was first introduced by Alan Turing in the early 1950s, and he believed that a system could be "intelligent" and mimic human behavior to the extent that it is difficult to distinguish whether a task is performed by a human or a machine (Russell & Norvig, 2010). From his early work, several AI technologies have emerged, and various applications of AI within an educational context have been introduced (e.g., Akgun & Greenhow, 2022; Popenici & Kerr, 2017). A more recent definition of AI is presented by Popenici & Kerr (2017), and they characterize AI as "computing systems that are able to engage in human-like processes such as learning, adapting, synthesizing, self-correction, and the use of data for complex processing tasks" (p. 2).

AI in education is any educational technology with the potential to discover patterns and make instructional decisions to shape pedagogical implementations with the final goal of enhancing teaching practices and the learning process. The increasing growth of AI-driven tools in education and their potential to enhance teaching practice has generated significant interest among scholars in the field (e.g., Holmes et al., 2023; Crompton & Burke, 2023; Wang et al., 2024; Zuo, 2025) and teachers who seek to leverage these technologies to enhance their teaching. However, the

adoption of AI technologies in educational contexts raises important questions about the role of teachers, professional development, and pedagogical practices.

Teacher-AI Collaboration. Research studies have explored AI-assisted systems and applications to enhance teachers' professional abilities to integrate AI into their teaching practice to better support student learning (Holstein & Alevan, 2022; Molenaar, 2022). AI-embedded dashboards assist teachers in monitoring students' learning and progress and provide teachers with additional insights to tailor instruction based on students' needs (Molenaar & Knoop-Van Campen, 2018). Additionally, AI can facilitate collaboration with human teachers to leverage the complementary role and strengths of each. AI systems allow teachers to monitor students' learning processes and make informed decisions based on students' needs.

The attraction and demand for Teacher-AI Collaboration (TAC) highlight the complementary role of AI technologies and human teachers in educational contexts (Amarasinghe et al., 2022). However, the integration of TAC is challenging in different educational contexts ranging from elementary school to higher education. In practice, teachers are still used to being the only teacher in the classroom, and the change required to collaborate with technology is challenging and complex. This shift is profound because it is not merely a single skill but a change that affects the entire culture of teaching practice (Vangrieken et al., 2015). Without professional training, teachers are expected to integrate AI into their instruction without a clear pedagogical model for effectively integrating AI technologies (Alfredo et al., 2024). Human teachers play a critical role in mediating between AI and teaching practice. Teachers need to know how to leverage TAC in their classrooms and how it can empower teachers rather than leave them feeling overpowered by technology (Alfredo et al., 2024; Almasri, 2024).

Teacher Adoption Frameworks. Different prevalent teacher adoption frameworks such as the Technology Acceptance Model (TAM) (Davis, 1989), the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) have been cited in the literature. These models highlight various factors contributing to teachers' adoption of AI, such as perceived usefulness, pedagogical knowledge, ease of use, and institutional support. Effective AI integration depends not only on the availability of AI tools but also on teachers' professional preparation and institutional support.

Other theoretical perspectives emphasize the complexity of teachers' AI adoption. For instance, the Diffusion of Innovations Theory by Rogers (2003) elaborates on how innovations spread within social systems and how factors such as complexity, compatibility, and relative advantage influence adoption decisions. Similarly, in educational settings, the Concerns-Based Adoption Model (CBAM) (Hall & Hord, 2011) explains that teachers require ongoing support, reflection, and professional training while moving from stages of concern to actual levels of use.

Recent studies have increasingly highlighted the significance of teachers' digital competence in supporting effective AI adoption. Falloon (2020) emphasized that teachers require both technical skills and critical digital competencies to evaluate and implement digital tools tailored to their pedagogical contexts. Ng et al. (2021) also argued that AI literacy includes understanding AI

concepts, as well as social implications and ethical considerations. These competencies are crucial for evaluating AI-generated outputs, making informed decisions, and protecting student privacy.

Other factors such as teacher autonomy, trust in AI technologies, and data privacy concerns influence teachers' willingness to collaborate with and integrate AI (Celik, 2023; Luckin et al., 2022). Educators may resist AI adoption when workload increases or when professional judgment is compromised. Conversely, they are more likely to adopt AI tools when they perceive them as transparent, supportive, and aligned with instructional objectives and effective student learning.

Together, research indicates that successful AI adoption largely depends on various factors such as AI literacy, beliefs, institutional conditions, and sustained professional development opportunities. While numerous systematic reviews examine AI in education broadly, fewer studies specifically synthesize research focused on teachers' perceptions, adoption decisions, preparedness, and professional needs related to AI integration. Therefore, this study provides a targeted content analysis of recent empirical research examining teachers' perceptions, experiences, and responses to AI technologies in educational settings.

Methodology

Research Design. This study adopted a qualitative methodology, specifically a content analysis approach, to examine 14 peer-reviewed articles on AI integration in teaching practice. Content analysis is a qualitative research design that provides a systematic procedure for compressing textual data into content categories based on explicit coding rules, and it includes both qualitative and quantitative approaches (Elo & Kyngäs, 2008). This approach allows researchers to extract themes, patterns, and trends across several studies. In this study, thematic categories were developed based on the guiding research questions, and the content of each paper in the selected journals was coded according to these predetermined categories. Following the content analysis, the findings were presented using descriptive analysis and full text analysis to identify patterns across the reviewed research papers.

Searching and Screening. The dataset was derived from a broader systematic literature search conducted in Web of Science (WoS) and Scopus, using keywords such as "AI in teaching," "AI for teachers," and "AI and teachers' perceptions." The search was limited to peer-reviewed articles published in English between 2023 and 2026 since ChatGPT introduced by OpenAI in November 2022. An initial total of 426 articles was identified. After removing duplicates and applying inclusion criteria (empirical studies, teacher/faculty participants, worldwide geographical setting, in English), 115 articles were retained for full-text screening. From this pool, 14 studies were randomly selected, forming the corpus for this content analysis. The relation of these studies with different countries, the use of various frameworks, methods, settings, themes, and the number of participants provide a broad view of teachers. This helps to understand the reasons for AI integration and denial in education and their causes.

Coding Framework and Analysis Process. A coding framework comprising "research methodology (quantitative, qualitative, or mixed methods)," "research context (school level or higher education)," "theoretical frameworks," "teachers' perceptions of AI," "factors influencing AI acceptance or resistance," and "pedagogical implications" was developed manually based on

key themes in the literature and aligned with the three research questions. It followed established approaches to qualitative content analysis (Mayring, 2014; Braun & Clarke, 2006) to analyze findings from the data.

In addition, inductive codes were constructed during the analysis process to capture patterns and themes emerging directly from the data that were not fully anticipated in advance. The coded data were then systematically organized and compared to identify recurring patterns, themes, and conceptual relationships across the studies. This analytic process enabled the identification of dominant research trends, methodological approaches, and key gaps in the literature, resulting in a structured content analysis of how AI is shaping teaching practices across diverse educational contexts.

Results

This section presents the findings of the content analysis in relation to the research questions guiding the study. The results are organized thematically to reflect patterns identified across the 14 reviewed studies on teachers' perceptions, acceptance, and use of artificial intelligence (AI) in education (Table 1). Specifically, the results are organized into a matrix table that assigns codes P1–P14 as source IDs, with their respective narrative citations and article titles. By assigning a specific ID (P1, P2, etc.) to each article, the study creates a clear audit trail and is replicable by allowing a reader, scholar, or peer reviewer who engages with it to see exactly which raw data (the 14 selected articles) led to which specific thematic findings later in the paper. The study also reports on teachers' perceptions of AI in school, AI adoption in teaching, school context (school level or higher education), and factors influencing AI acceptance and resistance, as well as methodological, contextual, and theoretical trends in the existing literature.

Table 1

Matrix Table of the Articles (n=14)

Source ID	Author (s) & Year	Title of Article
P1	Alcaine et al. (2024)	Training pre-service teachers to deal with cyberbullying: Collective intelligence as a mode of learning
P2	Al-Zahrani & Alasmari (2025)	A comprehensive analysis of AI adoption, implementation strategies, and challenges in higher education across the Middle East and North Africa (MENA) region
P3	Xin An et al. (2022)	Modeling English teachers' behavioral intention to use artificial intelligence in middle schools
P4	Bao et al. (2025)	Generative artificial intelligence in middle school classroom: A longitudinal exploration of teacher attitudes, evolving practices, and challenges

Source ID	Author (s) & Year	Title of Article
P5	Alwaqdani (2025)	Investigating teachers' perceptions of artificial intelligence tools in education: Potential and difficulties
P6	Cabero-Almenara et al. (2024)	Acceptance of educational artificial intelligence by teachers and its relationship with some variables and pedagogical beliefs
P7	Al-Abdullatif (2024)	Modeling teachers' acceptance of generative artificial intelligence use in higher education: The role of AI literacy, intelligent TPACK, and perceived trust
P8	Bower et al. (2024)	How should we change teaching and assessment in response to increasingly powerful generative artificial intelligence? Outcomes of the ChatGPT teacher survey
P9	Bozkuş & Canoğulları (2025)	Exploring the mediating roles of self-control, management, and meaningful learning self-awareness in the relationship between academic self-discipline and GAI acceptance
P10	Alhaif et al. (2025)	The reality of implementing artificial intelligence apps in the special needs classroom: A teacher's perspective
P11	Hamzaj (2025)	Generative AI acceptance among future educators: Personality and behavioral insights
P12	Alanazi (2025)	The impact of teacher characteristics on the effective use of AI for educating students with development disabilities in Saudi primary schools
P13	Blundell (2025)	Adopting generative AI in K-12 teaching and learning: Australian teachers' actions through the lens of innovation theory
P14	Bergdahl et al. (2026)	Transformation, support needs, and AI in K-12 education

Note: Compiled by the authors (2026) to detail the 14 articles selected for the content analysis.

RQ1: What Are Teachers' Perceptions of AI in School and University Settings?

The analysis shows that educators across Saudi Arabia, China, Spain, Australia, and the MENA region view AI as a “dual-edged” digital extension. Although acceptance is generally high, especially among younger educators and those in distance learning environments, this optimism is tempered by significant professional caution.

Teacher's Perception of AI Tools. The review of 14 studies shows that teachers from various regions, including Saudi Arabia, China, Spain, Australia, and the MENA area, see artificial intelligence as a “dual-edged” extension of digital teaching tools. The overall attitude is increasingly positive but balanced between recognizing AI's utility and exercising professional caution (Bergdahl et al. 2026).

Teachers generally view AI as a helpful resource for improving teaching efficiency and personalization. Data indicates that educators see AI's strength in creating teaching materials and offering quick feedback (Bao et al. 2025; Bower et al. 2024). Regarding personalized learning, there is agreement that AI applications support tailored instruction, especially for students with developmental disabilities and special needs (Alhaif et al. 2025; Alanazi, 2025).

Conversely, many educators find AI useful as an automated tutor; however, opinions are divided about its compatibility with traditional curricula (Xin An et al., 2022; Al-Abdullatif, 2024). Despite optimism, several concerns influence teachers' perceptions and contribute to a “hesitation gap” in implementation. Trust issues are prominent, with teachers worried about AI's reliability, bias, and output accuracy (Al-Zahrani & Alasmari, 2025; Alwaqdani, 2025). There are also concerns that over-dependence on AI might weaken students' critical thinking skills and reduce essential human interactions (Bao et al. 2025; Hamzaj, 2025). Others were cautious about AI's long-term impact on job security and its potential effects on the creative aspects of teaching (Cabero-Almenara et al., 2024; Bergdahl et al., 2026). Perceptions are also shaped by demographic and contextual factors.

In certain settings, university and secondary school teachers exhibit more positive attitudes than primary teachers. Regional differences exist, and some studies found female educators have higher AI awareness than males (Cabero-Almenara et al., 2024; Alanazi, 2025). Pre-service teachers showed moderate acceptance and found it useful for administrative and research tasks but emphasize the need for structured professional development (Alcaine et al., 2024; Hamzaj, 2025).

AI Adoption in Teaching. The most significant finding is the heavy scholarly emphasis on AI acceptance, which serves as the central focus for some of the studies (Xin An et al., 2022; Cabero-Almenara et al., 2024; Al-Abdullatif, 2024; Bozkuş & Canoğulları, 2025; Hamzaj, 2025). These studies primarily examined educators' behavioral intentions and the factors that facilitate the transition of AI from a theoretical concept to an active classroom tool. This thematic concentration is directly linked to the high frequency of the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) frameworks identified.

Beyond general acceptance, Alcaine et al. (2024) and Bergdahl et al. (2026) identified a critical requirement for structured professional development and resource allocation to ensure teacher competence. A distinct niche emerged in the studies by Alhaif et al. (2025) and Alanazi (2025), which focused on the role of AI in providing personalized learning supports and improving accessibility for students with developmental disabilities.

Regarding distribution and variable isolation, the analysis revealed that most current research remains focused on a single variable, such as Teacher Perceptions (Alwaqdani, 2025), Adoption Strategies (Al-Zahrani & Alasmari, 2025; Blundell, 2025), or Instructional Impact (Bower et al.,

2024). However, there is a developing trend toward multidimensional analysis. Notably, Bao et al. (2025) serves as a thematic link, addressing both teacher attitudes and their effect on teaching practices.

Settings. The distribution of the educational settings, summarized in Table 2, highlights a primary focus on post-secondary environments.

Table 2

Settings in AI Teaching Research

Setting	Number of Studies	Source ID
University	6	P1, P2, P6, P7, P9, P11
K-12	4	P4, P5, P13, P14
Middle school	2	P3, P10
Primary school	1	P12
Mixed (HS+ University)	1	P8

Note: Compiled by the authors (2026) to summarize the educational setting distribution of AI teaching in the 14 reviewed studies.

The most prevalent educational context in the corpus was university settings, accounting for nearly half of the studies (six out of 14). Some studies (Alcaine et al., 2024; Al-Zahrani & Alasmari, 2025; Cabero-Almenara et al., 2024; Al-Abdullatif, 2024; Bozkuş & Canoğulları, 2025; Hamzaj, 2025) centered on the perspectives of university faculty and pre-service teachers. This concentration suggests that AI integration is more developed or more frequently explored in higher education's structured academic settings than in early childhood or primary environments.

Within K–12 and secondary education, a substantial portion of research focused on K–12, with four studies (Bao et al., 2025; Alwaqdani, 2025; Blundell, 2025; Bergdahl et al., 2026). Some categorization, such as middle school contexts, was seen in two studies (Xin An et al., 2022; Alhaif et al., 2025), while primary school settings were the least represented, with only one study (Alanazi, 2025). This disparity indicates a research gap regarding how educators working with younger learners perceive and utilize AI tools.

Additionally, a small part of the literature examined mixed contexts that combine secondary and higher education. For example, Bower et al. (2024) examined both high school and university environments, offering insights into the educational transition and the consistent application of AI tools across different levels of academic maturity.

RQ2: What Factors Influence Teachers' Resistance to or Acceptance of AI Integration?

The analysis identified a complex interplay of psychological, pedagogical, and institutional factors that determine whether educators embrace or reject AI integration. These factors are categorized into primary drivers of adoption and significant barriers to implementation.

Reasons for Denial and Acceptance of AI in Education. The drivers of AI acceptance and teachers' willingness to adopt AI are primarily rooted in AI's perceived utility and alignment with their existing professional values. Perceived usefulness and efficiency are strongly linked to the

belief that AI can improve teaching efficiency, support academic workloads, and save time on administrative tasks (Al-Zahrani & Alasmari, 2025; Cabero-Almenara et al., 2024; Hamzaj, 2025).

Xin An et al. (2022) and Al-Abdullatif (2024) showed a stronger AI usage behavior among teachers with a constructivist orientation, who viewed the technology as a partner in student-centered learning. While educators possessing higher levels of Technological Pedagogical Content Knowledge (TPACK) and AI literacy report significantly more confidence and lower resistance (Al-Abdullatif, 2024; Bozkuş & Canoğulları, 2025).

In relation to barriers to AI Integration and Resistance, the content analysis revealed that AI resistance is often not a rejection of the technology itself but rather a response to perceived risks and institutional gaps. A primary source of resistance is the fear of potential misuse by students, particularly regarding plagiarism, data privacy, and the reliability of AI-generated content (Bao et al., 2025; Alwaqdani, 2025; Hamzaj, 2025). Alcaine et al. (2024) and Bergdahl et al. (2026), for example, showed that many educators remain hesitant due to a self-perceived lack of skills or resources or because it is too complex or unreliable.

Some studies such as Bao et al. (2025), Cabero-Almenara et al. (2024), and Bower et al. (2024) also identified major concerns regarding “over-dependency” on technology. Some teachers worry that this could diminish students’ critical thinking skills or jeopardize their job security in the long run. Additionally, Bower et al. (2024) and Bergdahl et al. (2026) revealed that the lack of clear ethical guidelines from institutions further impedes adoption, particularly in fields like English that are heavily influenced by Large Language Model (LLM) technology.

Beyond these, the findings also highlighted that acceptance is not solely an individual choice but is moderated by the environment. Institutional support, the availability of robust infrastructure, and the “enjoyment” of using AI tools serve as critical facilitators that can bridge the gap from initial hesitation to full integration (Al-Zahrani & Alasmari, 2025; Hamzaj, 2025).

RQ3: What Are the Methodological and Contextual Patterns in Existing Research on AI and Teachers?

Methodological Pattern. The methodological pattern of the 14 reviewed studies is summarized in Table 3, showcasing a strong preference for empirical, data-driven approaches over purely descriptive or interpretive methods.

Table 3
Methodological Patterns of Reviewed Studies

Research Design	Number of Studies	Source ID
Quantitative	8	P1, P3, P5, P6, P7, P9 P13, P10
Mixed Methods	5	P2, P8, P11, P14, P12
Qualitative	1	P4

Note: Compiled by the authors (2026) to summarize the methodological distribution of the 14 reviewed studies.

The analysis indicated a significant reliance on quantitative research designs, which account for more than half of the corpus (eight out of 14 studies). These studies (Alcaine et al., 2024; Xin An et al., 2022; Alwaqdani, 2025; Cabero-Almenara et al., 2024; Al-Abdullatif, 2024; Bozkuş & Canoğulları, 2025; Alhaif et al., 2025; Blundell, 2025) utilized quantitative approaches to measure variables such as teacher attitudes, behavioral intentions, and perceived ease of use regarding AI. This quantitative focus suggests that the current priority in the field is to establish broad, generalizable trends regarding AI adoption across various educational contexts.

Also, a substantial portion of the research that makes up five out of 14 studies employed the mixed-method approach (Al-Zahrani & Alasmari, 2025; Bower et al., 2024, Hamzaj, 2025; Alanazi, 2025; Bergdahl et al., 2026). These studies combined quantitative surveys with qualitative components, such as open-ended questions or follow-up interviews. By using mixed methods, these studies were able to quantify teachers' perceptions while also capturing the nuanced reasoning behind their resistance to or enthusiasm for AI integration.

Meanwhile, a key finding in the methodological distribution is the almost complete lack of purely qualitative research, with only one study (Bao et al., 2025) addressing this. Although the broader body of work in this research has focused on “what” teachers believe and “how many” intend to use AI, there is a noticeable scarcity of in-depth, ethnographic, or case-study research examining teachers' lived experiences during actual AI implementation in classrooms.

Theoretical/Conceptual Patterns. The theoretical landscape of the 14 reviewed studies is primarily characterized by a heavy reliance on technology acceptance models, alongside a significant portion of studies that lack an explicit theoretical grounding, as indicated in Table 4.

Table 4

Theoretical Frameworks Used in AI Education Studies

Framework	Frequency	Source ID
UTAUT (2)	2	P4, P6
UTAUT/ TPACK	1	P3
TAM (Extended TAM)	1	P2
TPACK /TAM	1	P7
TAM/ UTAUT	1	P11
Innovation Theory	1	P13
Teacher Traits Model	1	P14
Not specified	6	P1, P5, P8, P9, P10, P12

Note: Compiled by the authors (2026) to summarize the theoretical distribution of the 14 reviewed studies.

The analysis reveals that the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM) are the primary lenses through which AI integration is studied. UTAUT/UTAUT2, as appearing in Xin An et al. (2022), Bao et al. (2025), Cabero-

Almenara et al. (2024) and Hamzaj (2025), suggest that researchers are primarily concerned with the “performance expectancy” and “effort expectancy” of AI tools.

TAM and TAM(Extended) used in Al-Zahrani & Alasmari (2025), Al-Abdullatif (2024), and Hamzaj (2025), highlight a focus on “perceived usefulness” and “perceived ease of use.” The frequent crossover of these models, like its adoption in Hamzaj (2025), using both TAM/UTAUT indicates that scholars are attempting to capture a comprehensive view of why educators choose to adopt or resist AI tools in the classroom.

Also, the inclusion of Technological Pedagogical Content Knowledge (TPACK) in Xin An et al. (2022) and Al-Abdullatif (2024) is a critical pivot. While UTAUT and TAM focus on behavioral intention, TPACK focuses on the knowledge required to integrate technology effectively. The intersection of TPACK with acceptance models suggests that teacher “readiness” is increasingly viewed as a combination of psychological acceptance and technical-pedagogical competence. The use of Innovation Theory (Blundell, 2025) and the Teacher Traits Model (Bergdahl et al., 2026) represent a move toward understanding the broader organizational and personal contexts of AI adoption.

On the other hand, Innovation Theory views the diffusion of AI as a “new idea” within educational systems, while the Teacher Traits model focuses on individual psychological differences (such as openness to experience) that might predispose a teacher toward AI use. The most striking finding is that six of 14 studies (Alcaine et al., 2024; Alwaqdani, 2025; Bower et al., 2024; Bozkuş & Canoğulları, 2025; Alhaif et al., 2025; Alanazi, 2025) did not specify a theoretical framework, suggesting AI’s exploratory nature and its focus on “what is happening” rather than “why it is happening” through a verified theoretical lens. This theoretical gap also suggests that the pace of AI advancement may outpace the application of formal theory, leading to more data-driven or pragmatic reports without deep theoretical underpinnings.

Dominant AI Themes. The most prevalent theme identified across the literature is AI acceptance, which is the central focus of five studies (Xin An et al., 2022; Cabero-Almenara et al., 2024; Al-Abdullatif, 2024; Bozkuş & Canoğulları, 2025; Hamzaj, 2025) as shown in Table 5.

Table 5

Major Research Themes in AI Teaching Studies

Focus Area	Number of Studies	Source ID
AI Acceptance	5	P3, P6, P7, P9, P11
Teacher Perceptions	2	P4, P5
AI Adoption Strategies	2	P2, P13
AI in Special Education	2	P10, P12
Teacher Support/Needs	2	P1, P14
AI Impact on Teaching	2	P4*, P8

**Article marked with an asterisk addressed more than one research theme.*

Note: Compiled by the authors (2026) to summarize major themes in AI teaching studies of the 14 reviewed studies.

These articles primarily investigated the factors that influence a teacher's willingness to integrate AI tools into their professional practice. This finding aligns with the theoretical patterns noted in section 4.4, in which technology acceptance models (TAM and UTAUT) were the most frequently used frameworks.

Following AI Acceptance, the remaining research is distributed evenly across several specialized areas, with each theme represented by two studies (Bao et al., 2025; Alwaqdani, 2025) focused on general teacher attitudes, while Alcaine et al. (2024) and Bergdahl et al. (2026) highlighted specific Teacher Support/Needs, helping to identify the resources and training teachers require to feel competent with AI.

A notable niche identified was articles by Alhaif et al. (2025) and Alanazi (2025), which specifically explored the role of AI in Special Education, with focus on accessibility and personalized learning supports.

The articles also examined the practical side of integration through AI Adoption Strategies (Al-Zahrani & Alasmari, 2025; Blundell, 2025) and the measurable AI Impact on Teaching (Bao et al., 2025; Bower et al., 2024), which looked at how these tools change instructional outcomes. On the other hand, while most studies focused on a single domain, certain articles demonstrated thematic overlap. For instance, the study by Bao et al. (2025) is unique in that it addressed both Teacher Perceptions and AI Impact on Teaching, providing a bridge between how teachers feel about AI and how they utilize it in practice. Suggesting that while most research is currently siloed into specific categories, there is an emerging trend toward multi-dimensional analysis.

Discussion

This discussion situates the study's findings within the existing literature to provide deeper meaning and interpretation of the identified patterns in teacher-centered AI research, particularly regarding teachers' perceptions of AI tools, reason for denial and acceptance, AI adoption in education, methodological approaches, educational settings, theoretical/conceptual patterns, and AI themes.

Findings from the study revealed that teachers' overall perceptions of AI are positive but cautious. Many teachers acknowledge the potential of AI-driven technologies to improve teaching quality, automate instructional tasks, and tailor learning processes to different students. Additionally, AI tools are beneficial in creating learning materials, providing feedback, and enhancing differentiated instruction (Chiu et al., 2023; Holmes et al., 2022).

Despite the positive attitudes, teachers are also concerned about ethical issues, reliability, confidentiality of the data, and the potential impact of AI on students' creativity and critical thinking, as reported by previous studies as well (Zawacki-Richter et al., 2019). Many teachers believe that AI technologies can be considered supportive rather than a substitute for teachers. The findings are consistent with recent research suggesting that AI can serve as a complementary source to enhance teaching practice, and that the central role of human teacher expertise and emotional understanding should be maintained in educational contexts (Molenaar, 2022).

Another key finding is the existing gap between teachers' interest in adopting AI technology and their level of confidence and literacy in using them. Although teachers are willing and interested in adopting AI, many highlighted their limited knowledge and insufficient training on the effective integration of AI in their teaching practice. This is in line with similar findings in literature emphasizing the lack of structured professional training related to AI integration into teaching practice (Crompton & Burke, 2023; Alfredo et al., 2024).

This content analysis also uncovers different gaps in teacher-centered studies. First, most of the studies investigate the perceptions and acceptance of AI rather than examining AI technologies' impact on teaching practice and pedagogical decision making. Second, the significance of professional development in AI integration needs more attention. Many teachers report lack of confidence in adopting AI-driven technologies and AI literacy. Understanding how teachers develop their AI literacy through rich, professional training is crucial in effective use of AI technologies. Third, more studies are needed with a focus on teacher-AI collaboration. AI technologies are beneficial in instructional tasks, exploring how teachers effectively collaborate with AI-driven technologies in real classroom contexts (Holstein & Alevén, 2022). Finally, most of the studies highlight the significance of ethical concerns, academic integrity, and informed use of AI technologies in classroom contexts. Concerns such as misinformation, data privacy, and plagiarism as indicators of ethical considerations should be the focus in further studies.

Moreover, this study identifies a clear methodological pattern in the reviewed studies. Most of the reviewed papers used quantitative design as data collection tools in evaluating teachers' perceptions and behavioral intentions of integrating AI technologies. Only one study used a qualitative design, and mixed-method designs were used in a limited number of studies. The same patterns have been identified in systematic reviews of AI in education (Chiu et al., 2023; Zawacki-Richter et al., 2019). This imbalance highlights the need for conducting more qualitative studies in classroom-based contexts using various data collection tools such as interviews and classroom observation. These approaches provide a deeper understanding of teachers' perspectives, experiences, motivations, and challenges while integrating AI into their teaching practice (Holstein & Alevén, 2022).

Regarding educational settings, most studies were conducted in higher education contexts, while studies with a focus on schools remain limited. Since the challenges and pedagogical requirements are different across the contexts, further research should be done in K-12 settings, especially in primary and middle school. Comparative studies are also helpful in exploring different institutional policies, AI infrastructures and cultural contexts, and their role in affecting teachers' integration of AI and their strategies (Crompton & Burke, 2023).

The results also showed that the most dominant theoretical background was TAM. More specifically, the UTAUT and the TAM were the most frequently used by authors as theoretical frameworks. These frameworks highlight some factors such as perceived usefulness, ease of use, and intentions of adopting AI technologies (Venkatesh et al., 2003). Although technology adoption frameworks such as TAM and UTAUT provide valuable insights into teachers' perceptions of usefulness, ease of use, and behavioral intentions, they offer limited explanations of how AI technologies shape pedagogical decision making. In other words, adoption of AI tools does not necessarily translate into meaningful pedagogical integration. Teachers' beliefs about learning,

instructional goals, and classroom practices play a critical role in determining how AI is used in teaching. The dominance of technology acceptance frameworks in the reviewed studies suggests that current research emphasizes adoption behavior more than pedagogical transformation. Future research should therefore incorporate teacher-centered frameworks—such as TPACK and teacher-AI collaboration models—to better understand how educators integrate AI into teaching practices while maintaining pedagogical autonomy.

Studies with more pedagogically oriented frameworks are needed that focus on teacher knowledge, teacher-AI collaboration, and various structural strategies. Combining pedagogical frameworks and technology acceptance models may provide a comprehensive insight of how teachers adopt AI in real classroom contexts (Molenaar, 2022).

Implications

This content analysis of 14 studies on teachers' perceptions and adoption of AI in education highlights key implications for research, teaching practices, teacher training, and policymakers. While AI provides substantial opportunities to improve teaching and learning, successful integration relies on managing both technological and human elements.

Theoretical Implications. The reviewed studies demonstrate a concentration in higher education and K–12 contexts, with limited research in primary and middle schools. To develop a more comprehensive understanding of AI in teaching, future research should expand across diverse educational levels and cultural contexts. Longitudinal designs are particularly important to track changes in teachers' perceptions and practices over time, as several studies indicate that acceptance of AI evolves with experience and familiarity.

Additionally, mixed-method and qualitative approaches are also underrepresented—with only one qualitative study out of 14—and are crucial for exploring the nuanced experiences, motivations, and concerns of teachers, particularly in classrooms where AI adoption intersects with pedagogical beliefs and ethical considerations.

The dominant frameworks applied in the reviewed studies were UTAUT, TAM/extended TAM, and less frequently, TPACK, Innovation Theory, or Teacher Traits models. While these frameworks are useful for examining acceptance and adoption, there is a need to incorporate teacher-centered, pedagogically oriented frameworks that capture the complexity of teacher-AI collaboration (TAC). Frameworks such as TPACK, combined with ethical and socio-technical perspectives, could better guide research on the interaction between teacher knowledge, pedagogical decisions, and AI tools. Moreover, research should consider the role of constructivist and student-centered teaching beliefs in moderating AI adoption and use.

Pedagogical Implications. These findings reinforce the central role of teachers in guiding responsible and pedagogically meaningful AI integration in educational contexts. The content analysis underscores the need for teachers to actively engage in AI-supported teaching while maintaining professional autonomy. Teachers need structured professional development to build AI literacy, pedagogical skills for integrating AI, and strategies for collaborative human-AI decision making.

Effective TAC requires teachers to understand both the strengths and limitations of AI. Training should emphasize complementary roles where AI supports routine or data-intensive tasks, allowing teachers to focus on critical thinking, creativity, and relational aspects of teaching.

AI integration also necessitates revisiting traditional instructional and assessment approaches in AI-supported classrooms. For example, lesson planning, formative feedback, and collaborative activities may be enhanced through AI tools, but this requires careful integration aligned with curriculum objectives. At the same time, concerns about workload, technical barriers, and ethical issues need to be acknowledged and addressed through professional learning communities, peer collaboration, and institutional support structure.

Teacher education programs play a critical role in equipping pre-service and in-service teachers for AI integration. These programs should incorporate and address knowledge, technical skills, pedagogical applications, ethical considerations, and assessment strategies. Programs should encourage teachers to critically evaluate AI-generated content, understand potential biases, and integrate AI in ways that support equity and inclusion. Moreover, promoting constructivist and student-centered pedagogical orientations may enhance teachers' readiness to adopt AI effectively.

Finally, institutional and policy-level interventions are necessary to facilitate AI integration. Schools and universities must provide equitable access to reliable AI technologies, technical support, and implement ongoing professional development tailored to teachers' needs. Policies should clarify expectations for responsible AI use, academic integrity, data privacy, and ethical considerations to guide teachers in decision making. Institutions should develop coherent strategies for AI adoption that align with curriculum standards, teaching objectives, and teacher readiness.

Integrating AI in education is not merely a technological challenge but a socio-pedagogical one. Effective AI adoption requires research that deepens our understanding of teacher experiences, professional development that enhances AI literacy and pedagogy, and institutional policies that provide clear guidance, support, and resources. By addressing these areas, AI has the potential to transform teaching practices positively while respecting teacher expertise and promoting student-centered learning.

Additionally, exploring students' perspectives helps to understand AI's educational impact, while cross-regional, educational-level, and subject comparisons can guide tailored strategies. Cross-cultural studies are needed to assess how policies and cultural contexts influence adoption. Further investigation into ethical issues, responsible AI use, and long-term impacts is recommended. Studies should also examine factors such as self-efficacy, perceived usefulness, institutional support, and prior technology experience that affect AI integration.

Conclusion

This study provides a content analysis of 14 recent research papers examining teachers' perceptions and adoption of AI in educational settings, highlighting both opportunities and challenges in integrating AI into teaching practice. The findings indicate that teachers generally hold cautiously positive attitudes toward AI, recognizing its potential to enhance instructional efficiency, support student learning, and enable personalized and collaborative approaches.

However, acceptance is strongly influenced by factors such as AI literacy, perceived usefulness, ease of use, pedagogical beliefs, institutional support, and ethical considerations. Conversely, resistance is often associated with concerns about technical barriers, lack of training, academic integrity, and uncertainty about AI's role in teaching.

The analysis highlights the central role of teachers as key mediators in AI integration. Effective teacher-AI collaboration requires ongoing professional training, clear institutional policies, and pedagogically informed approaches that respect teachers' expertise while leveraging AI as a supportive tool rather than a replacement. While research frameworks such as UTAUT, TAM, and TPACK have provided insights into adoption processes, future research should adopt more teacher-centered and contextually sensitive frameworks to capture the complexity of AI integration in classrooms.

This study underscores the need for continued research across diverse educational contexts, longitudinal designs, and mixed methods approaches to examine the long-term impact of AI on teaching practices, student learning outcomes, and teacher readiness. Several specific areas warrant attention for further research. First, resistance to AI integration often stems from limited knowledge or confidence in using AI tools. Future research should examine effective models of AI professional development and evaluate their impact on teacher readiness and instructional practices. Second, concerns about plagiarism, data privacy, bias, and misuse of AI are highlighted. Research should investigate these ethical implications, establish guidelines for responsible AI use, and explore teacher decision making when balancing AI support with academic integrity. Third, evidence remains limited on how AI affects learning outcomes and instructional practices across subjects and diverse student populations. Further research should explore long-term classroom outcomes, including applications in special education and differentiated instruction. Finally, AI adoption varies across educational systems due to differences in institutional policies, resources, cultural beliefs, and socio-technical readiness.

Comparative research is needed to inform context-sensitive approaches to AI integration.

In conclusion, AI in education presents significant potential to transform teaching and learning, but its effective integration depends on aligning technology with pedagogy, teacher expertise, and institutional support. By addressing these factors, educators, researchers, and policymakers can work together to ensure that AI serves as a powerful ally in enhancing teaching quality and fostering meaningful, student-centered learning experiences.

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Note: An asterisk () following the DOI link indicates an article that was used as a data source for the content analysis.*

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Sara Ayubian (Ayubian@ksu.edu) is a Ph.D. student and Graduate Research Assistant in the Department of Curriculum & Instruction, College of Education, at Kansas State University in Manhattan, KS. Her research focuses on STEM education, teacher education, educational equity, and emerging technologies in education, including AI and immersive learning environments. Connect with her on LinkedIn at <https://www.linkedin.com/in/sara-ayubian-841280363>.

Vajiheh Shahsavari (Vajiheh@ksu.edu) is a Ph.D. student in the Department of Curriculum & Instruction, College of Education, at Kansas State University in Manhattan, KS. Her research interests include women's education, social justice, curriculum studies, AI in education, and teacher-AI collaboration. Follow her on LinkedIn: <https://www.linkedin.com/in/vajiheh-shahsavari-21687a1b1/>.

Khamisani, Nelofar (nelofar@ksu.edu) is a postdoctoral fellow in the Department of Curriculum and Instruction, College of Education at Kansas State University. Her research interests include rural education, teacher education, and AI integration.

Ernestina Wiafe (ernestinawiafe@ksu.edu) is a postdoctoral fellow in the Department of Curriculum and Instruction at Kansas State University. Her areas of expertise include African education research, teacher education, and comparative and international education using qualitative research approaches. She is also developing a growing research interest in the use of emerging technologies in education.

J. Spencer Clark (jspencerclark@ksu.edu) is Chair and Professor in the Department of Curriculum and Instruction at Kansas State University. His research interests span curriculum theory, digital literacies, teacher education, and STEM-integrated education. He has authored 45+ peer-reviewed publications on civic education, rural and place-based learning, and teacher development across multiple international contexts.