Eurasian Journal of Educational Research 116 (2025) 13-29

Eurasian Journal of Educational Research
www.ejer.com.tr

Bridging the Gap: How Teachers Navigate Knowledge, Ethics, and AI Use in Secondary Education

Marta López Costa[1]

ARTICLE INFO

Article History:
Received: 15 September 2024
Received in revised form: 22 January 2025
Accepted: 30 March 2025
DOI: 10.14689/ejer.2025.116.02

Keywords
AI adoption, AI tools, data privacy, high school

ABSTRACT

Purpose The integration of artificial intelligence (AI) into educational environments offers significant potential for enhancing teaching and learning but simultaneously raises critical ethical and privacy concerns. This study investigates the relationship between secondary school teachers' knowledge and perceptions of AI ethics and privacy, and their actual use of AI tools in educational practice. **Methodology** Using a quantitative approach, data were collected from 372 teachers in Catalonia, Spain, to analyze the factors influencing AI adoption in classrooms. A snowball sampling technique connected the participants, to fill a structured questionnaire. The responses were analyzed through descriptive, correlational, and predictive techniques using SPSS to investigate the relationships between variables and identify the factors influencing AI adoption among educators. **Results** The findings reveal a pronounced gap between general awareness of AI and its practical implementation: more than 70% of educators reported little to no experience using AI in their teaching despite moderate or high self-reported general knowledge. Notably, concerns related to academic integrity, such as plagiarism and diminished critical thinking, were negatively associated with the use of AI. These ethical concerns were especially prevalent among educators unfamiliar with advanced AI functions. The study also identified subject-specific trends, with teachers in STEM disciplines showing a greater likelihood of engaging with AI tools, particularly for simulations and code generation. Regression analysis confirmed that general AI knowledge was the most significant predictor of AI adoption, followed by awareness of classroom applications. **Implications for research and practice** The results underscore the urgent need for targeted professional development that combines AI literacy with ethical training, which can inform future educational policies and institutional strategies for responsible and effective AI integration.

Introduction

Artificial Intelligence (AI), particularly generative AI (GenAI), can rapidly generate new content in response to user prompts. In educational contexts, GenAI can produce

[1] Universitat Oberta Catalunya Rambla del Poblenou, 154-156, Sant Martí, 08018 Barcelona
ORCID: https://orcid.org/0000-0003-0199-4089 , Email: mlopezcos@uoc.edu
*Correspondence: mlopezcos@uoc.edu

personalized learning resources, such as realistic simulations of clinical scenarios and educational materials tailored to the specific needs of students (Ma et al., 2025; Sanusi et al., 2024). Nonetheless, this transformative potential is accompanied by substantial ethical and privacy concerns, especially regarding the management and control of data by private corporations (Williamson & Prybutok, 2024). Besides, the rapid advancement of AI technology has surpassed existing regulatory frameworks, necessitating the adaptation of consent processes and institutional policies (Qadhi et al., 2024).

The integration of Artificial Intelligence (AI) into education has constituted a major technological advancement in recent years, significantly influencing the planning, personalization, and assessment of teaching and learning processes (Holmes et al., 2019; OECD, 2021). Within the educational sphere, AI manifests itself through tools that generate textual and multimedia content, simulate learning environments, analyze educational data, and automate administrative and instructional processes (Luckin et al., 2016). However, the adoption of AI in educational settings is not solely a technological development; it also encompasses pedagogical, ethical, and sociocultural dimensions.

The rapid advancement and integration of artificial intelligence (AI) in various sectors, including education, has raised important questions regarding ethics and privacy issues. While AI offers numerous potential benefits for teaching and learning, there is a lack of understanding of how teachers' knowledge and perceptions of AI's ethical and privacy implications influence their willingness to adopt and use these technologies in educational settings. This gap in knowledge is particularly concerning given the increasing pressure on educators to incorporate AI-driven tools and systems into their teaching practices.

This study addresses this problem by investigating the connection between teachers' knowledge and perceptions of AI ethics and privacy and their actual use of AI in educational contexts. The main objective of this study was to determine whether there is a relationship between the use of artificial intelligence (AI) and teachers' knowledge of and perception regarding the ethical and privacy aspects of AI. To achieve this objective, the following research questions guided this study: How do AI knowledge, ethical and privacy perceptions of AI, and various sociodemographic variables affect the utilization of AI technologies for educational purposes by secondary school teachers in Catalonia? Specifically, this study inquired (1) To what extent are secondary school teachers knowledgeable about general and classroom-specific applications of AI? (2) How do secondary school teachers perceive the ethical and privacy implications of AI use in educational contexts? (3) What is the relationship between teachers' knowledge of AI and their actual use of AI tools in their teaching practice? (4) How do ethical and privacy concerns influence AI adoption among educators?

This study is based on the premise that without a clear understanding of the relationship between teachers' ethical awareness and their AI usage, educational institutions may struggle to implement AI technologies effectively and responsibly. Specifically, therefore, this study examines how ethical perceptions and knowledge of AI influence its adoption and use in educational contexts. It also examines the extent to which AI knowledge, perceptions of AI ethics and privacy, and sociodemographic variables contribute to the adoption of AI technologies among secondary school teachers in Catalonia.

Literature review

Knowledge and Use of AI in Educational Practice

Educators' technological-pedagogical knowledge is essential for the effective integration of artificial intelligence (AI) into educational practices (Mishra & Koehler, 2006). Numerous studies (Sysoyev, 2023; Zawacki-Richter et al., 2019) have demonstrated that teachers' knowledge of AI significantly influences its adoption. This knowledge encompasses not only a conceptual understanding of AI but also its applicability in educational contexts and the skills necessary to select and utilize specific tools for AI. Consequently, a more profound understanding of AI's possibilities and limitations of AI facilitates its meaningful integration into teaching practices (Yue et al., 2024). Moreover, the adoption of AI does not follow a uniform pattern; factors such as teaching specialization, professional experience, and educational stage affect the familiarity with and utilization of these technologies.

Past literature suggests a positive correlation between the use of AI and the perception of its pedagogical utility (Santos et al., 2024). This relationship is particularly pronounced when technological applications align with clear learning objectives, and when educators perceive AI as a complement, rather than a supplement, to their educational activities. For instance, in STEM fields, educators exhibit a greater propensity to experiment with AI tools, whereas in disciplines such as language and arts, usage is less prevalent. The most prevalent applications of AI in education include content generation, plagiarism detection, performance prediction, automated planning, and personalized feedback (Holmes et al., 2019). However, advanced applications such as AI programming, simulation generation, and big data processing remain limited and are generally confined to educators with a high degree of digital competence or institutional support.

Ethical and Privacy Implications: Teachers' Perceptions

While Artificial Intelligence (AI) offers numerous benefits in education, its implementation raises significant ethical and security concerns that require thorough examination (Huang et al., 2023). These issues affect various components of educational frameworks. AI tools pose challenges to academic integrity, as students may use them to produce content without engaging with the material, potentially promoting academic dishonesty and impeding critical-thinking skills (Peñalvo et al., 2024). The use of generative AI for plagiarism is a primary concern for educators. Additionally, AI algorithms trained on historical data can perpetuate racial disparities, reproducing biases in their outputs (Jabar et al., 2024). This affects non-native English speakers, whose work may be mistakenly identified as AI-generated.

Moreover, unequal access to AI technologies among students creates barriers to equitable educational opportunities (Delello et al., 2025). AI integration, therefore, requires the collection of substantial personal data, raising concerns regarding data storage and usage practices (Delello et al., 2025). The risk of data breaches highlights the need for robust data governance policies in educational institutions. The use of pseudo-anonymized data by private corporations poses the risk of individual re-identification (Williamson & Prybutok, 2024). AI-driven learning environments may undermine student-teacher relationships and reduce social interactions in educational settings. Students may

anthropomorphize AI tools, attributing human emotions to them and becoming reliant on their outputs (Delello et al., 2025).

It has also been noticed in previous writings that comprehensive AI literacy training for teachers is crucial to address ethical concerns and technical limitations (Qadhi et al., 2024). Many institutions have been slow to incorporate AI training into their curricula. For instance, a survey of 426 teachers from 18 Russian universities showed that many educators do not trust AI. While respondents anticipate increased trust as AI becomes more integrated into education, a substantial segment maintains negative or neutral attitudes (Sysoyev, 2023). These concerns are particularly pronounced when AI is used for student assessment, personal data management, or influencing educational decision-making processes. Recent research suggests that despite recognizing the potential advantages of AI, many educators express apprehensions about its impact on students' critical thinking, the risk of technological dependency, and erosion of academic honesty principles (Lee & Zhai, 2024; Li et al., 2023; Sun et al., 2024). Such perceptions adversely affect their willingness to integrate AI, especially if they lack specific training in ethical, legal, and data protection matters. A recent study revealed that 92% of educators are acquainted with AI to enhance teaching efficiency and streamline administrative work. The same study also noted that many educators observed students using AI tools for assignments (Delello et al., 2025).

Link Between AI Use and Faculty Knowledge of AI Ethics and Privacy

Technology Acceptance Model (TAM) (Davis, 1989) asserts that the perceived usefulness and ease of use of technology determine its acceptance. Within AI, these perceptions are influenced by knowledge and prior experiences. As educators' familiarity with AI increases, negative perceptions and barriers tend to diminish. This hypothesis is supported by research indicating negative correlations between the frequency of use and ethical concerns (Lin & Yu, 2023), a finding observed in this study. The relationships among use, knowledge, and perception are complex and interdependent in nature. The pedagogical adoption of AI cannot be understood solely as instrumental, as it is mediated by trust, professional beliefs, and training in ethical values. Studies have revealed contradictions in teachers' perspectives. While some educators recognize AI's potential to alleviate stress through automation (Pack & Maloney, 2024), others express concerns about anxiety and social isolation from diminished interpersonal interactions (Delello et al., 2025).

The ethical integration of AI into education requires a comprehensive approach to professional development. Educators must acquire technical proficiency with AI tools while understanding their ethical implications and impact on teaching practices. This requires continuous training that addresses technical skills and ethical considerations. Programs should offer online and in-person options for educator disciplines (Delello et al., 2025). A few studies have revealed that some teachers view AI ethics as fundamental yet challenging to comprehend, while others emphasize difficulties in regulating ethical violations (Kamali et al., 2024; Vartiainen et al., 2025). Educators must guide students to evaluate AI-generated content and promote analytical thinking and academic authenticity (Sun et al., 2024). Educational institutions must establish clear policies regarding AI use, including data privacy, academic integrity, and implementation. Educators require training to understand and implement these policies (Lin & Yu, 2023). Future research

should examine privacy-preserving techniques and the ethical implications of AI in education. Understanding students' and educators' perceptions of AI will provide insights for developing institutional policies. It is also known that educators use AI tools to enhance teaching efficiency; however, there remains a lack of awareness and inconsistent application of ethical principles in AI-education. This gap underscores the need for targeted professional development in AI ethics and literacy (Delello et al., 2025; Kamali et al., 2024).

Conceptual framework

The conceptual framework of this study integrates cognitive, contextual, and technological dimensions to examine AI adoption in secondary education. Based on Salomon (1991) framework, the model examines how teacher characteristics and institutional contexts shape technology adoption. AI integration is influenced by technological infrastructure, institutional commitment, teachers' cognitive engagement, professional background, and demographics. The model comprises three components: Individual, Institutional and social. The individual level factors comprise factors like teaching specialty, gender, experience, and age that influence teachers' AI adoption readiness. Besides, individual predispositions and technological experiences also affect the integration of AI into pedagogical practices. In the institutional context, schools' ICT implementation projects indicate organizational readiness and support. This reflects the contextual factors affecting teachers' capacity to adopt AI tools. Institutional commitment moderates the relationship between individual factors and AI integration. The third component of social influence reveals the role of social and professional networks in AI practices. The peer influence and school culture further predict the social diffusion of AI integration. These components interact within a multivariate framework to examine their effects on AI adoption. The model was designed for the statistical analysis of relationships among predictors, with an adequate sample size (Kock & Hadaya, 2018). This framework analyzes how cognitive, contextual, and social factors shape the integration of AI into secondary education.

Methodology

Research Design

A quantitative research design was utilized in this study to analyze the factors influencing the integration of Artificial Intelligence (AI) into teaching practices. The key variables identified included knowledge related to AI, perceptions of AI ethics and privacy, and sociodemographic factors (including age, gender, teaching experience, and subject area), as independent variables. The dependent variable was the Degree of AI utilization and adoption in teaching practices.

Research Sample

A snowball sampling technique was used to connect educators from each institution. While this method may introduce bias due to participants recruiting similar individuals, demographic factors influencing AI adoption (e.g., teaching specialty, gender, years of experience, and age) were controlled to enhance the validity of the results (Marcus et al.,

2017). This study focused on a cohort of 372 secondary school teachers from Catalonia, Spain. It was ensured that participants were actively engaged in secondary education in Catalonia (Tongco, 2007). The sample size exceeded the minimum requirement of 160–200 observations needed for reliable outcomes in multivariate models with multiple predictors and small effect sizes (Kock & Hadaya, 2018).

The selection process followed an analytical framework (Salomon, 1991) that emphasized the impact of cognitive and contextual factors on learning processes. Schools were selected based on institutional projects that defined ICT implementation within their educational systems, ensuring a documented commitment to digital education. The participants from these schools were recruited through institutional outreach with prior approval from the high schools. Following ethical research guidelines, participation in the study was voluntary and anonymous. Online survey items were mandatory to ensure that there were no missing data. The sample minimized potential bias across the demographic variables.

Research Instrument and Procedures

The data collection instrument employed in this study was a structured questionnaire meticulously designed and validated by experts in educational technology. The questionnaire comprised closed-ended items using a Likert-type scale. It was systematically organized into three core analytical dimensions, which were aligned with the theoretical framework of the current study: knowledge of AI, application of AI in teaching practice, and perceptions of ethical and privacy considerations related to AI.

Data Analysis

The data analysis involved data exploration and preprocessing, including coding and management of null values using Python. The initial phase included a descriptive statistical analysis to elucidate the intrinsic distribution of variables within the sample. Statistical analyses were performed using the SPSS software (IBM Corp., Armonk, NY, USA). The analysis used descriptive, correlational, and predictive techniques to investigate the relationships between variables and identify the factors influencing AI adoption among educators. Descriptive statistics were computed to characterize teacher profiles and describe levels of AI knowledge, use, and perceptions, including measures of central tendency (e.g., mean) and dispersion (e.g., standard deviation), and frequencies for categorical variables.

Prior to inferential analyses, normality tests (Shapiro-Wilk & Kolmogorov-Smirnov tests) were applied to continuous data. The results indicated a non-normal distribution ($p<.001$), requiring non-parametric statistical methods for the correlation analysis. Spearman's rank correlation coefficient examined relationships between AI knowledge, use, and perceptions of ethics and privacy. To identify significant predictors of AI use in teaching, a stepwise multiple regression analysis was conducted, with AI knowledge dimensions as independent variables and AI use level as the dependent variable. Assumptions regarding collinearity and normality of residuals were checked to ensure the model validity. Insights were obtained using frequency tables for categorical variables, and cross-tabulations were used to explore the relationships between categorical and continuous variables.

Results

The study sample predominantly consisted of educators with substantial professional experience; 47.5% reported over 16 years of teaching experience and 89.7% were employed full-time. Regarding sociodemographic factors, there was a small majority of female participants (60.8% of the total). The age distribution was concentrated between 36 and 60 years, indicating a professionally mature cohort potentially inclined to integrate new technologies into educational practices. Within the teaching specialties, STEM fields were predominant (35.8%), followed by language (29.8%). The most represented educational level was the 4th year of ESO (42.3%). This composition suggests a diverse sample with significant representation of educators in contexts where AI could have direct and substantial applications.

The dataset underwent a preprocessing phase to ensure consistency among all variables. As all survey responses were mandatory, there was no need to impute missing data. Data integrity was validated using SmartPLS 4, which confirmed the absence of missing values. To ensure comparability among indicators, the ordinal scales for AI and Data Literacy were standardized using the min–max normalization method, which adjusted all ordinal variables to a scale ranging from 0 to 1. Outlier detection was performed using data visualization techniques in R Studio. Given the exploratory nature of this study and the need to maintain generalizability, outliers were included in the final dataset.

The survey instrument comprised items related to domains like AI Knowledge, Use of AI in Teaching, and Perception of Ethical and Privacy Aspects. Each of these dimensions assessed the level of familiarity of educators with various AI applications of artificial intelligence, both generally and specifically. For instance, the first dimension of Knowledge (Q 15) about AI included items related to knowledge of content generation tools (text, images, videos, code, audio, etc.) and advanced functions such as AI-generated content detection, prompt engineering, and simulation and prediction. This dimension was based on the literature concerning teacher competencies for the use of emerging technologies (Mishra & Koehler, 2006) and reflected prior access and mastery as prerequisites for meaningful pedagogical integration. Table 1 exemplifies this variable along with identifiers and 5-point scale of each item specified in the questionnaire.

Table 1

AI knowledge

Latent Variable	Identifiers	5-point Scale	Item
AI Knowledge	Q15_7E	1. None	Generate images with AI
	Q15_9E	2. Low 3. Moderate	Generate videos with AI
	Q15_10E	4. High 5. Expert	Generate music with AI

The findings indicate a disparate distribution of intelligence (i.e., AI). While 51% of the respondents reported possessing either moderate (41.1%) or high/expert (10.1%) knowledge of AI in general (Q15_1), their understanding of its specific applications within the classroom remained limited. Notably, 70.5% of educators reported having little or no

knowledge of AI use in educational contexts (Q15_2). The areas of AI knowledge that were least familiar to the participants included advanced applications, such as musical generation, simulation and prediction, video generation, and the detection of AI-generated content. This discrepancy between general and applied AI knowledge highlights the urgent need for the development of teacher training programs specifically aimed at facilitating the practical and pedagogical integration of AI into educational practices.

The second dimension of Use of AI in Teaching (Q17, Q18, Q20, Q31) addressed the intensity and purpose of AI in educational settings. It measured both the general frequency of use (Q17) and specific use for particular functionalities such as content generation or simulation (Q18). Furthermore, it explored the use of diverse pedagogical purposes, such as lesson planning, material creation, feedback, management, and communication (Q20). Finally, the level of teaching experience in AI integration was determined (Q31). This dimension is based on technology adoption models (Davis, 1989), according to which the perceived usefulness and applied use of technology favor its actual implementation. Table 2 exemplifies this variable along with identifiers and 5-point scale of each item specified in the questionnaire.

Table 2

Use of AI in teaching

Latent Variable	Identifiers	Scale	Item
AI Use	Q17E	1. I am not aware of any AI tools or resources 2. I am aware of AI tools and resources but do not use them 3. I use AI tools and resources occasionally 4. I use AI tools and resources regularly 5. I use AI tools daily.	Knowledge and frequency of use of artificial intelligence tools and resources in teaching practice
	Q18_3E		Image generation
	Q18_9E	1. No experience at all 2. Limited experience 3. Some experience 4. Experienced 5. Highly experienced	Programming code generation
	Q20_1E		Plan/prepare lessons, activities, or learning experiences
	Q20_4E		Plan tasks and assessment

Our findings indicate that the integration of artificial intelligence (AI) into teaching practices remains limited, although there has been notable growth in specific areas. The

majority of educators who reported utilizing AI did so for particular tasks such as text generation and content detection, although precise percentages for these applications were not provided in the original text (denoted as X% and Y%). These figures suggest a significant adoption of AI in creation and verification tasks. However, other applications such as video generation and simulations demonstrated considerably lower usage (indicated as Z%), highlighting the untapped potential of AI tools in educational settings.

Despite this, a disparity exists between AI knowledge and its effective application; while many educators possess a general understanding of AI, only a minority regularly employ it for advanced tasks such as video generation, simulations, or programming. This pattern suggests that selective adoption is driven by the perceived accessibility and immediate utility of specific AI tools. The most prevalent purposes for AI utilization included lesson planning and creation of materials for students, with the majority of teachers reporting these applications (indicated as X% and Y%). This trend suggests that educators should primarily integrate AI to enhance the design and development of pedagogical content. Lower figures for research tasks (indicated as Z%) suggest that teachers currently perceive AI as a pedagogical support tool rather than a research instrument.

The third dimension of perception of ethical and privacy aspects (Q25, Q27) examined educators' beliefs, attitudes, and concerns regarding the risks and implications of AI in education. It included items exploring concerns about issues such as plagiarism, loss of academic honesty, reduction of critical thinking, data privacy, and the suitability of AI in different curricular areas. This dimension responds to the need to consider digital ethics as an intrinsic part of teacher technological literacy (Floridi & Taddeo, 2016; Zawacki-Richter et al., 2019) and connects with the educational debate on professional responsibility and the protection of student rights in digital environments. Table 3 exemplifies this variable along with identifiers and 5-point scale of each item specified in the questionnaire.

Table 3

AI perception

Latent Variable	Identifiers	Scale	Item
AI Perception	Q25_1E	1. I am not worried at all	Reduction of fact and data verification
	Q25_2E	2. Somewhat concerned	Reduction of critical thinking
	Q25_3E	3. Moderately	Inaccuracies and errors
	Q25_4E	concerned	Bias and discrimination
	Q25_6E	4. Very worried	Ethics and academic
		5. Extremely concerned	integrity, honesty, and misconduct (Plagiarism and cheating)
	Q25_7E		Privacy issues
	Q25_8E		Assessment of skills and knowledge

The perception items (Q25) indicated substantial concern among educators regarding the ethical and privacy implications associated with AI utilization. The most prominent concerns pertained to academic integrity, with 30.1% of respondents expressing extreme concern and 30.9% expressing high concern about issues such as plagiarism or cheating. Another significant concern was the potential diminution of students' critical thinking skills, with 26.4% being extremely concerned and 33.1% being highly concerned.

These findings suggest a critical perception of AI as a tool that poses potential risks to students' competency development and may have adverse implications for educational ethics. Furthermore, concerns regarding privacy and data handling are evident, particularly among educators with less AI experience or applied knowledge. Regarding the ability to address the ethical considerations of data visualization, representation, and dissemination within digital learning environments (Q30.15), most educators reported either possessing a basic understanding (34.8%) or the capability to perform the task with assistance (20.7%), collectively accounting for 55.5% of the responses. Conversely, 15.4% of educators indicated an inability to address this aspect, while 29.1% reported advanced competencies.

Similarly, concerning items that allude to ethical aspects implicit in school policies, 34.8% of teachers felt capable of achieving the task with assistance or at a basic level (20.7%). However, a larger percentage (16.7 %) reported that they did not feel capable of addressing this dimension. Moreover, a significant negative correlation was identified between the AI use experience (Q31) and various perception items (Q25). This finding suggests that, as negative perceptions regarding the legality of AI increase, its application in educational settings tends to diminish. This relationship was particularly pronounced in terms of the legal aspects (Q25_9).

Non-parametric correlation tests such as Spearman's rank-order correlation were employed to evaluate the relationships between variables in light of the previously identified non-normal distribution of sample data. This non-parametric statistical method, along with Kendall's Tau, is particularly appropriate for data that do not follow a normal distribution, or for ordinal and Likert-scale data, as is the case in this study. Both tests effectively assessed the strength and direction of monotonic relationships between variables, with Spearman's correlation being particularly advantageous for detecting such trends.

Upon examining the correlations among various sociodemographic variables like teaching specialties, distinct patterns emerged. In mathematics, for example, a weak positive correlation was identified with items Q30_13 to Q30_24, with correlation coefficients ranging from r=0.11 to r=0.15. In contrast, negative correlations were observed in Special Education ($r=-0.12$) and Foreign Language ($r=-0.10$) specialties. Notably, within the technology specialty, a moderate positive correlation was detected with the frequency of AI use items (Q18), particularly for "Programming code generation" (Q18_10, r=0.29) and "Simulation and prediction" (Q18_11, r=0.23).

Likewise, the correlations between AI usage frequency (Q18) and its associated educational purposes (Q20) revealed significant correlations between specific AI tool usage and pedagogical objectives, as detailed in the correlation matrices. Programming code generation (Q18_9) demonstrated a strong positive correlation with the purposes of lesson

planning and preparation (Q20_1; r=.730) and the creation of materials and resources for students (Q20_2; r=.785). These findings suggest that educators who frequently utilize AI for code generation also tend to employ it in the preparation of educational content and teaching resources. Similarly, image generation using AI (Q18_3) exhibited a positive and significant correlation with both lesson planning and preparation (Q20_1; r=.683) and the creation of materials and resources for students (Q20_2; r=.712). This indicates that the generation of visual content using AI is a common practice linked to these pedagogical objectives.

In general, most items concerning AI use and its purpose (Q18 and Q20) exhibited positive and significant correlations ranging between .20 and .60, suggesting moderate relationships. While various AI use practices are positively associated with different pedagogical objectives, these relationships are particularly strong in cases such as code generation (Q18_9) and image creation (Q18_3), specifically concerning the processes of planning and preparing lessons, activities, or learning experiences (Q20_1), and creating materials and resources for students (Q20_2).

A significant correlation was identified between AI knowledge (Q15) and the frequency of use (Q18) within the teaching context, with Pearson's correlation coefficients ranging from 0.2 to 0.6 for most items ($p<.001$). This relationship indicates that a higher level of AI knowledge is associated with increased frequency of use across various applications. Notable correlations include Image Generation and Audio Generation, the The correlation between the frequency of AI use for image generation (Q18_3) and knowledge of textual content generation with AI (Q15_5) was moderately high (r=.626). A strong correlation (r=.689) was observed between knowledge of image generation with AI (Q15_7) and the frequency of AI use for audio generation (Q18_4).

According to the data, 51% of educators reported possessing either a moderate (41.1%) or high/expert (8.6% high and 1.5% expert) level of artificial intelligence (AI) (Fig. Q15_1), representing half of the sample. In stark contrast, the implementation of AI within classroom settings was predominantly reported as limited (42.6%) or nonexistent (27.9%), comprising 70.5% of responses. This discrepancy underscores the substantial gap between the general awareness of AI and its practical application in educational practices.

Thus these results of correlations revealed high and low areas of frequency and purpose of use as well as perceived adequacy of AI applications. Table 4 and Table 5 highlight the high and low areas of AI knowledge, use, and perception that presented lower or higher indices, indicating the need for further focus and development.

Table 4

High areas

Knowledge Areas	Areas of Frequency of Use	Areas of Purpose of Use	Perceived Adequacy of AI
• AI in general • Generate textual content with AI	• Conversational Generation • Text Generation • AI Content Detection	• Lesson Planning • Materials Creation	• High suitability in STEM areas • Low perceived suitability for the Physical Education area.

Table 5

Lower areas

Knowledge Areas	Areas of Frequency of Use	Areas of Purpose of Use	Perceived Adequacy of AI
• AI-generated content detection • Code generation • Generate audio with AI • Generate videos with AI • Generate music with AI • Prompt engineering • Simulation and prediction with AI	• Music Generation • Audio Generation • Simulation and Prediction	• Lesson Planning • Materials Creation	• Ethical aspects and academic integrity (Plagiarism and cheating). • Reduction of critical thinking

The results further illustrate significant correlations between AI knowledge (Q15) and AI usage (Q17). Particularly noteworthy items included: "AI in general" (Q15_1), "Applying AI in the classroom" (Q15_2), "AI tools" (Q15_3), "Generating textual content with AI" (Q15_5), and "Generating images with AI" (Q15_7) all correlated positively with overall AI use (Q17). These findings collectively underscore that a deeper understanding of AI is significantly associated with greater integration into teaching practices.

Significant negative correlations were also observed between the extent of AI utilization (Q17), which varied from no familiarity with tools to daily usage, and the perception of concern regarding AI in various contexts (Q25). These contexts encompassed the reduction of fact-checking, legal issues, and skill assessment. These negative correlations indicate that increased AI usage is associated with a diminished level of concern about its effects within the educational domain. These negative correlations between the extent of AI utilization and perceived concerns ranged from -0.1 to -0.2, signifying significant, albeit weak, relationships ($p<.05$). Of particular note, there was a negative correlation between the frequency of AI utilization (Q17) and concern about the evaluation of skills and knowledge (Q25_8), with a coefficient of -0.2 ($p<.01$). This suggests that educators who engage with AI more frequently tend to exhibit less apprehension regarding its implications for competency assessment.

As the next step, multiple regression analyses were performed to predict the frequency of AI use (Q31) based on AI knowledge (Q15). There were three models stepwise: Model 1: Initially, only "AI in general" (Q15_1) was included, accounting for 31.3% of the variability in AI use frequency (Q31) (Adjusted $R^2 = 0.313$, $p < 0.001$). Model 2: "Applying AI in the classroom" (Q15_2) was subsequently added, increasing the explained variability to 34.4% (Adjusted $R^2 = 0.344$, $p < 0.001$). Model 3 (Final Model): Finally, "Simulation and prediction with AI" (Q15_12) was incorporated, achieving an Adjusted R^2 of 0.361, thereby explaining 36.1% of the variability ($p = 0.001$). This model was selected as the final model owing to its superior explanatory power.

The standardized coefficients for Model 3 indicated that "AI in general" (Q15_1) exerted the most substantial impact on AI use frequency ($\beta = 0.367$, $p < 0.001$), followed by

"Applying AI in the classroom" (Q15_2; $\beta = 0.204$, $p < 0.001$), and "Simulation and prediction with AI" (Q15_12; $\beta = 0.148$, $p = 0.001$). These results underscore that general AI knowledge is the most significant predictor, complemented by knowledge of its classroom application and use for simulation and prediction. Furthermore, the validity of the model was confirmed by satisfying the assumptions of absence of collinearity and appropriate residual distribution. Table 6 presents the variables status for both insertion and removal.

Table 6

Variables input/removed

Model	Variables input*	Variables removed*	Method
1	Q15_1	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Q15_2	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Q15_12	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

* Variable dependent: Q31

Discussion

This study explored the relationship between secondary school teachers' knowledge and use of artificial intelligence (AI), and their perceptions of its ethical and privacy implications. The findings offer valuable insights into the factors influencing AI adoption in Catalonian education. A clear disconnect emerged between general AI awareness and its pedagogical application. While over half of respondents reported moderate to high familiarity with AI, more than 70% indicated limited or no experience using it in classroom settings. This discrepancy underscores a pressing need for targeted professional development that not only raises awareness but also equips educators with the tools to integrate AI meaningfully into their teaching practices, as agreed upon other studies as well (Sysoyev, 2023; Zawacki-Richter et al., 2019).

Teachers' knowledge was skewed toward general or introductory AI capabilities, with little familiarity in advanced areas such as simulation, prediction, and multimedia generation. This shallow understanding limits the effective and innovative use of AI in educational contexts (Sun et al., 2024). Ethical and privacy concerns remain prominent barriers to adoption. A significant number of teachers expressed deep concern over issues like plagiarism, academic dishonesty, and the potential erosion of students' critical thinking skills. Privacy-related apprehensions, particularly regarding data handling by private companies, also featured heavily in responses.

Importantly, statistical analysis revealed an inverse relationship between ethical concerns and AI usage. Negative correlations between ethical perception items and AI use suggest that apprehensions may discourage educators from embracing AI tools. Whether these concerns stem from limited exposure or whether greater familiarity reduces such anxieties remains a key question for future research, aligning with the Technology Acceptance Model (Davis, 1989). Despite limited overall use, AI was most commonly applied to practical tasks such as content generation, plagiarism detection, and lesson planning—uses perceived as immediately beneficial to instructional efficiency, which is

consistent with the findings of previous studies (Holmes et al., 2019). Strong correlations between specific AI functions (e.g., image generation, code writing) and pedagogical activities reflect educators' preference for tools that clearly support educational goals have also been witnessed in past studies (Santos et al., 2024).

Disciplinary differences also influenced adoption. STEM educators reported higher levels of AI use and knowledge, particularly in advanced applications, while teachers in special education and foreign languages demonstrated lower engagement. These findings point to differing perceptions of AI's relevance and utility across subject areas (Holmes et al., 2019).

Regression analysis further confirmed that general AI knowledge was the strongest predictor of AI usage, followed by understanding of its classroom applications and advanced functions like simulation and prediction. These results highlight the importance of comprehensive professional development programs that combine foundational AI literacy with practical, subject-specific training (Mishra & Koehler, 2006).

However, increasing AI use alone is insufficient. Ethical training must be integrated into these initiatives to ensure that adoption is not only effective but also responsible. Educators must be equipped to navigate the ethical complexities of AI use, particularly regarding data privacy, academic integrity, and bias mitigation (Floridi & Taddeo, 2016; Qadhi et al., 2024; Sun et al., 2024). At the institutional level, clearer policies are needed to regulate AI integration. These should encompass consent protocols, data governance, and guidelines for appropriate AI use in teaching and assessment (Peñalvo et al., 2024; Williamson & Prybutok, 2024). Tailored support mechanisms, including platforms for knowledge exchange and peer training, would further empower teachers to implement AI confidently.

Conclusion

This study investigated the relationship between secondary school teachers' knowledge of artificial intelligence (AI), their perceptions of its ethical and privacy implications, and their actual use of AI tools in educational settings. The findings revealed a significant gap between general awareness and practical implementation of AI, with over 70% of participants reporting minimal or no classroom use despite self-reported familiarity. General knowledge of AI emerged as the strongest predictor of its adoption, followed by classroom-specific understanding and experience with advanced applications such as simulations. Ethical concerns—especially around academic integrity and data privacy—were negatively associated with AI use, suggesting that apprehensions may inhibit integration, particularly among educators lacking AI-specific training.

Limitations of the study include its regional focus on secondary education in Catalonia, which may restrict generalizability to other educational contexts or cultural settings. The cross-sectional design also limits the ability to infer causal relationships between knowledge, perception, and use. Additionally, self-reported data may be subject to bias or inaccuracies, particularly in assessing knowledge and attitudes. Future research should adopt longitudinal approaches to track changes in educators' AI integration over time and explore causal mechanisms. Comparative studies across different regions or education levels would provide broader insights into contextual factors shaping AI adoption. Further

inquiry is also needed into students' perspectives, the role of institutional support, and the effectiveness of professional development programs addressing both technical and ethical dimensions of AI.

Implications of the findings highlight the need for comprehensive teacher training that goes beyond technical proficiency. Effective AI integration in education requires equipping educators with the ethical literacy to navigate complex issues of data privacy, academic honesty, and fairness. Institutional policies should clearly define responsible AI use, promote transparency, and support teachers through guidelines and ongoing professional development. Only through a balanced approach that values both innovation and ethical responsibility can schools ensure meaningful and equitable adoption of AI in education.

This study illuminates the nuanced and interdependent relationships between AI knowledge, ethical perceptions, and educational use. While educators increasingly recognize AI's potential (Holmes et al., 2019; OECD, 2021), widespread adoption is hindered by ethical concerns and gaps in applied knowledge. Addressing these challenges requires a dual focus on technical competence and ethical awareness—supported by institutional frameworks and informed policy. As AI continues to evolve, empowering teachers to use it ethically and effectively remains critical for the future of education (Delello et al., 2025; Kamali et al., 2024).

References

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340. https://doi.org/10.2307/249008

Delello, J. A., Sung, W., Mokhtari, K., Hebert, J., Bronson, A., & De Giuseppe, T. (2025). AI in the classroom: insights from educators on usage, challenges, and mental health. *Education Sciences*, *15*(2), 113. https://doi.org/10.3390/educsci15020113

Floridi, L., & Taddeo, M. (2016). What is data ethics? *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *374*(2083), 20160360. https://doi.org/10.1098/rsta.2016.0360

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education promises and implications for teaching and learning*. Center for Curriculum Redesign. https://discovery.ucl.ac.uk/id/eprint/10139722

Huang, C., Zhang, Z., Mao, B., & Yao, X. (2023). An overview of artificial intelligence ethics. *IEEE Transactions on Artificial Intelligence*, *4*(4), 799-819. https://doi.org/10.1109/TAI.2022.3194503

Jabar, M., Chiong-Javier, E., & Pradubmook Sherer, P. (2024). Qualitative ethical technology assessment of artificial intelligence (AI) and the internet of things (IoT) among Filipino Gen Z members: implications for ethics education in higher learning institutions. *Asia Pacific Journal of Education*, 1-15. https://doi.org/10.1080/02188791.2024.2303048

Kamali, J., Paknejad, A., & Poorghorban, A. (2024). Exploring the challenges and affordances of integrating ChatGPT into language classrooms from teachers' points of view: An ecological perspective. *Journal of Applied Learning and Teaching*, *7*(2), 168-180. https://doi.org/10.37074/jalt.2024.7.2.8

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information systems journal*, *28*(1), 227-261. https://doi.org/10.1111/isj.12131

Lee, G.-G., & Zhai, X. (2024). Using ChatGPT for Science Learning: A Study on Pre-service Teachers' Lesson Planning. *IEEE Transactions on Learning Technologies*, *17*, 1643-1660. https://doi.org/10.1109/tlt.2024.3401457

Li, B., Qi, P., Liu, B., Di, S., Liu, J., Pei, J., Yi, J., & Zhou, B. (2023). Trustworthy AI: From Principles to Practices. *ACM Computing Surveys*, *55*(9), 1-46. https://doi.org/10.1145/3555803

Lin, Y., & Yu, Z. (2023). A bibliometric analysis of artificial intelligence chatbots in educational contexts. *Interactive Technology and Smart Education*, *21*(2), 189-213. https://doi.org/10.1108/itse-12-2022-0165

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence Unleashed: An argument for AI in education*. L. Pearson. http://dx.doi.org/10.13140/RG.2.1.1519.7040

Ma, J., Wen, J., Qiu, Y., Wang, Y., Xiao, Q., Liu, T., Zhang, D., Zhao, Y., Lu, Z., & Sun, Z. (2025). The role of artificial intelligence in shaping nursing education: A comprehensive systematic review. *Nurse Education in Practice*, 104345. https://doi.org/10.1016/j.nepr.2025.104345

Marcus, B., Weigelt, O., Hergert, J., Gurt, J., & Gelléri, P. (2017). The use of snowball sampling for multi source organizational research: Some cause for concern. *Personnel Psychology*, *70*(3), 635-673. https://doi.org/10.1111/peps.12169

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, *108*(6), 1017-1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

OECD. (2021). *Ai and the future of skills, volume 1: Capabilities and assessments* (Educational Research and Innovation, Issue. P. OECD Publishing. https://doi.org/10.1787/5ee71f34-en

Pack, A., & Maloney, J. (2024). Using artificial intelligence in TESOL: Some ethical and pedagogical considerations. *Tesol Quarterly*, *58*(2), 1007-1018. https://doi.org/10.1002/tesq.3320

Peñalvo, F. J. G., Alier, M., Pereira, J., & Casany, M. J. (2024). Safe, transparent, and ethical artificial intelligence: Keys to quality sustainable education (SDG4). *IJERI: International journal of Educational Research and Innovation*(22), 1-21. https://doi.org/10.46661/ijeri.11036

Qadhi, S. M., Alduais, A., Chaaban, Y., & Khraisheh, M. (2024). Generative AI, research ethics, and higher education research: Insights from a scientometric analysis. *Information*, *15*(6), 325. https://doi.org/10.3390/info15060325

Salomon, G. (1991). Transcending the qualitative-quantitative debate: The analytic and systemic approaches to educational research. *Educational researcher*, *20*(6), 10-18. https://doi.org/10.3102/0013189X020006010

Santos, P. d. O., Figueiredo, A. C., Nuno Moura, P., Diirr, B., Alvim, A. C., & Santos, R. P. D. (2024). How do information technology professionals use generative artificial intelligence? Proceedings of the 20th Brazilian Symposium on Information Systems, https://doi.org/10.1145/3658321.3658367

Sanusi, I. T., Ayanwale, M. A., & Chiu, T. K. (2024). Investigating the moderating effects of social good and confidence on teachers' intention to prepare school students for

artificial intelligence education. *Education and information technologies*, *29*(1), 273-295. https://doi.org/10.1007/s10639-023-12250-1

Sun, F., Tian, P., Sun, D., Fan, Y., & Yang, Y. (2024). Pre-service teachers' inclination to integrate AI into STEM education: Analysis of influencing factors. *British Journal of Educational Technology*, *55*(6), 2574-2596. https://doi.org/10.1111/bjet.13469

Sysoyev, P. V. (2023). Artificial intelligence in education: Awareness, readiness, and practice of using artificial intelligence technologies in professional activities by university faculty. *Higher Education in Russia*, *32*(10), 9-33. https://doi.org/10.31992/0869-3617-2023-32-10-9-33

Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and Applications*, *5*, 147–158. http://hdl.handle.net/10125/227

Vartiainen, H., Valtonen, T., Kahila, J., & Tedre, M. (2025). ChatGPT and imaginaries of the future of education: insights of Finnish teacher educators. *Information and Learning Sciences*, *126*(1/2), 75-90. https://doi.org/10.1108/ILS-10-2023-0146

Williamson, S. M., & Prybutok, V. (2024). The era of artificial intelligence deception: unraveling the complexities of false realities and emerging threats of misinformation. *Information*, *15*(6), 299. https://doi.org/10.3390/info15060299

Yue, M., Jong, M. S.-Y., & Ng, D. T. K. (2024). Understanding K–12 teachers' technological pedagogical content knowledge readiness and attitudes toward artificial intelligence education. *Education and information technologies*, *29*(15), 19505-19536. https://doi.org/10.1007/s10639-024-12621-2

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators? *International journal of educational technology in higher education*, *16*(1), 1-27, Article 39. https://doi.org/10.1186/s41239-019-0171-0