

Article

Pedagogical Approaches to the Use of Artificial Intelligence in Teaching: Teachers' Preferences

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Abstract

Artificial intelligence (AI) is increasingly being introduced into educational practice, raising questions about how teachers perceive its pedagogical role and the extent to which they are willing to integrate it into teaching. This study examined primary and secondary school teachers' preferred pedagogical approaches to AI use and the contribution of professional awareness and conceptual beliefs to explaining these preferences. A total of 322 teachers from primary and secondary schools in Croatia completed an online questionnaire measuring professional awareness of AI, conceptual beliefs about its role in education, and preferred pedagogical approaches. Descriptive statistics, correlation analysis, and multiple regression were used to analyse the data. The results showed a clear preference for an integrative approach, in which AI is used to support teaching while teachers retain professional control over pedagogical decisions. The traditional approach was less pronounced, whereas the technological approach was almost entirely absent. Viewing AI as a didactically useful teaching tool was a significant positive predictor of preference for the integrative approach, whereas inactive awareness and critical beliefs about AI risks were significant negative predictors. These findings suggest that teachers accept AI primarily as a supportive tool within a pedagogical model that preserves their autonomy and responsibility for teaching.

Keywords: artificial intelligence in education; conceptual beliefs; integration of technology in teaching; pedagogical approaches; teachers' professional orientation

1. Introduction

The digital transformation of education in recent years has been strongly shaped by the development of artificial intelligence, particularly its generative variant. Generative artificial intelligence (GenAI) can be defined as a set of software tools which, based on existing datasets and through the application of artificial intelligence algorithms, generate original textual, visual, auditory and multimedia content ([Mao et al., 2024](#)). Within the educational context, such tools include, among others, Duolingo, ChatGPT, DALL·E, Siri, Research Rabbit, Gemini and Jenni.AI, as well as other related applications used in teaching and learning. Unlike earlier digital tools, generative artificial intelligence is no longer just a supporting technology, but is gradually becoming an active element of the teaching process. The integration of these technologies into educational practice assumes well-developed digital competences of both teachers and students, particularly their ability to use them purposefully and effectively in teaching processes ([Garzón-Artacho et al., 2021](#); [García López et al., 2024](#); [Moura & Carvalho, 2024](#)). GenAI in educational systems is directed towards



Academic Editor: Tak Lam Wong

Received: 25 May 2026

Revised: 1 July 2026

Accepted: 3 July 2026

Published: 5 July 2026

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improving the quality of the learning experience and transforming educational processes towards greater flexibility and accessibility. In this sense, artificial intelligence enables the creation of stimulating and interactive learning environments and reduces barriers to access to education, especially through digital and online platforms (Sharma et al., 2019). The use of chatbots, machine translation systems, adaptive learning systems and intelligent tutoring systems further enriches both teaching and learning activities. In addition, simulations, virtual reality and intelligent tutorials enable a deeper understanding of content and the development of competencies relevant for addressing contemporary social and professional challenges (Sharma et al., 2019; Chounta et al., 2022; Holmes et al., 2022; Moura & Carvalho, 2024). Such changes raise not only the question of the availability and technical capabilities of AI tools, but also of the ways in which they are pedagogically integrated. The OECD points out that the development of artificial intelligence in education reshapes questions regarding what students should learn, which competences remain essential in the age of artificial intelligence, and how curricula, teaching processes and the role of the teacher should evolve (OECD, 2026). Relevant strategic documents emphasise the ethical use of digital technologies and artificial intelligence. UNESCO's Recommendation on the Ethics of Artificial Intelligence (UNESCO, 2021) provides a comprehensive framework for the application of AI systems across various social domains, including education, science, culture, communication and information. In the educational context, the document particularly emphasises the need for systematic ethical reflection, the development of critical thinking, the application of principles of responsible design, and the acquisition of fundamental knowledge about artificial intelligence. Member states are therefore encouraged to develop and implement research initiatives aimed at the responsible and ethically grounded use of AI technologies in teaching, initial teacher education, professional development, and e-learning systems. The document highlights the importance of empowering all participants in the educational process, while at the same time emphasising the irreplaceable role of interpersonal relationships, the social dimension of learning, and the value of traditional forms of education in interactions between teachers and students, as well as among students themselves (UNESCO, 2021).

Accordingly, pedagogical approaches to the use of artificial intelligence in teaching are increasingly becoming the focus of research interest. Existing studies indicate that teachers recognise the usefulness of AI tools in lesson preparation, the creation of teaching materials, the organisation of activities, summarising and adapting content, designing tasks, and carrying out administrative work (Alfarwan, 2025; Cheah et al., 2025). However, their use is not uniform. Differences are reflected not only in the frequency of use, but also in which functions teachers perceive as pedagogically valuable forms of support, at which stages of the teaching process they use them, and what role they assign to them in teaching and learning (Chen et al., 2020; Güneyli et al., 2024; Alé et al., 2025; Alfarwan, 2025). Systematic reviews further show that the application of artificial intelligence in primary education, despite its recognised pedagogical potential, raises a number of challenges related to ethics, reliability, teacher preparedness, and its meaningful integration into teaching practice (Crompton et al., 2024). Uygun (2024) notes that teachers express concerns, highlighting the risk of creating an emotionally impoverished learning environment, potential threats to data security and privacy, the encouragement of student passivity, and negative effects on the development of students' inquiry and critical thinking skills. The way in which teachers approach artificial intelligence is also related to their perceptions of usefulness, ease of use, self-efficacy, and pedagogical beliefs. Research on K-12 teachers' adoption of generative AI further confirms the importance of pedagogical beliefs in shaping teachers' intention to use AI for teaching. Constructivist pedagogical beliefs have been shown to positively predict teachers' intention to adopt generative AI, whereas transmissive

pedagogical beliefs are negatively related to such intention (Tang & Zhong, 2026). This finding is particularly relevant for the present study because it supports the assumption that teachers' preferences regarding AI use are not determined only by perceived usefulness or technical familiarity, but also by their underlying pedagogical orientation. Research shows that teachers generally demonstrate openness towards AI tools and recognise their potential to enhance efficiency, support lesson planning, and facilitate the development of customised materials. However, they simultaneously express concerns related to ethics, privacy, content reliability, potential bias, and the risk of diminishing the human dimension of teaching (Cabero-Almenara et al., 2024; Güneyli et al., 2024; Val & López-Bueno, 2024; Yim & Wegerif, 2024; Alé et al., 2025; Bergdahl & Sjöberg, 2025).

Zhai (2023) emphasises that generative artificial intelligence is transforming the role of teachers and the ways in which they operate within their profession. He argues that perceptions of artificial intelligence, its acceptance, knowledge about it, and actual practices of use should not be considered separately, but rather as interconnected components of teachers' professional activity. In this regard, Zhai (2023) proposes a framework distinguishing four possible teacher roles within a generative AI environment: observer, adopter, collaborator, and innovator. For a more meaningful and in-depth integration of GenAI into teaching, continuous professional development of teachers and appropriate institutional support are essential (Akgun & Greenhow, 2022; Uygun, 2024; Yue et al., 2024; Zhai, 2024). Systematic reviews of artificial intelligence and learning analytics in teacher education further indicate that the successful use of AI in education depends not only on the availability of technological tools, but also on teachers' digital competences, attitudes, perceptions, and professional preparedness. Salas-Pilco et al. (2022) emphasise that AI and learning analytics can support teaching, learning, feedback, and decision-making in teacher education, but also point to the need for a stronger pedagogical and ethical grounding of their use. This is particularly relevant for the present study, as teachers' preferred approaches to AI use are likely to reflect not only their technical familiarity with AI tools, but also their professional awareness and conceptual beliefs about the role of AI in teaching.

In accordance with the above, it is justified to examine which pedagogical approaches to the use of artificial intelligence teachers consider appropriate for teaching practice. The successful implementation of artificial intelligence depends on the pedagogical design of teaching activities and the ways in which it is used in education (Liu & Zhong, 2024; Yue et al., 2024; UNESCO, 2024). In this regard, it is also important to consider the areas in which teachers most frequently use AI tools, as well as the frequency of their application. The results of such research may contribute to a better understanding of teachers' needs and preferences and serve as a basis for the development of a pedagogically grounded and purposeful integration of artificial intelligence tools into the teaching process.

Although existing research has extensively documented how AI tools function (Chen et al., 2020; Crompton et al., 2024) and how teachers perceive and accept them (Cabero-Almenara et al., 2024; Galindo-Domínguez et al., 2024; Yim & Wegerif, 2024), considerably less attention has been devoted to teachers' professional awareness of AI and their conceptual beliefs about its role, and to how these dimensions relate to the pedagogical approaches teachers prefer. It is at this level that the present study positions its contribution, from which the research questions follow directly.

In this study, a pedagogical approach to the use of AI is understood as the extent to which a teacher retains their own professional judgement when deciding about AI, rather than delegating it to the tool. On this basis, we distinguish three approaches, developed for the present study: using AI as support while retaining one's judgement (integrative), relying mainly on one's own practice with minimal use of AI (traditional), or delegating decisions to AI (technological). This distinction rests on the premise that

teachers' pedagogical beliefs are decisive for technology integration (Ertmer, 2005; Tondeur et al., 2017) and that the use of AI in educational decision-making requires professional judgement rather than its wholesale delegation to technology (Bearman & Ajjawi, 2023). The typology proposed in the present study was not adopted from the existing literature but was theoretically derived by integrating insights from research on the role of teachers' beliefs in technology integration (Ertmer, 2005; Tondeur et al., 2017), the importance of professional judgement in AI-supported educational contexts (Bearman & Ajjawi, 2023), and contemporary conceptualisations of teachers' roles in generative AI environments (Zhai, 2023, 2024). Zhai's (2023, 2024) framework of teacher roles is retained as complementary: it describes the roles teachers occupy, whereas our typology concerns the decisions through which those roles are enacted.

In addition to examining the role of teachers' professional awareness and conceptual beliefs, it is also relevant to consider whether preferred pedagogical approaches to the use of artificial intelligence vary across teaching domains. Teaching domains differ in their epistemic structure—that is, the extent to which they rely on procedural versus interpretive knowledge and the degree to which their content is standardized—as well as in their associated methodological (didactic) traditions (Qu et al., 2024). These characteristics may influence how compatible teachers perceive artificial intelligence to be with their subject area, particularly in activities such as generating, organizing, and adapting instructional content. Consequently, teachers in different domains may differ in their openness towards AI-supported teaching practices. For example, attitudes and patterns of use may vary between natural-science subjects and arts or humanities disciplines (Bergdahl & Sjöberg, 2025). At the same time, shared professional standards and a common sense of educational responsibility may result in similar pedagogical orientations regardless of teaching domain (Galindo-Domínguez et al., 2024; Tripathi et al., 2025). Examining these alternative expectations is therefore important for understanding whether pedagogical approaches to AI are shaped primarily by subject-specific characteristics or by broader professional beliefs and values.

The aim of this study was to examine which pedagogical approaches to the use of artificial intelligence in teaching are preferred by teachers in primary and secondary schools, and to determine the extent to which professional awareness of artificial intelligence and conceptual beliefs about its role in education contribute to explaining these approaches. The study addressed the following research questions:

- RQ1. Which pedagogical approaches to the use of artificial intelligence are preferred by teachers in primary and secondary schools?
- RQ2. To what extent do dimensions of professional awareness and conceptual beliefs contribute to explaining preferred pedagogical approaches to the use of artificial intelligence?
- RQ3. Are there statistically significant differences in scores on the scales of preferred pedagogical approaches to the use of artificial intelligence with respect to the participants' teaching domain (social sciences and humanities, natural sciences, technical fields, arts, and integrated primary classroom teaching)?

The findings are expected to contribute to a better understanding of the factors shaping teachers' pedagogical decisions regarding AI and to inform the development of professionally grounded strategies for its integration into teaching.

2. Materials and Methods

2.1. Research Sample

The study included a total of 322 teachers employed in primary and secondary schools in the Republic of Croatia. The sample (Table 1) was structured to encompass three professional teaching contexts: primary classroom teaching ($n = 133$), subject teaching in

primary schools ($n = 108$), and secondary school teaching ($n = 81$). Such a distribution enables the analysis of pedagogical approaches to the use of artificial intelligence in relation to different teaching demands, which vary with regard to lesson planning, subject specificity, and the methodological structure of the educational process.

Table 1. Research Sample.

Variable	Category	f	%
Gender	Female	285	88.5
	Male	37	11.5
Work experience	0–5 years	51	15.8
	6–10 years	41	12.7
	11–15 years	45	14.0
	16–20 years	44	13.7
	Over 20 years	141	43.8
Professional Qualification	Teacher	215	66.8
	Teacher mentor	50	15.5
	Senior teacher advisor	36	11.2
	Outstanding senior teacher advisor	21	6.5
Occupation	Primary classroom teacher (primary school)	133	41.3
	Subject teacher (primary school)	108	33.5
	Secondary school teacher	81	25.2
Teaching domain	Primary education (integrated teaching)	133	41.3
	Social sciences and humanities	101	31.4
	Natural sciences	47	14.6
	Technical fields	23	7.1
	Arts	18	5.6

With regard to gender distribution, female participants predominate in the sample (88.5%), reflecting the general characteristics of the teaching profession. In terms of work experience, the sample is largely composed of more experienced participants, with 43.8% having more than 20 years of service. Such a structure provides insight into established professional patterns and ways of interpreting the role of artificial intelligence in teaching, which are not primarily shaped by the initial stages of professional development. Considering the distribution of professional titles, the majority of participants have not undergone formal career advancement (66.8%), while a smaller proportion of the sample consists of mentor teachers, senior teachers (advisers), and outstanding senior teachers. In terms of teaching domain, the largest group comprised teachers in integrated primary education ($n = 133$; 41.3%). These teachers teach all subjects in the lower grades of primary school and were therefore treated as a distinct domain category. Among subject teachers, the largest groups taught social sciences and humanities ($n = 101$; 31.4%), followed by natural sciences ($n = 47$; 14.6%), technical fields ($n = 23$; 7.1%), and the arts ($n = 18$; 5.6%).

A convenience (non-probability) sample was employed in the study, whereby participants were included based on availability and voluntary participation through the online distribution of the questionnaire. This sampling approach is common in research relying on participants' self-assessment in the educational context, particularly when the aim is to examine patterns of professional orientations and interpretations within a heterogeneous

population of teachers. Although a convenience sample does not allow for strict generalisation of the results to the entire population, its structure enables the identification of relevant patterns and relationships among the variables studied, which is in accordance with the analytical nature of this research.

2.2. Instruments

For the purposes of this research, a questionnaire was developed to examine the relationship between professional awareness and conceptual beliefs about the use of artificial intelligence in education, as well as perceptions of the ways in which it is pedagogically integrated into the educational process. The underlying assumption in the construction of the instrument is that teachers' relationship to AI is not manifested only in their attitudes towards the technology, but primarily in the ways in which they attribute pedagogical meaning to it and define its role in teaching practice. The instrument consists of three scales.

The Professional Awareness of AI in Education Scale (25 items, Likert scale 1–5) measures five qualitatively distinct levels of professional awareness, which are treated as reflecting different patterns of engagement and reflexivity in the professional context. These levels include inactive, superficial, instrumental, ethical, and critically integrative awareness. The conceptual foundation of this scale is based on the UNESCO AI Competency Framework for Teachers (UNESCO, 2024), which distinguishes different levels of professional awareness of AI, ranging from the acquisition of basic understanding to the level of critical reflection and active participation in shaping educational practice. Furthermore, research examining the development of teachers' AI competences confirms that the professional relationship to AI does not develop linearly, but that different patterns coexist depending on professional experience, self-efficacy, and contextual factors (Chiu et al., 2024), which directly influenced the decision to operationalise the levels as independent subscales rather than as stages of a single developmental scale.

The Conceptual Beliefs about the Role of AI in Education Scale (16 items, Likert scale 1–5) measures four interpretative frameworks: pedagogical, critical, pragmatic, and reflexive conceptions. The theoretical basis for the operationalisation of this scale lies in research showing that teachers' pedagogical beliefs, particularly those concerning the perceived usefulness of AI and trust in its pedagogical potential, have significant predictive power for the actual acceptance and integration of AI tools (Choi et al., 2023). Such a multidimensional conceptualisation of beliefs is consistent with findings confirming that teachers' constructivist or transmissive orientation is one of the key moderators in the adoption of AI in teaching (Cabero-Almenara et al., 2024).

Professional awareness and conceptual beliefs are treated as distinct but related constructs. Professional awareness refers to the level and sophistication of teachers' engagement with artificial intelligence as a professional and educational issue, ranging from disengagement to critical reflection. Conceptual beliefs, in contrast, refer to the positions and interpretative perspectives that teachers adopt regarding the role of artificial intelligence in education. In other words, professional awareness concerns how and to what extent teachers reflect on artificial intelligence, whereas conceptual beliefs concern how they understand it and the role they attribute to it. The constructs are modelled separately because teachers may demonstrate a high level of professional reflection while holding different conceptual positions regarding artificial intelligence, ranging from critical and restrictive views to transformative ones. Thus, professional awareness captures the depth and quality of reflection on artificial intelligence, whereas conceptual beliefs capture the ways in which teachers conceptualise its educational significance and role.

The Preferred Pedagogical Approaches to the Use of AI Scale comprises seven situational scenarios with three response options and examines how teachers would respond in

specific teaching situations related to the use of AI in instruction. The format of situational scenarios with multiple response options was selected because declarative statements about attitudes towards AI do not always capture how teachers would actually behave in specific pedagogical situations. This approach draws on the understanding that the situational specificity of an instrument is important for the validity of measuring professional preferences (Bearman & Ajjawi, 2023). Each scenario offers three types of responses corresponding to the integrative model (AI as a supportive tool while maintaining professional control and judgement), the traditional model (retaining the dominant role of the teacher with minimal reliance on AI), and the technological model (delegating teaching decisions or functions to AI). The scenarios encompass situations related to lesson planning, student assessment, unauthorised use of AI by students, content that is not in accordance with learning outcomes, monitoring progress, methodological suggestions, and the optimisation of planning.

Respondents were required to select only one of the three response options in each scenario. This forced-choice format was employed to encourage participants to commit to one of the competing pedagogical approaches rather than endorsing multiple approaches simultaneously, thereby enabling a clearer classification of their pedagogical preferences. Each approach was scored according to the number of scenarios (out of seven) in which the respondent selected the corresponding option. This procedure yielded three scores ranging from 0 to 7, the sum of which always equalled 7, with higher scores indicating a stronger preference for a given approach. Because all three scores were derived from the same set of choices, they were compositional (ipsative) in nature, meaning that they were mutually dependent and necessarily negatively related. This characteristic was taken into account in the data analysis.

The items for all three scales were developed based on relevant theoretical frameworks and insights from the literature (Bearman & Ajjawi, 2023; Choi et al., 2023; Cabero-Almenara et al., 2024; Chiu et al., 2024; UNESCO, 2024). Prior to administration, all items were reviewed by the authors for clarity, content coverage, and alignment with the intended dimensions, providing initial evidence of content validity. The instrument was then piloted on a separate sample of 40 teachers from the target population who were not included in the main study. Based on their feedback, the clarity, comprehensibility, and appropriateness of the items were confirmed, and minor refinements were made to the wording of several statements; no substantial revisions were required. Because the instrument was developed deductively to operationalise theoretically specified dimensions, exploratory factor analysis was not conducted in this phase. The aim of the study was not to develop or validate a new measurement instrument, but rather to examine relationships among theoretically predefined dimensions. Analyses were conducted using composite scores for each dimension. The emphasis was placed on descriptive analyses, assessment of scale reliability, and examination of relationships among variables rather than on investigating the latent structure of the instrument. Nevertheless, further psychometric evaluation is warranted, including the examination of the instrument's factorial structure and the collection of additional evidence regarding its construct validity, which will be addressed in future studies.

The distinct purposes of the three scales correspond directly to the research questions addressed in the study. The Preferred Pedagogical Approaches Scale was used to identify teachers' preferred approaches to the use of AI and to examine differences in the preferences of teachers from different teaching domains (RQ1 and RQ3), whereas the Professional Awareness and Conceptual Beliefs scales were used to examine the extent to which these dimensions contribute to explaining preferred pedagogical approaches to the use of AI (RQ2).

2.3. Research Procedure

This study employed a quantitative cross-sectional survey design with a predictive component, in which dimensions of professional awareness and conceptual beliefs were examined as predictors of teachers' preferred pedagogical approaches to the use of AI.

Data were collected via a structured online questionnaire distributed via a digital platform, with access to the study organised in a way that ensured voluntary and anonymous participation. Prior to completing the questionnaire, participants were provided with relevant information about the purpose and aims of the study, as well as the nature of their participation, including the option to withdraw from the study at any stage without any consequences. Special attention was paid to ensuring the ethical soundness of the research procedure, including transparency in informing participants, the protection of the confidentiality of the collected data, and the preservation of participants' anonymity throughout all stages of the research and data processing.

The study was conducted in accordance with relevant ethical guidelines for scientific research in the field of education, and its implementation was approved by the Ethics Committee of the Faculty of Education, Josip Juraj Strossmayer University of Osijek (Republic of Croatia).

2.4. Data Analysis Method

Statistical data analysis was carried out using the IBM SPSS Statistics software package (Version 29.0, IBM Corp., Armonk, NY, USA). The analytical procedure was focused on examining the relationships between the dimensions of professional awareness, conceptual beliefs, and preferred pedagogical approaches to the use of artificial intelligence, with individual approaches treated as separate criterion variables. In the initial phase of the analysis, the distributional characteristics of all variables were examined and potential outliers were identified. Univariate outliers were identified using standardized (z) scores with a threshold of ± 3.5 , and multivariate outliers using Mahalanobis distances; on this basis, 14 cases were removed, yielding the final analytic sample of $N = 322$. In all regression models, predictors were entered simultaneously in a single step.

Considering the sample size and the stability of parametric procedures under conditions of moderate deviations from normality, further analysis was based on the application of parametric statistical methods.

Descriptive statistics were used to determine the level of preference for individual pedagogical approaches and to conduct a comparative analysis of their representation within the sample. This enabled the identification of dominant patterns of professional orientation towards the use of artificial intelligence in teaching.

To examine the predictive role of professional awareness and conceptual beliefs, multiple regression analyses were conducted, with the integrative, traditional, and technological approaches analysed as separate criterion variables.

As the three approach scores are ipsative in nature, they are linearly dependent and necessarily negatively intercorrelated. The use of separate standard regression models is nevertheless justified on three grounds. First, each approach is modelled independently, thereby avoiding the singular joint system that would arise were the linearly dependent scores entered simultaneously. Second, the integrative and traditional approaches constitute two poles of a single underlying continuum ($r = -0.96$ in the present data) and are accordingly interpreted as a single contrast rather than as two independent findings. Third, the technological approach is near-constant and is therefore reported for completeness but not interpreted substantively. A fully composition-appropriate analysis, employing log-ratio transformations or compositional and multinomial models, is recognised as a desirable direction for future research.

Differences in preferred pedagogical approaches with respect to participants' teaching domains were examined using one-way analysis of variance (ANOVA). The reliability of the measurement instruments was assessed by calculating the internal consistency coefficient (Cronbach's α).

3. Results

3.1. Descriptive Analysis of the Main Research Variables

The analysis of descriptive indicators (Table 2) indicates that the distributions of all analysed variables differ statistically significantly from the normal distribution, according to the Kolmogorov–Smirnov test. However, the values of skewness and kurtosis fall within acceptable limits for all variables except the technological approach, which is near-constant (approximately 91% of respondents scored zero) and departs markedly from normality (skewness = 3.44, kurtosis = 9.88); this variable is therefore presented for completeness but is not subjected to substantive parametric interpretation. Considering the sample size and the robustness of parametric procedures to moderate deviations from normality, parametric statistical tests were applied in the subsequent analysis.

Table 2. Descriptive Statistics.

	M	C	D	SD	Skew.	Kurt.	Min	Max	KS(p)	α
Professional Awareness										
Inactive Awareness	1.9	1.8	1.0	0.93	0.82	−0.23	1.0	4.8	0.00	0.89
Superficial Awareness	3.0	3.0	3.0	0.73	−0.25	−0.18	1.0	4.8	0.00	0.64
Instrumental Awareness	4.0	4.0	5.0	0.72	−0.67	0.12	1.8	5.0	0.00	0.82
Ethical Awareness	4.0	4.1	4.2	0.68	−0.74	0.39	1.8	5.0	0.00	0.74
Critical-Integrative Awareness	3.9	4.0	4.0	0.68	−0.50	0.12	1.4	5.0	0.00	0.76
Conceptual Beliefs										
Pedagogical Conception	4.2	4.3	5.0	0.72	−0.68	0.01	1.8	5.0	0.00	0.87
Critical Conception	3.4	3.4	3.0	0.79	0.05	−0.55	1.5	5.0	0.00	0.70
Pragmatic Conception	4.3	4.5	5.0	0.60	−0.83	0.34	2.0	5.0	0.00	0.81
Reflexive Conception	3.8	3.8	4.0	0.65	−0.27	0.12	1.5	5.0	0.00	0.63
Preferred Approaches to the Use of AI										
Integrative Approach	5.2	6.0	6.0	1.68	−1.33	1.37	0.0	7.0	0.00	
Traditional Approach	1.7	1.0	1.0	1.69	1.39	1.54	0.0	7.0	0.00	
Technological Approach	0.1	0.0	0.0	0.25	3.44	9.88	0.0	1.0	0.00	

LEGEND: M—mean, C—median, D—mode, SD—standard deviation, Skew.—skewness, Kurt.—kurtosis, Min—minimum score, Max—maximum score, KS(p)—significance (probability of error) of the Kolmogorov–Smirnov test for testing distribution normality, α —reliability coefficient (Cronbach's alpha).

The assessment of the internal consistency of the scales, expressed by Cronbach's α coefficient, indicates satisfactory to high levels of reliability for the majority of the applied measurement subscales. In this regard, borderline reliability was identified for the Superficial Awareness ($\alpha = 0.64$) subscale within the Professional Awareness of the Use of AI in Education scale. Borderline reliability was likewise found, within the conceptual-belief subscales, for the Reflexive conception ($\alpha = 0.63$), while the Critical conception was at the conventional threshold ($\alpha = 0.70$); findings involving these borderline subscales are interpreted with appropriate caution. Cronbach's α is reported only for the Likert-type awareness and belief subscales and is not reported for the preferred-approach scores, which are ipsative (forced-choice) counts for which internal-consistency reliability is not an appropriate index.

3.2. Professional Awareness of Artificial Intelligence

Patterns of professional awareness regarding the use of AI in education indicate the dominance of active and reflectively grounded orientations in relation to passive forms of professional engagement. The lowest value was recorded at the level of inactive awareness ($M = 1.9$; $SD = 0.93$), confirming that a passive and disengaged attitude towards artificial intelligence is not typical for the majority of participants. Superficial orientation ($M = 3.0$; $SD = 0.73$) is present to a moderate extent, suggesting that a proportion of teachers retain a limited, predominantly operational understanding of its role. On the other hand, higher levels of professional awareness (instrumental $M = 4.0$; $SD = 0.72$; ethical $M = 4.0$; $SD = 0.68$; and critical-integrative $M = 3.9$; $SD = 0.68$) demonstrate high and mutually very similar levels of expression. The results of the repeated measures analysis of variance indicate that participants differ statistically significantly in their assessments of individual levels of professional awareness, with a large effect size identified ($F = 539.27$, $p < 0.01$, $\eta^2 p = 0.63$). Bonferroni post hoc tests confirmed that almost all levels differ significantly from one another, with two exceptions: no statistically significant differences were found between the instrumental and ethical levels, nor between the instrumental and critical-integrative levels ($p = 1.00$; $p = 0.25$). The absence of significant differences between these levels of awareness suggests their functional interconnectedness and possible overlap in the ways in which teachers integrate different aspects of professional reflection on artificial intelligence.

3.3. Conceptual Beliefs About the Role of Artificial Intelligence in Education

The structure of conceptual beliefs reveals a clear predominance of pragmatically and pedagogically oriented interpretations of artificial intelligence. Two conceptions are dominant: the pragmatic conception, which reflects the view that AI is acceptable only when pedagogically justified and accompanied by an active role of the teacher, and the pedagogical conception, which perceives AI as a tool for enhancing teaching practice. Both achieved high mean values ($M = 4.3$ and $M = 4.2$), suggesting that teachers are neither explicitly pro-AI nor opposed to it, but rather selective and conditional in their approach.

The reflexive conception ($M = 3.8$; $SD = 0.65$) occupies an intermediate position, indicating that teachers recognise the potential of artificial intelligence for deeper changes in education, although this perspective does not dominate over the pragmatic approach. The critical conception ($M = 3.4$; $SD = 0.79$) demonstrates a moderate level of expression and a relatively balanced distribution (Skew = 0.05), suggesting the presence of awareness of risks, but without a dominant role in shaping attitudes.

Analysis of variance confirms statistically significant differences between the four conceptions ($F = 134.46$, $p < 0.01$, $\eta^2 p = 0.30$). Teachers most strongly endorse beliefs that view AI as a pedagogically useful and conditionally acceptable tool, while beliefs concerning its transformative role or its risks to professional autonomy are considerably less pronounced.

3.4. Preferred Educational Approaches to the Use of AI

Results on the scale of preferred pedagogical approaches indicate a pronounced preference for the integrative model of incorporating artificial intelligence into the teaching process ($M = 5.2$; $SD = 1.68$), whereby the technology is predominantly positioned as support for teachers' professional practice. In contrast, the traditional approach ($M = 1.7$; $SD = 1.69$), and particularly the technological approach ($M = 0.1$; $SD = 0.25$), show extremely low levels of acceptance. Patterns of asymmetry further confirm this distribution, with responses concentrated at higher values of the integrative approach and a marked absence of orientation towards delegating teaching functions to AI technology. Such a structure of results suggests that teachers do not reject artificial intelligence, but rather integrate it within

clearly defined boundaries of professional control. The acceptability of artificial intelligence is conditioned by its compatibility with existing pedagogical frameworks, rather than by a willingness to redefine the teacher's role in the teaching process. The obtained results indicate a selective integration of artificial intelligence, whereby teachers actively filter its role in accordance with their own professional standards and responsibilities.

3.5. Prediction of Preferred Approaches to the Use of AI in Teaching

In order to examine how professional awareness and conceptual beliefs about the use of AI in education shape the preference for pedagogical approaches to the use of artificial intelligence in teaching, standard multiple regression analyses were conducted in which individual approaches to the use of artificial intelligence were treated as separate criterion variables. Such an analytical approach enabled insight into differential patterns of predictive relationships, that is, into which aspects of professional awareness and conceptual beliefs contribute to shaping different models of perceiving the use of artificial intelligence in teaching. The emphasis was placed on distinguishing three qualitatively different pedagogical orientations, which reflect the relationships between teacher autonomy and the role of technology in the teaching process.

3.6. The Role of Professional Awareness and Conceptual Beliefs in Explaining Preference for the Integrative Approach to the Use of AI in Teaching

The results of the correlation analysis (Table 3) show that preference for the integrative approach to the use of artificial intelligence in teaching, which involves balanced and purposeful integration of AI into the teaching process, is associated with several predictor variables, with correlations ranging from negligible to moderate. Some associations are effectively zero, notably with ethical awareness ($r = -0.01$) and critical-integrative awareness ($r = 0.02$), and should not be read as relationships. Among the significant correlations, those with pragmatic beliefs ($r = 0.13$) and reflexive beliefs ($r = 0.17$) are weak and should not be overstated, whereas only pedagogical beliefs ($r = 0.42$) and inactive awareness ($r = -0.42$) reach a moderate, practically relevant magnitude.

Table 3. Intercorrelations among predictors and correlations between predictors and the Integrative Approach as the criterion variable.

	1	2	3	4	5	6	7	8	9	10
1. Integrative Approach	1	−0.42 **	−0.30 **	0.32 **	−0.01	0.02	0.42 **	−0.36 **	0.13 **	0.17 **
2. Inactive Awareness		1	0.58 **	−0.39 **	−0.02	−0.11 *	−0.51 **	0.51 **	−0.20 **	−0.26 **
3. Superficial Awareness			1	−0.04	0.24 **	0.11 *	−0.19 **	0.44 **	0.09	0.02
4. Instrumental				1	0.29 **	0.29 **	0.73 **	−0.25 **	0.37 **	0.48 **
5. Ethical					1	0.72 **	0.24 **	0.27 **	0.56 **	0.34 **
6. Critical-Integrative						1	0.28 **	0.20 **	0.49 **	0.48 **
7. Pedagogical							1	−0.29 **	0.52 **	0.57 **
8. Critical								1	0.19 **	0.05
9. Pragmatic									1	0.50 **
10. Reflexive										1

LEGEND: * $p < 0.05$; ** $p < 0.01$.

Preference for the integrative approach is positively associated with the instrumental level of professional awareness ($r = 0.32$), which reflects the belief that AI is useful primarily as a tool that accelerates lesson preparation, facilitates administrative tasks, and automates repetitive activities: that is, an understanding of AI through the lens of work efficiency. A positive association was also found with pedagogical beliefs ($r = 0.42$), which perceive AI as a means that can support more effective lesson planning and delivery and

enable the development of higher-quality teaching materials, provided that teachers retain professional judgement. The integrative approach also correlates positively with pragmatic beliefs ($r = 0.13$), which endorse the view that the use of AI is acceptable only when pedagogically justified, when the teacher maintains an active role, and when transparent ethical regulation is ensured, as well as with reflexive beliefs ($r = 0.17$), which understand AI as a phenomenon that transforms fundamental concepts of education and opens space for the development of innovative teaching models.

A negative association was found with inactive awareness ($r = -0.42$), characterised by the absence of professional reflection on AI and the belief that the topic is not relevant to teaching practice, as well as with superficial awareness ($r = -0.30$), which indicates a general interest in AI without a deeper understanding of its role and without active professional engagement. A negative relationship was also identified with critical beliefs ($r = -0.36$), which emphasise that the introduction of AI may undermine the pedagogical role of the teacher, reduce professional autonomy, and lead to a superficial approach to teaching.

No statistically significant association was found with the ethical level of professional awareness ($r = -0.01$), which involves reflection on the ethical justification of AI use, its implications for educational values, and the requirement that any integration be grounded in pedagogical criteria, nor with the critical-integrative level ($r = 0.02$), which denotes the highest level of professional awareness—active participation in shaping the role of AI in education and reflection on AI as a phenomenon that transforms the educational paradigm and the identity of the teaching profession.

Intercorrelations among the predictors are moderate to high and do not indicate a pronounced problem of multicollinearity, as shown in greater detail in Table 4.

Table 4. Measures of residual autocorrelation (Durbin–Watson) and multicollinearity (VIF and tolerance) for the Integrative Approach model.

	Durbin–Watson	Tolerance	VIF
Inactive Awareness	1.814	0.435	2.300
Superficial Awareness		0.559	1.788
Instrumental Awareness		0.426	2.346
Ethical Awareness		0.389	2.569
Critical-Integrative Awareness		0.418	2.391
Pedagogical Conception		0.300	3.333
Critical Conception		0.554	1.804
Pragmatic Conception		0.463	2.159
Reflexive Conception		0.524	1.909

The value of the Durbin–Watson coefficient ($DW = 1.81$) indicates the absence of significant autocorrelation of residuals, thereby satisfying the assumption of independence of errors. Indicators of multicollinearity fall within acceptable limits. Tolerance values range from 0.300 to 0.559, while variance inflation factor (VIF) values range between 1.80 and 3.33. As none of the values exceed critical thresholds, it can be concluded that there is no pronounced multicollinearity among the predictors. With regard to outliers, these were removed prior to all analyses, and therefore had no influence on the obtained results. The results of the regression analysis are presented in Table 5.

The results of the regression analysis (Table 5) show that the regression model is statistically significant ($F(9, 312) = 12.58, p < 0.01$) and that the set of predictors explains 27% of the variance in preference for the integrative approach to the use of artificial intelligence in teaching ($R^2 = 0.266$).

Table 5. Contribution of scores on individual subscales of the Professional Awareness and Conceptual Beliefs scales to the explanation of the Integrative Approach.

	V	B	t	p
Criteria	27%			
Inactive Awareness		−0.15	−2.04	<0.05
Superficial Awareness		−0.09	−1.44	>0.05
Instrumental Awareness		0.06	0.80	>0.05
Ethical Awareness		−0.01	−0.07	>0.05
Critical-Integrative Awareness		−0.05	−0.61	>0.05
Pedagogical Conception		0.25	2.83	<0.01
Critical Conception		−0.15	−2.24	<0.05
Pragmatic Conception		0.02	0.33	>0.05
Reflexive Conception		−0.02	−0.28	>0.05
R = 0.516; R ² = 0.266; Adjusted R ² = 0.245; F(9, 312) = 12.58; p < 0.01				

LEGEND: R—multiple correlation coefficient, R²—coefficient of determination, V—percentage of explained variance.

Among the included predictors, three variables make a statistically significant contribution: pedagogical beliefs (perceiving AI as a didactically useful tool; $\beta = 0.25$, $t = 2.83$, $p < 0.01$), as a positive predictor, and inactive awareness (a passive attitude and lack of interest in AI; $\beta = -0.15$, $t = -2.05$, $p < 0.05$) and critical beliefs (emphasising the risks and limitations of AI; $\beta = -0.15$, $t = -2.24$, $p < 0.05$), which are negatively associated with preference for the integrative approach. The remaining variables did not prove to be statistically significant predictors.

The obtained results indicate that a more positive perception of artificial intelligence as a useful teaching tool contributes to a greater inclination towards the integrative approach, while a passive attitude towards the technology and an emphasis on its limitations reduce the likelihood of its balanced and purposeful integration into the teaching process.

3.7. The Role of Professional Awareness and Conceptual Beliefs in Explaining Preference for the Traditional Approach to the Use of AI in Teaching

Prior to conducting the regression analysis, the fundamental assumptions were examined, including intercorrelations among variables, residual autocorrelation, multicollinearity, and the presence of outliers. Correlational relationships between predictors and the criterion variable are presented in Table 6.

Table 6. Intercorrelations among predictors and correlations between predictors and the Traditional Approach as the criterion variable.

	1	2	3	4	5	6	7	8	9	10
1. Traditional Approach	1	0.41 **	0.29 **	−0.34 **	0.02	−0.01	−0.41 **	0.36 **	−0.12 *	−0.17 **
2. Inactive Awareness		1	0.58 **	−0.39 **	−0.02	−0.11 *	−0.51 **	0.51 **	−0.20 **	−0.26 **
3. Superficial Awareness			1	−0.04	0.24 **	0.11 *	−0.19 **	0.44 **	0.09	0.02
4. Instrumental Awareness				1	0.29 **	0.29 **	0.73 **	−0.25 **	0.37 **	0.48 **
5. Ethical Awareness					1	0.72 **	0.24 **	0.27 **	0.56 **	0.34 **
6. Critical-Integrative Awareness						1	0.28 **	0.20 **	0.49 **	0.48 **
7. Pedagogical Conception							1	−0.29 **	0.52 **	0.57 **
8. Critical Conception								1	0.19 **	0.05
9. Pragmatic Conception									1	0.50 **
10. Reflexive Conception										1

LEGEND: * $p < 0.05$; ** $p < 0.01$.

Preference for the traditional approach, which entails maintaining the dominant role of the teacher with minimal reliance on AI, is positively associated with inactive awareness ($r = 0.41$, $p < 0.01$), characterised by the absence of professional reflection on AI and the belief that the topic is not relevant to teaching practice. A positive association was also found with superficial awareness ($r = 0.29$, $p < 0.01$), which indicates a general interest in AI

without active professional engagement and without a clear understanding of its potential applications in teaching, as well as with critical beliefs ($r = 0.36, p < 0.01$), which are based on the view that the introduction of AI may undermine the pedagogical role of the teacher, reduce professional autonomy, and lead to a superficial approach to teaching.

A negative association was found with the instrumental level of professional awareness ($r = -0.34, p < 0.01$), which understands AI as a tool that accelerates lesson preparation and facilitates repetitive administrative tasks, as well as with pedagogical beliefs ($r = -0.41, p < 0.01$), which perceive AI as a means that can support lesson planning and delivery and the development of teaching materials, subject to teachers' professional judgement. A negative relationship was also identified with reflexive beliefs ($r = -0.17, p < 0.01$), which understand AI as a phenomenon that transforms fundamental concepts of education and opens up possibilities for the development of innovative teaching models.

No statistically significant association was found with either the ethical or the critical-integrative level of professional awareness. In other words, deeper and critically grounded professional reflection on AI is not associated with a preference for the traditional approach. This finding suggests that teachers who view AI in the most reflective and critical manner are not necessarily those who completely reject it, indicating a qualitative distinction between critical reflection and passive resistance to technology. Intercorrelations among the predictors are moderate and do not indicate a pronounced problem of multicollinearity, and detailed indicators are presented in Table 7.

Table 7. Measures of residual autocorrelation (Durbin–Watson) and multicollinearity (VIF and tolerance) for the Traditional Approach model.

	Durbin–Watson	Tolerance	VIF
Inactive Awareness	1.815	0.435	2.300
Superficial Awareness		0.559	1.788
Instrumental Awareness		0.426	2.346
Ethical Awareness		0.389	2.569
Critical-Integrative Awareness		0.418	2.391
Pedagogical Conception		0.300	3.333
Critical Conception		0.554	1.804
Pragmatic Conception		0.463	2.159
Reflexive Conception		0.524	1.909

The value of the Durbin–Watson coefficient ($DW = 1.82$) indicates the absence of significant autocorrelation of residuals, thereby satisfying the assumption of independence of errors. Indicators of multicollinearity fall within acceptable limits. Tolerance values range from 0.300 to 0.559, while variance inflation factor (VIF) values fall within the range of 1.80 to 3.33. Such values indicate that there is no pronounced multicollinearity among the predictors. This is expected given the moderate correlations among the predictors. With regard to outliers, these were removed prior to all analyses, and therefore had no influence on the obtained results. The results of the regression analysis are presented in Table 8.

The results of the regression analysis (Table 8) indicate that the regression model is statistically significant ($F(9, 312) = 12.33, p < 0.01$) and that the set of predictors explains 26% of the variance in preference for the traditional approach to the use of artificial intelligence in teaching ($R^2 = 0.262$). Among the included predictors, three variables make a statistically significant contribution to explaining preference for the traditional approach. Inactive awareness ($\beta = 0.15, t = 1.98, p < 0.05$), reflecting the absence of professional reflection on AI and the belief that the topic is not relevant to teaching practice, and critical beliefs ($\beta = 0.14, t = 2.14, p < 0.05$), based on the view that AI may undermine the pedagogical role of the teacher and reduce professional autonomy, positively contribute to preference for this

approach. In contrast, pedagogical beliefs ($\beta = -0.24$, $t = -2.73$, $p < 0.01$), which perceive AI as a means that can support lesson planning and the development of teaching materials, subject to teachers' professional judgment, are negatively associated with the traditional approach. Teachers who endorse these beliefs are less likely to prefer the complete retention of the dominant role of the teacher with minimal reliance on AI.

Table 8. Contribution of scores on individual subscales of the Professional Awareness and Conceptual Beliefs scales to the explanation of the Traditional Approach.

	V	B	t	p
Criteria	26%			
Inactive Awareness		0.15	1.98	<0.05
Superficial Awareness		0.08	1.26	>0.05
Instrumental Awareness		−0.09	−1.20	>0.05
Ethical Awareness		0.01	0.18	>0.05
Critical-Integrative Awareness		0.05	0.69	>0.05
Pedagogical Conception		−0.24	−2.73	<0.01
Critical Conception		0.14	2.14	<0.05
Pragmatic Conception		0.00	−0.05	>0.05
Reflexive conception		0.01	0.19	>0.05
R = 0.512; R ² = 0.262; Adjusted R ² = 0.241; F(9, 312) = 12.33; $p < 0.01$				

LEGEND: R—multiple correlation coefficient, R²—coefficient of determination, V—percentage of explained variance.

The remaining variables did not prove to be statistically significant predictors in this model.

The findings suggest that a preference for the traditional approach cannot be explained solely by a rejection of technology, but is specifically linked to passivity towards AI and concerns regarding professional autonomy. At the same time, perceiving AI as a didactically useful and pedagogically designed tool, rather than merely a substitute mechanism, acts as a factor that reduces this preference. This finding indicates that the key variable in the acceptance of AI in teaching is the way in which teachers conceptualise its role—either as a threat to professional autonomy or as a means of supporting it.

3.8. The Role of Professional Awareness and Conceptual Beliefs in Explaining Preference for the Technological Approach to the Use of AI in Teaching

Prior to conducting the regression analysis, the assumptions of the model (correlations, residual autocorrelation, multicollinearity, and outliers) were re-examined. The results of the correlation analysis are presented in Table 9.

Table 9. Intercorrelations among predictors and correlations between predictors and the Technological Approach as the criterion variable.

	1	2	3	4	5	6	7	8	9	10
1. Technological Approach	1	0.06	0.08	0.09	−0.07	−0.07	−0.01	0.00	−0.11 *	0.00
2. Inactive Awareness		1	0.58 **	−0.39 **	−0.02	−0.11 *	−0.51 **	0.51 **	−0.20 **	−0.26 **
3. Superficial Awareness			1	−0.04	0.24 **	0.11 *	−0.19 **	0.44 **	0.09	0.02
4. Instrumental Awareness				1	0.29 **	0.29 **	0.73 **	−0.25 **	0.37 **	0.48 **
5. Ethical Awareness					1	0.72 **	0.24 **	0.27 **	0.56 **	0.34 **
6. Critical-Integrative Awareness						1	0.28 **	0.20 **	0.49 **	0.48 **
7. Pedagogical Conception							1	−0.29 **	0.52 **	0.57 **
8. Critical Conception								1	0.19 **	0.05
9. Pragmatic Conception									1	0.50 **
10. Reflexive Conception										1

LEGEND: * $p < 0.05$; ** $p < 0.01$.

The correlation analysis (Table 9) shows that preference for the technological approach, which entails a pronounced reliance on AI and the delegation of part of the teaching decision-making to technology, is not systematically associated with levels of professional

awareness or with conceptual beliefs about AI. The only statistically significant, but low negative association was found with pragmatic beliefs ($r = -0.11$, $p < 0.05$), which present the view that the use of AI is acceptable only when pedagogically justified and when the teacher retains an active role in the teaching process. All other correlations did not reach the level of statistical significance. Because the technological approach is a near-constant variable with very limited variability (the large majority of respondents scored zero), the absence of significant predictors should be attributed primarily to this restricted variability rather than to a genuine absence of associations; the corresponding model is therefore reported for completeness.

The absence of significant associations with the remaining predictors can be interpreted in two ways. On the one hand, the technological approach is likely weakly represented in the sample, that is, teachers who would fully delegate teaching decisions to AI constitute a marginal group, which reduces the statistical power to detect associations. On the other hand, this finding suggests that a tendency to delegate teaching decisions to technology is not characteristic of any specific level of professional awareness or of a particular type of conceptual belief, making it difficult to predict on the basis of the measured constructs.

Intercorrelations among the predictors are moderate and do not indicate a pronounced problem of multicollinearity, and detailed indicators are presented in Table 10.

Table 10. Measures of residual autocorrelation (Durbin–Watson) and multicollinearity (VIF and tolerance) for the Technological Approach model.

	Durbin–Watson	Tolerance	VIF
Inactive Awareness	1.815	0.435	2.300
Superficial Awareness		0.559	1.788
Instrumental Awareness		0.426	2.346
Ethical Awareness		0.389	2.569
Critical-Integrative Awareness		0.418	2.391
Pedagogical Conception		0.300	3.333
Critical Conception		0.554	1.804
Pragmatic Conception		0.463	2.159
Reflexive Conception		0.524	1.909

The value of the Durbin–Watson coefficient ($DW = 1.82$) indicates the absence of significant autocorrelation of residuals, thereby satisfying the assumption of independence of errors. Indicators of multicollinearity fall within acceptable limits. Tolerance values range from 0.300 to 0.559, while VIF values range between 1.80 and 3.33, indicating the absence of a pronounced multicollinearity problem among the predictors. As for the outliers, these were removed prior to all analyses, and therefore had no influence on the obtained results. The results of the regression analysis are presented in Table 11.

Table 11. Contribution of scores on individual subscales of the Professional Awareness and Conceptual Beliefs scales to the explanation of the Technological Approach.

	V	B	t	p
Criteria	5%			
Inactive Awareness		0.03	0.35	>0.05
Superficial Awareness		0.08	1.03	>0.05
Instrumental Awareness		0.20	2.42	<0.05
Ethical Awareness		−0.06	−0.66	>0.05
Critical-Integrative Awareness		−0.04	−0.45	>0.05
Pedagogical Conception		−0.05	−0.50	>0.05
Critical Conception		0.04	0.48	>0.05
Pragmatic Conception		−0.14	−1.66	>0.05
Reflexive Conception		0.04	0.53	>0.05
$R = 0.219$; $R^2 = 0.048$; Adjusted $R^2 = 0.021$; $F(9, 312) = 1.74$; $p > 0.05$				

LEGEND: R—multiple correlation coefficient, R^2 —coefficient of determination, V—percentage of explained variance.

The results of the regression analysis indicate that the model is not statistically significant ($F(9, 312) = 1.74, p > 0.05$) and that the set of predictors explains a very small proportion of the variance in preference for the technological approach to the use of AI in teaching ($R^2 = 0.048$; adjusted $R^2 = 0.021$). None of the included predictors proved to be statistically significant, indicating that professional awareness and conceptual beliefs do not contribute to explaining this approach. The findings suggest that the technological approach, which means a pronounced reliance on artificial intelligence and the delegation of teaching decisions to technology, is not systematically associated with the examined dimensions, which may indicate its limited presence and insufficient development within the sample.

3.9. Differences in Scores on Individual Scales Depending on Teachers' Teaching Domain

In order to examine whether the results on the analysed variables differ with respect to professional context and teaching domain, participants were categorised into five groups according to their teaching domain: social sciences, natural sciences, technical fields, arts, and primary classroom teaching. This classification enabled insight into possible differences in professional orientations arising from the specific characteristics of subject content and the methodological requirements of different domains.

Prior to conducting further analyses, the assumption of homogeneity of variance was tested using Levene's test for each variable. This ensured the methodological appropriateness of applying one-way analysis of variance to examine differences between the defined groups (Table 12).

Table 12. Results of testing the homogeneity of variance using Levene's test when examining differences according to teachers' teaching domain.

	Levene's Statistics	df1	df2	p
Inactive Awareness	0.27	4	317	>0.05
Superficial Awareness	0.80	4	317	>0.05
Instrumental Awareness	0.60	4	317	>0.05
Ethical Awareness	0.91	4	317	>0.05
Critical-Integrative Awareness	0.92	4	317	>0.05
Pedagogical Conception	0.97	4	317	>0.05
Critical Conception	0.20	4	317	>0.05
Pragmatic Conception	0.50	4	317	>0.05
Reflexive Conception	1.85	4	317	>0.05
Integrative Approach	1.29	4	317	>0.05
Traditional Approach	1.68	4	317	>0.05
Technological Approach	1.04	4	317	>0.05

LEGEND: df—degrees of freedom, p—probability of error.

Levene's statistic indicates that there are no statistically significant differences in variances between groups of participants for any of the variables. The results of testing for differences are presented in Table 13.

The results of the analysis of variance indicate limited differentiation between the groups, with a statistically significant effect identified only for the dimension of instrumental awareness ($F(4, 317) = 2.50, p < 0.05$). However, additional post hoc analyses using Scheffé's test did not confirm the significance of individual pairwise differences, suggesting a weak magnitude of the identified effect. Such a pattern of results indicates that, despite the initially detected statistical significance, the differences between groups are not sufficiently pronounced to suggest clearly differentiated professional patterns. This means that the instrumental dimension of professional awareness shows a certain degree of variability

among the groups, but without a sufficiently strong effect to carry interpretative weight in the context of the pedagogical positioning of artificial intelligence.

Table 13. Results of one-way ANOVA testing differences according to teachers' teaching domain.

	F	p
Inactive Awareness	0.85	>0.05
Superficial Awareness	1.73	>0.05
Instrumental Awareness	2.50	<0.05
Ethical Awareness	2.01	>0.05
Critical-Integrative Awareness	1.77	>0.05
Pedagogical Conception	1.96	>0.05
Critical Conception	0.45	>0.05
Pragmatic Conception	0.87	>0.05
Reflexive Conception	1.69	>0.05
Integrative Approach	1.77	>0.05
Traditional Approach	0.89	>0.05
Technological Approach	1.72	>0.05

LEGEND: F—F ratio of one-way ANOVA, *p*—probability of error.

4. Discussion

The pronounced tendency of teachers to favour the integrative approach to the use of AI in teaching, which conceptualises AI as a pedagogical partner to the teacher, is consistent with the results of previous international research, according to which teachers accept AI as a supportive tool rather than as a substitute or a threat to professional autonomy (Bergdahl & Sjöberg, 2025). The correspondence of this finding with Zhai's (2023, 2024) category of collaborator indicates that teachers in the sample prefer a form of professional integration that entails an active, selective, yet still engaged role in the use of AI. However, the high standard deviation of the preference for the integrative approach suggests that this dominant orientation is not homogeneous. It includes significant individual differences that should be further examined in future longitudinal research.

The absence of a preference for the technological approach is analytically as important as the dominance of the integrative one. It indicates that teachers, at least at the level of self-assessment, are professionally convinced that pedagogical decision-making should remain within their remit, even when AI is present and functionally useful. This finding supports the theoretical position that the teaching profession is inherently resistant to the full delegation of pedagogical judgement to external systems, including algorithmic ones (Facer & Selwyn, 2021; Bearman & Ajjawi, 2023). At the same time, the absence of this extreme pattern may partly reflect social desirability bias, which represents a limitation of self-assessment instruments that should be taken into account.

These findings should be interpreted as espoused preferences rather than as evidence of actual classroom enactment. The scenarios capture teachers' behavioural intentions in concrete pedagogical situations—a deliberate design choice aligned with the research questions—rather than observed integration of AI in the classroom; behavioural intention is itself a legitimate construct, and the forced-choice situational format was chosen precisely because it captures intention more faithfully than decontextualized attitude scales (Bearman & Ajjawi, 2023). A substantial gap may nevertheless exist between teachers' espoused pedagogical preferences and their actual, daily classroom enactments, and the strong preference for the integrative approach reported here may partly reflect a professionally desirable orientation rather than documented use. This interpretation is consistent with empirical work on teachers' actual AI-usage behaviours, which reports uneven adoption and persistent difficulties of integration (Alfarwan, 2025; Cheah et al., 2025; Crompton et al., 2024;

Uygun, 2024). Accordingly, the practical implications of the present findings are framed within the limits of what preference data can support, as a basis for directing professional development and institutional support rather than as a description of classroom behaviour, and future research should incorporate observational or log-based indicators of actual AI use, which would allow the relationship between espoused preferences and enacted practice to be examined directly.

The results of the regression analysis offer several interesting interpretative perspectives. Pedagogical beliefs, that is, the perception of AI as a didactically useful tool that can improve lesson planning and delivery, proved to be a key positive predictor of preference for the integrative approach and a negative predictor of preference for the traditional approach. This result supports the theoretical assumption that beliefs about the pedagogical usefulness of technology shape teachers' professional orientation towards that technology (Ertmer, 2005; Tondeur et al., 2017). It is not sufficient for teachers just to be aware of AI and to understand its general capabilities. It is important that they perceive it as a pedagogically meaningful resource, which presupposes a certain level of didactic elaboration of its potential applications.

The negative contribution of inactive professional awareness and critical beliefs to the preference for the integrative approach, alongside their positive contribution to the preference for the traditional approach, reveals two qualitatively distinct pathways leading to the traditional approach. One is passive, characterised by a low level of engagement and the absence of an active professional relationship towards AI, while the other is critical, characterised by a conscious and reasoned reluctance to integrate AI, based on perceived risks and limitations. This distinction is particularly important because the predictions for inactive awareness and critical beliefs point towards the same outcome (preference for the traditional approach), yet originate from entirely different professional positions (passivity versus active critical reflection). As regression analysis does not distinguish between these two pathways, this finding requires further qualitative verification. This interpretation should nevertheless be regarded as tentative, given the ipsative nature of the outcome variables and the strong dependence between the integrative and traditional approaches. The absence of a contribution from higher levels of professional awareness (ethical and critical-integrative) as predictors of preferred approaches is also theoretically interesting. However, the observed associations were negligible in magnitude (ethical awareness $r = 0.01$; critical-integrative awareness $r = 0.02$) and should not be overinterpreted. The explanations offered below are therefore tentative and should be regarded as possible interpretations requiring further empirical verification. This finding indicates that developed professional reflexivity and critical reflection on the role of AI do not necessarily lead to a preference for either the integrative or the traditional approach. One possible interpretation is that a high level of reflexivity generates a simultaneous understanding of both the potential and the limitations of AI, thereby neutralising a clear orientation towards a particular approach. The result may also be explained by the fact that higher levels of professional awareness are closer to epistemological rather than instrumental dimensions of teaching practice, and therefore are not fully captured by situational instruments measuring pedagogical preferences. These results can be synthesised within a framework in which professional awareness and conceptual beliefs shape how AI is interpreted and evaluated in pedagogical decision-making (Ertmer, 2005; Tondeur et al., 2017). Rather than acting directly, they influence how AI is appraised in a given situation and are thereby associated with teachers' preferred approaches to its use. In each scenario, teachers must decide whether to involve AI while retaining professional judgement (integrative), keep it at the margins (traditional), or delegate the decision to AI (technological), and beliefs act as a cognitive filter on the perceived pedagogical costs and benefits of involving it. Pedagogical

beliefs frame AI as a didactically valuable resource that can support instructional goals and are associated with the integrative approach. Critical beliefs frame AI as a potential threat to teachers' professional role and autonomy and are associated with the traditional approach, whereas inactive awareness reflects an absence of professional attention, so the decision defaults to established practice. Pragmatic and reflexive beliefs, by contrast, remain conditional or principled and therefore do not orient concrete situational decisions as directly, which is consistent with their non-significance.

The absence of statistically significant differences in the preference for these approaches across teaching domains indicates homogeneity of teachers' orientations towards AI within the Croatian school system, regardless of the subject area in which they work.

The technological approach remained beyond the scope of statistical explanation, as evidenced by both its extremely low prevalence and the non-significance of the overall regression model. Although this finding should be interpreted with considerable caution due to the extremely limited variability of the technological approach, two tentative explanations may be considered. First, it is possible that this approach does not represent a stable psychological disposition, but rather a marginal and weakly grounded response that was selected incidentally or situationally by a negligible minority of participants. Second, it is possible that this pattern is suppressed by the normative context of the professional culture, in which the delegation of decision-making to algorithms is clearly perceived as unacceptable, and is therefore not chosen by respondents regardless of their actual beliefs.

Limitations

The conducted study has several methodological limitations that should be considered when interpreting the findings. The instrument relies on self-assessments within situational scenarios, which may introduce social desirability bias: that is, participants may have assessed their responses in accordance with professional norms rather than with what they would actually do in teaching practice. Furthermore, the cross-sectional research design does not allow for causal conclusions regarding the direction and nature of relationships between professional awareness, conceptual beliefs, and preferred pedagogical approaches. In addition, although the sample is relatively large, it is not random and does not ensure full generalisation of the findings to the population of Croatian teachers. It is possible that teachers with a prior interest in AI in education were more likely to participate in the study, which may have resulted in an overestimation of the prevalence of positive attitudes.

The findings should also be interpreted in light of several measurement-related limitations. Although the instrument was developed deductively and showed evidence of content validity and satisfactory internal consistency, its factorial structure has not yet been examined through exploratory or confirmatory factor analysis. Accordingly, further validation on an independent sample represents an important next step in strengthening evidence for its construct validity.

A further limitation relates to the scope of the scenario-based measure. Although the seven scenarios were intentionally framed around broad, profession-wide decision-making situations, they cannot fully capture all contextual nuances associated with different teaching roles, subject areas, and student age groups.

Another limitation concerns the possibility that factors not included in the present study may also contribute to teachers' preferred approaches to AI use in teaching. Previous research suggests that variables such as prior experience with digital technologies and AI, technological proficiency, and digital self-efficacy may influence how teachers perceive and use AI in educational contexts (Garzón-Artacho et al., 2021; Chiu et al., 2024; Moura & Carvalho, 2024). Although these variables are conceptually distinct from professional awareness and conceptual beliefs, they may partly account for individual differences in

teachers' orientations towards AI. Future research should therefore incorporate a broader range of personal and contextual variables in order to provide a more comprehensive explanation of teachers' preferred pedagogical approaches to AI use.

A particular methodological challenge is presented by the technological approach, which, due to its negligible representation in the sample and highly non-normal distribution, is difficult to examine using standard parametric methods. This finding may, in itself, be theoretically relevant. It is possible that the full delegation of teaching decisions to AI represents an attitude that conflicts with dominant professional norms of teacher autonomy, which explains its marginal presence even in the context of anonymous survey research.

Future research should employ a longitudinal design in order to monitor changes in teachers' attitudes and practices in the context of the rapid development of AI technologies. It is also recommended to combine quantitative measures with qualitative methods in order to understand not only the dominant orientation of teachers towards AI, but also its genesis, its conditioning by the institutional context, and its variability over time. It would also be useful to include objective indicators of the actual use of AI in teaching, which would enable verification of the relationship between declared preferences and actual teaching behaviour. Because the three preferred-approach scores are ipsative and linearly dependent, future studies should employ compositionally appropriate analytical techniques (e.g., log-ratio transformations or multinomial/compositional models) in order to examine these preferences more rigorously.

5. Conclusions

This study contributes to understanding the pedagogical dimension of integrating AI into teaching practice by focusing not on what teachers do with AI, but on how they professionally conceptualise its role. The tendency towards an integrative orientation, alongside the near-complete absence of a technological orientation, indicates that teachers in Croatia perceive AI as a resource that fits within their professional practice, rather than as a substitute or a threat.

Pedagogical beliefs (the perception of AI as a didactically useful tool) constitute a key positive predictor of preference for the integrative approach, while passive professional disengagement and an emphasis on the limitations of AI predict a preference for the traditional approach. It should be noted that the finding wherein pedagogical beliefs predict the integrative approach, while inactive awareness and critical beliefs predict the traditional approach, represents a single contrast viewed from two angles rather than two independent results, given that the integrative and traditional approaches are mirror images of one another ($r = -0.96$). The corresponding claims are therefore framed in terms of one underlying dimension—greater versus lesser reliance on AI while retaining professional control. These findings translate into concrete recommendations for distinct stakeholders. Because pedagogical beliefs are the strongest positive predictor of the integrative approach, teacher-education institutions should embed AI within methodology and didactics courses—rather than only within ICT courses—through scenarios in which prospective and in-service teachers design and critically appraise AI-supported teaching materials and activities while retaining professional judgement, thereby strengthening a pedagogical rather than a merely technical framing of AI. Because inactive awareness negatively predicts the integrative orientation, school principals and leadership teams should introduce low-threshold, mandatory introductory activities and peer demonstrations by colleagues who already use AI, in order to move disengaged teachers from passivity towards engagement. Because critical beliefs predict a more reserved, traditional orientation, educational policymakers should provide clear and transparent guidelines on data protection, academic integrity, and the limits of AI, so that the legitimate concerns of critically oriented teachers are addressed

institutionally and a barrier to integrative use is reduced. At the policy level, embedding AI competences into qualification standards and continuing-professional-development frameworks, together with shared libraries of exemplary teaching scenarios, would support these aims. Understanding teachers' preferred approaches to AI use may support the development of educational policies and professional-development initiatives that are aligned with teachers' needs and professional perspectives.

Author Contributions: Conceptualization, A.L. and A.Š.; methodology, A.L.; software, A.L.; validation, A.L.; formal analysis, A.L.; investigation, A.L., S.T. and A.Š.; resources, S.T. and A.Š.; data curation, A.L.; writing—original draft preparation, A.L., S.T. and A.Š.; writing—review and editing, A.L., S.T. and A.Š.; visualization, A.L., S.T. and A.Š.; supervision, A.L. and A.Š.; project administration, A.L., S.T. and A.Š. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of Josip Juraj Strossmayer University of Osijek, Faculty of Education (Klasa: 602-04/25-04/04; Urbroj: 2158-63-02-25-42; approved on 2 June 2025).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Participation was voluntary and anonymous. Prior to completing the online questionnaire, all participants were informed about the purpose of the study, the voluntary nature of participation, the anonymity of their responses, and their right to withdraw at any time without consequences. By proceeding with and submitting the questionnaire, participants provided their informed consent.

Data Availability Statement: The data presented in this study are available on request from the corresponding author due to privacy and ethical restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

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