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ARTIFICIAL INTELLIGENCE IN TEACHER EDUCATION: INVESTIGATING PRE-SERVICE TEACHERS' ATTITUDES, PRACTICES, AND PERSPECTIVES

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Abstract: This study investigates pre-service teachers' experiences, attitudes, and practices regarding Artificial Intelligence (AI) in education, with the aim of understanding how future educators perceive and engage with emerging technologies. It addresses four research questions focusing on their exposure to AI tools, perceptions of integration into teaching and learning, current practices, and perceived challenges. A mixed-methods questionnaire was administered to 73 students at the Ecole Normale Supérieure 'Assia Djebar', Constantine. The instrument combined quantitative analysis of close-ended items, which provided measurable data in relation to use and attitudes, with thematic analysis of open-ended responses, which offered deeper insights into perspectives and concerns. Results reveal varied levels of AI experience, with most engagement occurring in academic support tasks rather than in direct teaching practices. Attitudes towards AI integration were generally positive, though tempered by a significant proportion of neutral and uncertain views, suggesting a cautious openness. While some participants reported emerging uses – such as lesson preparation, assessment support, and information retrieval – others expressed resistance linked to concerns over reliability, ethics, and over-reliance on technology. Key apprehensions included technology dependence, data privacy, inequitable access, and lack of clear pedagogical guidance. The findings portray a sample population of university students that is curious and open to AI's potential, yet mindful of its risks. The results further underscore the importance of equipping pre-service teachers with targeted training, opportunities for critical engagement, and institutional support to develop responsible and reflective practices. The study contributes to ongoing debates on digital transformation in education and highlights the need for teacher education programs to anticipate technological shifts, preparing future educators to integrate AI in ways that are ethical, inclusive, and pedagogically meaningful.

***Keywords**:* Artificial Intelligence (AI); attitudes; experiences; pre-services teachers; teacher education; technology

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1. Introduction

Artificial Intelligence (AI) is rapidly shaping many fields, including education. AI powered tools like ChatGpt, Grammarly, QillBot, and AI-based learning platforms are increasingly involved in teaching and learning environments. The last two decades have witnessed a growing interest among educators and scholars in the role of technology in education, which in turn, provoked challenging questions about the multifaceted connotations of the digital technology use in higher education (Castañeda & Selwyn, 2018). Teacher education programs are, then, faced with the challenge of preparing future teachers to understand, evaluate, and effectively use AI technologies in their practice (Langran et al., 2024; Trust et al., 2023). Pre-service teachers, as future educators, are expected to be digitally literate and capable of integrating new technologies in pedagogically sound ways (Vartiainen et al., 2024). Therefore, understanding their attitudes, experiences and current practices can inform the design of teacher training programs, as many of them are already experimenting with AI tools (Suchanek et al., 2024), but often without formal guidance or critical reflection on pedagogical and ethical implications.

The implementation of AI technologies in education helps introduce an 'innovative pedagogy' that fosters creativity and independent learning (Altinay & Altinay, 2024). Moreover, AI is considered 'a powerful instrument to facilitate opportunities for instructional design, technological development, and educational innovation and research (Ouyang & Jiao, 2021, p. 178). The benefits of AI can be seen at all stages and in different aspects of teaching and learning. From lesson planning to content design and organisation to practice and assessment, research findings support the potential of AI powered tools in facilitating group discussion and debate (Kasneci et al., 2023), real time feedback (Olasehinde, 2024; Zhu et al., 2023), and assisting with planning and material design (Atlas, 2023).

While the integration of AI tools and Machine Learning (ML) has undoubtedly brought new ways for the teaching/learning practices, it also raises some challenges and concerns about technical, ethical and security issues. Building solid digital literacies by instructors and learners, as well as the need for a clear strategy and pedagogical approach (Kasneci et al., 2023) are more urgent than ever before. Sowthworth et al. (2023) stressed the importance of empowering the new generation of students with AI competence which will enable them to cope with the demands of the 21st century society where AI is an important part of people's daily life. Moreover, they explained that AI literacy is not only a technical skill, but is rather a 'pedagogical challenge' which requires a multiple set of academic, scientific, ethical, and affective skills that need to be addressed by higher education curricula.

In addition, issues of over-reliance on AI, entailing the risk of decreased capacities in critical thinking and higher order skills, academic integrity, and data privacy are also common worries among scholars and practitioners in the field of education. Akgun and Greenhow (2022) pointed to the negative consequences of AI on students' privacy and autonomy, increased bias and discrimination, leading to new forms of inequity. The AI dilemma, in fact, reflects increased tensions between enthusiasm and hesitation in adopting AI tools in educational environments and requires wise decisions, careful planning, and rational implementation in educational and societal settings.

Despite the growing body of research on AI in education, studies focusing on pre-service teachers, especially in developing North African contexts, remain limited. There is a need for more research about AI in teacher education (Cun & Huang, 2024), which focuses more specifically on documenting how future teachers are experiencing, interpreting, and using AI in their academic and training journeys. On this basis, the present study aims to explore Algerian pre-service teachers' experiences, attitudes, and practices regarding AI in

education, with the aim of informing more responsive and future oriented teacher training frameworks. In relation to the advanced objectives, four research questions are raised:

RQ1: What are pre-service teachers' experiences with using AI tools in their academic or teaching practice?

RQ2: What attitudes do they hold toward the integration of AI in education?

RQ3: What practices, if any, are they adopting or resisting?

RQ4: What challenges or concerns do they perceive regarding the use of AI in teaching and learning?

2. Literature Review

2.1. AI in Teacher Education

The integration of technology into education is not a recent development, but rather a continuous process that has evolved significantly over time. Initially, educational settings incorporated basic multimedia tools such as televisions, tape recorders, overhead projectors, and desktop computers to support teaching and learning. With the advent of the internet, e-learning platforms and innovative teaching models such as blended, hybrid, and flipped classrooms, reshaped the dynamics of instructional delivery. More recently, the rapid emergence of AI has marked a transformative shift in the educational landscape. AI powered tools are increasingly being integrated into teaching practices, offering new possibilities for content generation, personalized learning, and teacher support.

AI is defined as "the science and engineering of creating intelligent machines" (Su et al., 2023, p.1 as cited in Cun & Huang, 2024). Machine learning algorithms have the power of providing new insights, predictions, and solutions tailored to individual users' needs (Luan et al., 2020). Though the interest in AI integration in educational contexts has existed since at least the 1980's (Williamson & Eynon, 2020), the year 2023 marked a significant breakthrough in the development and public adoption of AI (Langran et al., 2024) with AI tools such as ChatGpt gaining widespread attention for their advanced capacities in Natural Language Processing (NLP), content generation, and educational support. Since then, the discussion about AI in education, also referred to as 'AIEd' by Ouyang and Jiao (2021), and 'educative AI' by Su and Yang (2023), has gained increasing interest in exploring not only how AI can or should be integrated into educational settings, but also in identifying the key issues and competencies that need to be addressed within teacher education programs (Langran et al., 2024).

Following the increased interest in AI technologies, an urgent need for the development of AI literacy among students and teachers has come to the surface. AI literacy, according to Su and Yang (2023) refers to 'the ability to understand, use, and critically evaluate AI technologies and their impact on society' (p. 2). As such, developing competence and skill in AI involves basic knowledge about AI concepts and different uses, in addition to an ability to analyze and evaluate the application of AI systems for academic and interactional purposes. Sharing the same view, Altinay et al. (2024) emphasized the importance of building AI competence which would contribute to fostering an engaging and motivating learning environment for both students and teachers. To achieve these goals, great efforts have to be made at different hierarchical levels, ranging from decisions by policy makers in the field of higher education to active implementation by teacher educators within classroom settings. The decision about the program revision can be sparked either at higher level – by upper administration represented by deans, provosts, or college presidents – or at the level of faculty members who, through formal or informal discussions, express the need for change and for

rethinking the actual curricula (Langran et al., 2024). In the Algerian context, decisions about program revision have to be sooner made. A subsequent step would involve carefully planned course design by experts in the fields of education and digital technology. Clear objectives have to be set, followed by a decision about the scope or what Langran et al. (2024) referred to as width and breadth of AI integration. Furthermore, higher education institutions have to work on providing training courses on the use of AI tools while at the same time raising awareness about effective and ethical use to cultivate the potential of AI technology in advancing quality education for its pre-service teachers (Jamal, 2023).

Several models of AI integration in educational programs have been identified. Cun and Huang (2024, p. 64) tackled the Technological Pedagogical Content Knowledge (TPACK), based on Mishra & Koehler (2006) framework. TPACK suggests a method for the implementation of AI in teacher education focusing on the development of three main types of knowledge: Technological Knowledge (TK), Content Knowledge (CK) and Pedagogical Knowledge (PK). The intersection among the three domains results in compound areas of Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK) and Pedagogical Content knowledge (PCK). Finally, Technological Pedagogical Content Knowledge (TPACK) gives a holistic overview of the three and subsequent domains in the framework. It represents ‘the ultimate goal of education, where technological, pedagogical, and content knowledge intersect effectively to promote meaningful learning experiences with AI.

In the Algerian teacher education context, while content and pedagogical aspects seem to be less challenging given the fact they have been the center of focus for many years already, the technological knowledge; especially in relation to AI literacy, appears to be more challenging. The actual programs of Algerian teacher education schools at the English department, for example, introduce content modules such as language skills, linguistics, grammar and phonology at elementary levels (1st & 2nd year) while pedagogical modules, such as psychology, teaching methodologies, material design, and psycho pedagogy are gradually introduced starting from the third year of academic training. The technology part, however, under the name of ‘Information and Communication Technologies (ICT) represents a very small percentage of the overall study program (1H 30min per week) during the three first years of instruction only. Tate et al. (2023) referred to this problematic issue in traditional teacher education programs which, according to him, have ‘siloed’ technology aspects into a single course. Moreover, most Algerian TE institutions still follow conventional teacher training models which are based on face to face lecturing, workshops and seminars, and even classroom-based mentorship (Olasehinde, 2024). Therefore, it is more than necessary to rethink study programs in Algerian pre-service education to allow for more integration of technology-based courses, with more focus on AI literacy, which according to Rütti-Joy et al. (2023) is one of the fundamental goals for sustainable development, and subsequently for sustainable education.

2.2. Practices and Experiences with AI Tools

In recent years, the widespread adoption of AI tools has transformed how individuals in different contexts engage with information, perform tasks, and solve problems. As AI technologies become increasingly accessible, and user-friendly, a growing body of literature has explored the way(s) people interact with these tools for personal, academic, or professional purposes.

Artificial Intelligence is becoming ubiquitous and deeply embedded in our everyday life (Luan et al., 2024). From voice assistants like Siri and Alexa to personalized recommendations on platforms such as Netflix, youTube, and Spotify, AI is embedded in

routine digital interactions (Haenlein & Kaplan, 2019). In communication, tools such as predictive text and machine translation (eg. Google translate, DeepL) facilitate cross-lingual understanding and real time assistance (Gao et al., 2018). In daily productivity, AI powered applications such as Grammarly, ChatGpt, and Otter.ai support writing, summarizing, and note taking tasks, enhancing proficiency for both students and professionals (Zawacki-Ritchter et al., 2019; Dwivedi et al., 2023). AI also plays a growing role in health monitoring (via fitness trackers and apps), navigation (eg. Google Maps), and financial management (eg. Robo advisors and Fraud detection). These applications are often perceived as helpful and time saving, yet they also raise concerns about surveillance, data privacy, and over dependence on automation (Crawford, 2021).

In academic and instructional contexts, AI tools have contributed to enhancing teaching skills by providing easy and free access to various tools and resources (Jamal, 2023). Nowadays, teachers have no worries about designing materials for their classes as personalized pictures, dialogues, texts, songs and a plethora of high quality resources are at the click. This would render their teaching experience more enjoyable and contribute greatly to their professional development. AI can also assist teachers in routine administrative tasks such as grading, tracking attendance, and managing students' records (Olasehinde, 2024) which used to take more time and effort at the expense of effective and quality instruction. The positive impact on teaching practices would certainly be reflected in better learning experiences and academic outcomes. Xu (2024) highlighted the advantages of AI integration in enhancing learners' engagement, improving their academic performance and mastery by providing adaptive support and timely feedback, assessing their progress and identifying their learning gaps at a regular basis, and finally providing unique opportunities of experiential learning through immersive technologies like VR and AR.

Understanding pre-service teachers' attitudes as well as their practices and experiences with AI systems is necessary for the development of AI-based programs in elementary or higher education. In this context, Altinay et al. (2024) highlighted the need for examining the experiences of student teachers especially in relation to 'AI mediated instruction' (p. 465). Indeed, it is of great importance to portray pre-service teachers' readiness, satisfaction or dissatisfaction, needs and interests as well as their fears and worries from their position as both university students and future educators. Vartiainen et al. (2024) for their part, stressed the importance of investigating teachers' imaginaries since they hold the primary responsibility of educating future generations. They also underlined the tight links between pedagogical practices and social norms and values which greatly contribute in shaping teaching methods and strategies. Furthermore, Castañeda and Selwyn (2018, p. 4) considered education as 'profoundly an emotional and human process', therefore, understanding the emotions and feelings of its people is of great importance in any discussion about the use of digital technology.

Cun and Huang (2024) carried out a qualitative study to investigate pre-service teachers' perspectives about AI use in education. The results revealed different experiences and attitudes towards AI integration in instructional settings, with two major themes being mostly recurrent: the benefits of using AI, and concerns about such a use. For the benefits, respondents pointed to AI support for teaching and learning in different TPACK aspects; content, pedagogical, and technological knowledge. At the same time, the interviewees expressed their concerns about such issues as cheating and overdependence on AI tools which may lead to killing creative and original thinking. Another study by Altinay et al. (2024) focused on examining pre-service teachers' motivation in using AI systems. The findings indicated positive attitudes towards AI use which, according to the participants, can significantly improve the teacher-learner interaction by ensuring timely and tailored feedback,

facilitating communication and collaboration, and supporting personalised learning experiences. In a similar vein, the study of Suchanek et al. (2024) investigated future teachers' attitudes and expectations in relation to AI technologies. The study findings indicate high levels of awareness about the importance of AI integration, with ChatGpt being the most frequently used AI tool. Moreover, the results point to a positive attitude from the part of the participants in the survey towards AI use and their willingness to rely on these tools in their actual learning and future teaching experiences. Nonetheless, the respondents highlighted some risks which are associated with AI implementation such as technical challenges, lack of AI literacy, and most importantly the risk of cheating.

2.3. ChatGpt as a Transformative Tool in Teaching and Learning

While the literature on AI tools covers a wide spectrum of applications and user experiences, one particular tool has attracted unprecedented attention in both public and academic discourse: ChatGpt. Since its release in late 2022, ChatGpt has emerged as a prominent example of generative AI in action, sparking extensive debate about its potential to transform teaching, learning, and assessment. Given its rapid adoption and the volume of studies examining its educational implications, it warrants dedicated discussion as a distinct focal point within the broader exploration of AI practices and experiences.

ChatGpt, developed by OpenAI and released to the public in November 2022, has rapidly become one of the most discussed AI applications in education. Designed as a large language model capable of generating human-like texts in response to prompts, it offers a wide range of functionalities including answering questions, summarizing content, explaining complex concepts, generating lesson ideas, and providing feedback on written work (OpenAI, 2023; Kasneci et al., 2023). Within months of its launch, educators and learners worldwide began experimenting with its potential in academic contexts, from supporting brainstorming and drafting assignments to assisting with language learning and lesson planning (Lo, 2023; Susnjack, 2023). Studies suggest that many users, including pre-service teachers view ChatGpt as a valuable tool for saving time, enhancing creativity, and offering alternative explanations that aid understanding (Cotton et al., 2023).

However, the rapid adoption of ChatGpt has also brought several concerns to the forefront. Critics point to its tendency to produce inaccurate or fabricated information, its lack of source transparency and the potential for overreliance which may hinder the development of critical thinking and independent problem-solving skills (Zhai, 2023; Rudolph et al., 2023). Ethical issues such as plagiarism, academic dishonesty, bias in generated outputs, and data privacy have also been raised in both scholarly and public discussions (Kasneci et al., 2023; Cotton et al., 2023). These concerns highlight the need for explicit guidance in educational settings to ensure that ChatGpt is used critically and ethically, and in ways that genuinely enhance teaching and learning.

3. Methodology

3.1. Context

The study was conducted at l'Ecole Normale Supérieure 'Assia Djebar' Constantine (ENSC), Algeria. The school offers undergraduate and postgraduate programs designed to prepare future teachers across various scientific and literary disciplines and for different levels, from primary school to higher education. In recent years, there has been a growing interest in ENSC – and in different Algerian universities as well (Attia, 2025) – in exploring the role of emerging technologies by faculty members and administration reflected in the organisation of a variety of scientific and academic manifestations around the theme. This context provided a

suitable setting for investigating pre-service teachers' attitudes, practices and perspectives regarding the implementation of AI tools.

3.2. Participants

The sample of the study included 73 pre-service teachers in the English department at L'ENSC. The respondents were in mid-study cycle – third year (74%) and fourth year (26%) grade levels, with 83,6% of them aged between 20-22. The great majority of the respondents are females (97,3%), reflecting the overall situation of teacher education schools and the overall image of the teaching profession in Algeria where the majority of teachers are females. All participants were enrolled in courses that included components of English language, pedagogical content, and with a lesser degree educational technology. Participation in the study was voluntary, and all responses were anonymous. Table 1 below gives detailed presentation of the respondents' demographic information

Table 1
Respondents' Demographic Information

Variable	Category	Frequency	Percentage (%)
Age	Under 20	12	17.3
	20-22	61	83.6
	23-35	2	2 .7
Gender	Female	71	97.3
	Male	2	2.7
Grade level	3rd year	54	74
	4th year	19	26

3.3. Procedures

Data were collected through an online survey questionnaire developed by the researcher, informed by themes identified in the review of literature on AI in education. The questionnaire consisted of four main sections: (1) demographic information; collecting routine data about students' age, sex, and grade level; (2) Experiences with AI; (3) attitudes and perspectives on AI, and (4) AI in future teaching practice. The questionnaire included both closed-ended items, in the form of multiple choice questions, and 5 point Likert scale statements; and open-ended questions to allow participants to elaborate on their attitudes and experiences. The survey was created using Google Forms and distributed to participants via class communication platforms; Moodle & Google classroom. Respondents were free to complete the questionnaire and submit it at their earliest convenience. Prior to participation, students were informed about the purpose of the study and assured of the confidentiality and anonymity of their responses. Completion of the questionnaire was considered as providing informed consent.

4. Results

4.1. Experiences with AI

This section presents the participants' familiarity with AI, their frequency and type of AI use in academic contexts, and their experiences with integrating AI into teaching-related activities.

4.1.1 Familiarity with AI

Table 2

Students' Familiarity with AI Tools

Level of Familiarity	Frequency	Percentage (%)
Very familiar	13	17.8
Familiar	45	61.6
Neutral	10	13.7
Unfamiliar	0	0.0
Very infamiliar	06	8.2

As illustrated in table 2. The majority of students indicated being familiar (61,6%) with AI, 17,8% answered 'very unfamiliar', 13,7% held a neutral position. A small proportion (8.2%) felt being very unfamiliar, while none reported being simply 'unfamiliar'.

4.1.2. General AI Use in Academic Studies

Table 3

Students' experience with AI Tools

	Frequency	Percentage (%)
Yes	72	98.6
No	1	1.4

Table 4

Frequency of AI use

Frequency of Use	Frequency	Percentage (%)
Very often	6	8.2
Often	23	31.5
Occasionally	38	52.1
Rarely	6	8.2
Never	0	0.0

As indicated in tables 3 & 4, almost all respondents (98.6%) reported having used AI tools in their academic work. More than half (52.1%) use them occasionally, while 31.5% use them often, and 8.2% very often. Rare use was reported by 8.2% of participants.

4.1.3. Types of AI Tools Used

Table 5

Types of AI Tools Used

Type of AI Tool	Frequency	Percentage (%)
AI writing assistants	52	72.2
Research tools	21	29.2
Educational software	9	12.5
Data analysis tools	0	0.0
Other (eg. Translation AI)	5	6.9

Results in table 5 indicate that AI writing assistant tools are by far the most widely used (72.2%), followed by research tools (29.2%) and educational software (12.5%). Data analysis tools are notably absent from the participants' AI use probably because the students are not yet involved in research activities, which take place in the final year of their training (5^{th} year).

4.1.4. AI in Teaching-Related Activities

Table 6

The use of AI in teaching-related activities

	Frequency	Percentage (%)
Yes	42	57.5
No	31	42.5

Table 7

AI use in instructional activities

Theme	Description	Example quotes
Lesson planning and structuring	Using AI to generate lesson outlines, adapt materials for different levels, and plan activities.	*« I use AI to draft lesson plans and adapt content to suit my students' level*. »
Activity design and creation	Developing quizzes, exercises, and interactive tasks.	« AI help me design grammar exercises and vocabulary games. »
Information search and summarization	Finding and condensing relevant teaching resources or content.	« I ask AI to summarize complew articles for easier classroom explanation. »
Presentation preparation	Creating slides and visual aids	« AI generates presentation templates and bullet points for my lectures. »
Language learning support	Providing examples, explanations, and practice tasks for students	« I use Ai to give my students extra sentence-building exercises. »

Results in the sixth and seventh tables above indicate that more than half of the participants (57.5%) reported using AI in teaching-related tasks, with the most common uses being lesson planning, activity creation, and resource summarization. Open-ended responses highlight a variety of creative and supportive uses of AI in teaching contexts.

4.2. Attitudes and Perspectives on AI

The second section examined pre-service teachers' attitudes and perspectives regarding the use of AI in education. Questions in this section investigated the perceived impact of AI, students' opinion about the integration of AI in study programs, the expected benefits and challenges, as well as their preparedness for adopting AI tools in their future teaching.

4.2.1. Perceived Impact of AI on Education

Table 8

Perceived Impact of AI on Education

Perception of AI's Impact	Frequency	Percentage (%)
Very positive	1	1.4
Positive	32	43.8
Neutral	28	38.4
Negative	12	16.4
Very negative	0	0.0

As shown in table 8, the majority of respondents expressed a generally favourable perception of AI in education with 43.8% describing its impact as positive and 1.4% as very positive. A neutral stance was taken by 38.4%, while 16.4% viewed AI negatively. Notably, no respondents considered AI's impact to be 'very negative'.

Table 9

Opinions on Integrating AI in Teacher Education Programs

Opinion	Frequency (n)	Percentage (%)
Yes	29	39.7
No	18	24.7
Unsure	26	35.6

The results indicate mixed opinions: 39.7% supported integration, 24.7% opposed it, while 35.6% were uncertain.

The open-ended responses revealed diverse reasoning:

- **Pro-integration arguments** emphasized AI's potential to facilitate teaching, save time, enhance creativity, and prepare future teachers for the inevitable technological shifts.
- **Against-integration arguments** centred on concerns about reduced creativity, increased student laziness, and over-reliance on AI.
- **Uncertain respondents** often recognized both benefits and risks, suggesting that integration should be conditional, supervised, and focused on responsible use.

4.2.2. Perceived benefits and challenges

Table 10

Primary Concerns about AI in Education

Concern	Frequency (n)	Percentage (%)
Over-reliance on technology	43	58.9
Privacy and data security	22	30.1
Job displacement	14	19.2
Ethical implications	14	19.2
Inequities in access	13	17.8
Other concerns	5	6.9

As indicated in table 10, the most frequently cited concern was over-reliance on technology (58.9%), followed by privacy and data security (30.1%). Concerns about job displacement and ethical implications were each noted by 19.2% of respondents, while 17.8% pointed to inequities in access. A small proportion (6.9%) cited other concerns which were indeed a rewording of the suggested options like replacing other jobs, and encouraging laziness.

Table 11

Perceived Benefits of AI in Teaching and Learning

Benefits	Frequency (n)	Percentage (%)
Time saving for teachers	64	61.6
Enhanced learning resources	39	53.4
Personalized learning experiences	28	38.4
Data-driven insights to improve teaching	21	28.8
Improved accessibility for diverse learners	20	27.4

As illustrated by table 11, the top perceived benefit was 'time saving for teachers' (61.6%), followed by 'enhanced learning resources (53.4%) and personalised learning experiences (38.4%). Other benefits included 'data driven insights to improve teaching' (28.8%) and improved accessibility for diverse learners' (27.4%).

4.2.3. Preparedness for AI adoption in future teaching practices

Table 12

Confidence in Using AI in Future Teaching Practice

Confidence level	Frequency (n)	Percentage (%)
Not confident at all	3	4.1
Somewhat not confident	10	13.7%
Neutral	34	46.6
Somewhat confident	20	27.4
Very confident	6	8.2

Confidence levels were varied, with 46.6% feeling neutral, 27.4% somewhat confident, and 8.2% very confident. Lower confidence levels were less common, with 13.7% somewhat not confident and 4.1% not confident at all.

4.3. AI in Future Teaching Practice

The third section tackles students' perceptions of AI as future educators. It collects information about the potential uses of AI, the challenges which they may encounter, and whether or not they are interested in receiving more information and training about AI use.

4.3.1. Uses of AI in Future Teaching Tasks

Table 13

AI in Future Teaching Practice

AI in future teaching practice	Frequency (n)	Percentage (%)
AI for personalised learning	19	26
AI for administrative tasks	24	32.9
AI for content creation	46	63
AI for student assessment and feedback	15	20.5
AI for classroom management	23	31.5

The majority of students (63%) saw AI as a tool for content creation such as lesson plans, quizzes, and assignments. Around one third identified administrative tasks (32.9%) and classroom management (31.5%) as key uses. A smaller proportion envisioned AI for personalised learning (26%) or for student assessment and feedback (20.5%).

4.3.2. Perceived Challenges

Table 14

Challenges in AI Integration

Challenges	Frequency (n)	Percentage (%)
Lack of resources or training for teachers	29	39.7
Limited access to technology or AI tools	35	47.9
Resistance from teachers or students	19	26
Ethical concerns (e.g. bias in AI systems)	30	41.1
Lack of clear guidelines or policies	27	37

The most frequently cited challenge was limited access to technology or AI tools (47.9%). Ethical concerns such as bias (41.1%) and lack of resources and training for teachers (39.7%) were also common. Over one-third (37%) highlighted the absence of clear guidelines or policies, while 26% pointed to resistance from teachers and students.

4.3.3. Interest in Training Programs

Table 15

Interest in Receiving More Training on AI use

Interest in AI training	Frequency (n)	Percentage (%)
Yes	36	49.3
No	13	17.8
May be	24	32.9

Nearly half of respondents (49.3%) expressed interest in receiving more training or information on AI use in education, with an additional 32.9% indicating they might be interested. Only 17.8% said they did not wish to receive further training.

Q16.a. If yes or maybe, what kind of training or information would you find most helpful?

Thematic analysis of students' answers revealed the following recommendations for future training:

- Practical skills and tool usage (e.g., prompts, lesson planning, quiz creation, assessment tools).
- Ethical and responsible use (avoiding over-reliance, maintaining creativity, privacy concerns).
- Awareness and theoretical understanding (knowing what AI is, types of AI, its role in education).
- Classroom integration strategies (personalized learning, classroom management, engaging students)
- Resource access and platform familiarity (apps, cites, online courses, books)

5. Discussion

The findings of this study provide valuable insights into pre-service teachers' experiences, attitudes, and anticipated practices regarding AI integration in education. Overall, the results reveal openness towards using AI in future teaching, tempered by concerns over ethical issues, limited hands-on experience, and the need for targeted training.

5.1. Experiences with AI: Early Engagement but Limited Depth

While many participants reported having some prior exposure to AI tools, their experience appeared to be largely informal and exploratory rather than systematic. This aligns with recent studies (e.g., Zawacki-Richter et al., 2019; Mhlanga, 2023) that note the rapid growth of AI awareness among educators, but also highlight a lack of structured opportunities for in-depth skill development during teacher training. Without targeted integration into teacher education curricula, pre-service teachers risk entering the profession with a superficial understanding of AI capabilities or limitations.

5.2. Attitudes towards AI: Optimism Coupled with Ethical Concerns

The survey results indicate strong enthusiasm for AI's potential in teaching, particularly in areas such as lesson preparation, assessment, and resource creation. This is consistent with findings from Alenezi (2023) and Chiu et al. (2023), which showed that educators tend to view AI as a means to enhance efficiency and creativity. However, ethical concerns –particularly around data privacy, student dependency, and bias – were recurrent in participants' responses. This tension between perceived benefits and ethical apprehensions reflects the dual nature of AI adoption, as emphasised by Holmes et al. (2022), where innovation must be balanced with responsible use.

5.3. Skills Needed for Effective AI Integration

Participants identified a need for both technical skills (e.g. prompt engineering, tool operation) and pedagogical skills (e.g., designing AI supported lessons, integrating AI without reducing student critical thinking). They also emphasized the importance of *ethical literacy* in AI use. This triad – technical, pedagogical, and ethical competencies – echoes the TPACK framework (Mishra & Koehler, 2006), extended here to incorporate AI-specific ethics. Importantly, the responses suggest that teacher education programs should embed AI literacy training not only as a technical skill set, but also as a pedagogical and ethical responsibility.

5.4. Anticipated AI Use in Future Teaching Practice

Most pre-service teachers indicated a strong likelihood of integrating AI into their future classrooms, particularly for lesson planning and feedback. This finding is in line with the Technology Acceptance Model (Davis, 1989), where perceived usefulness is a key predictor of adoption intention. However, the presence of a small but a notable group of undecided or reluctant respondents suggests that factors such as confidence, institutional support, and prior training may play significant roles in determining actual classroom implementation.

6.5. Implications for Teacher Education

These findings collectively point to a pressing need for teacher preparation programs to adopt a proactive stance towards AI integration. Rather than leaving AI exploration to chance or occasional workshops, structured modules could:

- Equip pre-service teachers with AI technical skills through hands-on practice.
- Foster pedagogical strategies that leverage AI without diminishing human creativity.
- Provide a framework for ethical decision-making in AI-supported teaching.

Overall, the results offer a nuanced picture of pre-service teachers' engagement with AI in education directly addressing the study's four research questions. In relation to RQ1, participants reported various levels of experience with AI tools with many having explored them primarily for academic support rather than in teaching contexts. A possible reason is that their actual position is more that of students than of teachers. Things would have been

different with final year students, more involved in teaching activities through the practicum. Regarding RQ2, attitudes towards AI integration were generally positive, though tempered by a notable proportion of neutral and uncertain positions, suggesting openness alongside caution. Concerning RQ3, while some participants indicated emerging practices – such as using AI for lesson preparation or assessment support – there was also evidence of resistance, often linked to concerns over reliability, ethics, and over-reliance on technology. Finally RQ4 highlighted significant apprehensions, especially about technology dependence, data privacy, and the potential for unequal access, underscoring the need for balanced, well-informed integration strategies. Taken together, these insights point to a cohort that is curious and willing to explore AI's potential, but mindful of its challenges, calling for targeted training, critical engagement, and institutional support to ensure meaningful and ethical adoption.

6. Conclusion

This study explored pre-service teachers' experiences, attitudes, practices, and concerns regarding the use of AI in education. The results indicate that while the participants generally recognise the potential of AI to support teaching and learning, their engagement remains cautious and selective. Positive attitudes are tempered by concerns about accuracy, ethical implications, and equitable access, which influence both adoption and resistance. Emerging practices demonstrate a willingness to experiment with AI tools, yet highlight the need for critical awareness and pedagogical guidance.

These findings point to the importance of integrating AI literacy into teacher education programs, ensuring that pre-service teachers not only acquire technical skills but also develop the capacity to evaluate AI critically and ethically. Institutions should provide targeted training, foster reflective practice, and create supportive environments where AI can be explored as a complementary tool rather than a replacement for human judgement.

Future research should expand the scope by including in-service teachers, examining longitudinal changes in AI use, and exploring how institutional policies shape adoption. As AI technologies continue to evolve, teacher education must be proactive in preparing educators who can navigate this landscape with confidence, responsibility, and creativity.

References

Akgun, S., & Greenhow, C. (2022). Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics, 2,* 431–440. https://doi.org/10.1007/s43681-021-00096-7

Alenezi, M. (2023). Digital learning and digital institution in higher education. *Education Sciences, 13*(1), 88. https://doi.org/10.3390/educsci13010088

Altinay, Z., Altinay, F., Dagli, G., Shadiev, R., & Othman, A. (2024). Factors influencing ai learning motivation and personalisation among pre-service teachers in higher education. *MIER Journal of Educational Studies Trends & Practices*, *14*(2), 462–481. DOI: 10.52634/mier/2024/v14/i2/2714

Attia, M. (2025). Artificial intelligence, startups and English language: What potential unintended effects on higher education, scientific research and labor market? *Journal of Studies in Language, Culture, and Society (JSLCS) 8*(3), 169–180.

Atlas, Stephen. "ChatGPT for Higher Education and Professional Development: A Guide to Conversational AI." (2023). https://digitalcommons.uri.edu/cba_facpubs/548

Castañeda, L., & Selwyn, N. (2018). More than tools? Making sense of the ongoing digitizations of higher education. *International Journal of Educational Technology in Higher Education*, *15*(1). https://doi.org/10.1186/s41239-018-0109-y

Chiu, T. K., Moorhouse, B. L., & Bergner, Y. (2023). Teacher support and student motivation to learn with artificial intelligence. *Self-Determination Theory Newsletter.* selfdeterminationtheory.org

Cotton, D. R., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, *60*(5), 505–516.

Cun, A., & Huang, T. (2024). Generative AI and TPACK in teacher education: Pre-service teachers' perspectives. In M. Searson, E. Langran, & J. Trumble (Eds). *Exploring new horizons: Generative artificial intelligence and teacher education*. Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/223928/

Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008

Dwivedi, Y. K., Hughes, D. L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., & Raman, R. (2023). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, *71*, 102642.

Gao, Q., Wang, L., & Li, J. (2018). Machine translation in everyday communication: User experiences and expectations. *Machine Translation*, *32*(3), 195–212.

Grassini, S. (2023). Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Scences*, *13*, 692. https://doi.org/10.3390/educsci13070692

Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. *California Management Review*, *61*(4), 5–14.

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning.* Center for Curriculum Redesign.

Jamal, A. (2023). The role of Artificial Intelligence (AI) in teacher education: Opportunities & challenges. *International Journal of Research and Analytical Reviews (IJRAR), 10*(1)

Kasneci, E.; Seßler, K.; Küchemann, S.; Bannert, M.; Dementieva, D.; Fischer, F.; Gasser, U.; Groh, G.; Günnemann, S.; Hüllermeier, E. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual differences.* *103*, 102274. https://www.sciencedirect.com/science/article/abs/pii/S1041608023000195

Langran, E. Searson, M. , Trumble, J. (2024). Transforming teacher education in the age of generative AI. In M. Searson, E. Langran,, & J. Trumble (Eds). *Exploring new horizons: Generative artificial intelligence and teacher education*. Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/223928/

Li, Y. (2024). Constructing an AI-driven teacher training model for vocational education: teachers' information literacy and teaching competence at the same time. *Applied*

Mathematics and Nonlinear Sciences, *9*(1), 1–19, https://doi.org/10.2478/amns-2024-3087

Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences*, 13(4), 410.Luan, H. Geczy, P., Lai, H. Gobert, J., Yang, S. J. Ogata, H., Baltes, J. Guerra, R. Li, P., & Tsai, C. (2020). Challenges and future direcctions of big data and aftificial intelligence in education. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2020.580820

OpenAI. (2023). *GPT-4 technical report*. OpenAI. https://arxiv.org/abs/2303.08774

Mhlanga, D. (2023, February 11). *Open AI in education: The responsible and ethical use of ChatGPT towards lifelong learning* [Working paper]. SSRN. https://doi.org/10.2139/ssrn.4354422

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

Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computer and Education: Artificial intelligence.* https://www.sciencedirect.com/science/article/pii/S2666920X2100014X

Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?. *Journal of Applied Learning & Teaching*, *6*(1), 1–22.

Rütti-Joy, O. Winder, J., & Biedermann, H. (2023). Buidling AI literacy for sustainable teacher education. *Zeitschrift für Hochschulentwicklung.* DOI: 10.21240/zfhe/18-04/10

Southworth, J., Migliaccio, K., Glover, J., Glover, J. N., Reed, D., McCarty, C., Brendemuhl, J., & Thomas, A. (2023). Developing a model for AI across the curriculum: Transforming the higher education landscape via innovation in AI literacy. Computers and Education: artificial Intelligence. https://doi.org/10.1016/j.caeai.2023.100127

Su, J., & Yang, W. (2023). Unlocking the power of ChatGpt: A framework for applying generative AI in education. ECNU Review of Education. DOI: 10.1177/20965311231168423

Suchanek, O., Kancner, M., Havlásková, T., & Javorcik, T. (2024). The digital revolution in education: The role of AI from the Perspective of future teachers. *Proceedings of the 23rd European Conference on e-Learning, ECEL 2024.*

Susnjak, T. (2023). ChatGPT: The end of online exam integrity? *Journal of University Teaching & Learning Practice*, *20*(3), 06.

Trust, T., Whalen, J., & Mouza, C. (2023). Editorial: ChatGPT: Challenges, opportunities, and implications for teacher education. *Contemporary Issues in Technology and Teacher Education, 23*(1), 1–23.

Vartiainen, H., Valtonen, T., Kahila, J., & Matti Tedre (2024). ChatGpt and Imaginaries of the future of education : Insights of Finnish teacher educators. *Information and Learning Sciences*, DOI 10.1108/ILS-10-2023-0146

Williamson, B., & Eynon, R. (2020). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology*, *45*(3), 223–235, DOI: 10.1080/17439884.2020.1798995

Xu, Z. (2024). AI in education: Enhancing learning experiences and student outcomes**.** *Proceedings of the 4th International Conference on Signal Processing and Machine Learning*. DOI: 10.54254/2755-2721/51/20241187

Zhai, X. (2022). ChatGPT user experience: Implications for education. *Education Technology Research and Development*, *71*, 1–4.

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.

Zhu, C., Sun, M., Luo, J., Li, T., & Wang, M. (2023). How to harness the potential of ChatGPT in education? *Knowledge Management & ELearning*, *15*(2), 133–152. https://doi.org/10.34105/j.kmel.2023.15.008

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