# Pre-Service Teachers' Perceptions of Artificial Intelligence within the UTAUT Model

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**Abstract:** This study aims to examine pre-service teachers' perceptions of using artificial intelligence (AI) tools in their learning processes and their intentions to utilize these technologies as future teachers within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Adopting a qualitative approach, the participants of this research consist of education faculty students studying at a public university in Türkiye. In this context, data were collected from 109 pre-service teachers via written opinion forms and from 6 pre-service teachers through semi-structured interviews. Descriptive findings indicate that all participants reported using AI tools, and half of them reported using these tools a few times a week. Content analysis was employed to derive codes from the data. Codes derived from both written responses and interview data were organized under the themes of performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and risks and concerns. The findings reveal that students primarily associate the performance expectancy of AI tools with "fast and easy access to information" and "simplified understanding." In terms of effort expectancy, most students found AI tools easy to use, while some students also reported expending effort to verify the accuracy of AI responses. Regarding social influence, participants reported that their AI awareness and usage are shaped significantly by their social environment, particularly by peers and social media. Concerning facilitating conditions, despite the widespread adoption of AI across all fields today, participants emphasized the need for training and curriculum integration to support informed AI use. Although pre-service teachers most frequently intend to use AI for content generation and activity/task design in their future teaching, they expressed significant concerns. These include the potential for AI to promote cognitive laziness, disseminate inaccurate or biased information, negatively affect creativity, and pose risks to data privacy and security. The study concludes that while future educators utilize AI and are willing to integrate it into their practice, they remain cautious, particularly regarding the risk of cognitive laziness. Consequently, it is recommended that AI literacy be integrated into education programs to better prepare future educators for AI-enhanced classrooms.

**Keywords**: Pre-Service Teacher, Artificial Intelligence, UTAUT, Behavioral Intention, AI in Education

## 1. Introduction

The adventure of artificial intelligence (AI), which began in 1950 with Alan Turing's seminal question, "Can machines think?", gained official recognition through the "Dartmouth Artificial Intelligence Summer Research Project" led by John McCarthy (Dartmouth, 1956). This journey, initiated by a single inquiry, has evolved into a sophisticated technology capable of perceiving and understanding human language (Bozkurt, 2023) and generating novel content in various formats, such as text, audio, images, or video (Gupta et al., 2024). Due to its "generative" capabilities, AI has begun to integrate into numerous fields, ranging from tourism (Scarpi, 2024) to healthcare (Babu & Boddu, 2024). Education has emerged as one of the sectors undergoing a profound transformation process driven by this technological advancement (Bozkurt, 2023).

Regarding its contributions to education, AI has been shown to offer significant benefits, including content development, providing feedback, personalizing learning, enhancing accessibility, and increasing engagement (Ayeni et al., 2024; Grover, 2024). As an instructional assistant, AI can support educators in tasks such as lesson planning, material preparation, and assessment (Hsu & Ching, 2023). However, AI also brings forth several concerns related to security, data privacy, copyright, and the generation of biased or inaccurate information (UNESCO, 2024). It has been noted that the existing digital divide in accessing and using internet tools may be further exacerbated by AI (Daepp & Counts, 2024). Moreover, the non-transparent operational principles of AI tools, often referred to as the "black box" phenomenon, and the lack of clarity regarding their training datasets (Bozkurt, 2023) heighten user concerns over data privacy and security (Grover, 2024). Additionally, serious apprehensions persist regarding academic integrity, the accuracy of generated outputs, the potential loss of critical thinking skills, and the development of overreliance (Pitts et al., 2025).

Despite the aforementioned concerns, the existing literature indicates that the majority of higher education students maintain a positive perception toward AI (Almassaad et al., 2024; Yakut et al., 2025). According to Chan and Hu (2023), students use AI tools for purposes such as personalized and instant learning support, research and analysis support, assistance with writing and brainstorming, and facilitating visual and auditory multimedia.

However, it was also noted that students are concerned about the accuracy of the output produced, data privacy and security risks, and unclear policies (Chan & Hu, 2023). Furthermore, various studies have investigated the determinants of students' acceptance of AI and indicated that adoption is primarily driven by factors such as perceived benefits, perceived ease of use, and perceived usefulness, alongside behavioral intentions and overall attitudes (Chaamwe, 2025).

The integration of technologies, from television to the internet, into educational settings has been extensively analyzed through the lens of technology acceptance frameworks. Davis (1989) addressed the adoption of information technologies through the Technology Acceptance Model (TAM), focusing on perceived ease of use and perceived usefulness. Building upon this, Venkatesh et al. (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT), an integrated model synthesizing core constructs from previous theories. UTAUT posits that performance expectancy, effort expectancy, facilitating conditions, and social influence are direct determinants of behavioral intention and actual usage behavior. Performance expectancy reflects the belief that technology improves job performance, while effort expectancy captures perceived ease of use. Facilitating conditions refer to the necessary infrastructure and resources, whereas social influence denotes the impact of significant others and the environment on adoption.

The "Quality Education" goal of the United Nations Sustainable Development Goals aims to ensure "inclusive and equitable quality education" for all. Similarly, the OECD (2021) report, titled "Building the Future of Education," emphasizes that education is vital for social progress and poverty alleviation. To achieve this, the report stresses the necessity of distributing educational opportunities equitably throughout society. AI holds the transformative potential to bridge these gaps by providing inclusive and accessible quality education through the rapid generation of content in diverse formats tailored to individual student needs. However, the successful realization of this potential depends not only on the technology itself but also on the educators who implement it. Teachers play a critical role in maximizing the opportunities AI offers to education while mitigating its inherent risks. Therefore, understanding the factors that drive or hinder pre-service teachers' adoption of AI is essential for preparing a generation of educators capable of fostering equitable learning environments in an AI-enhanced landscape. Accordingly, this study seeks to address the following research question:

- What factors influence pre-service teachers’ AI adoption intention within the framework of UTAUT?

## 2. Methodology

This study employs a qualitative research design to gain an in-depth and nuanced understanding of pre-service teachers' perspectives on AI. The study group consists of a total of 109 students selected through purposive sampling from the faculty of education at a leading public university in Istanbul.

Two different qualitative data collection methods were used to ensure data triangulation and increase the reliability of the findings. The written opinion form and interview questions were prepared by the researchers within the framework of UTAUT. First, data was collected from 109 pre-service teachers through structured written interview forms. This allowed for the collection of a wide range of qualitative data by capturing diverse perspectives. The written opinion forms were designed using Google Forms and distributed electronically to the participants. Data collection was conducted on a voluntary basis, ensuring that all pre-service teachers participated in the online platform. Following the analysis of the written forms, in-depth semi-structured interviews were conducted with pre-service teachers from 6 different departments. This stage aimed to examine the themes emerging from the written data in greater depth. The semi-structured interviews were carried out in an online environment. Following the completion of the interviews, the video and audio recordings were systematically transcribed to prepare the qualitative data for content analysis.

Demographic data in written forms were analyzed using descriptive statistical analysis to determine the demographic characteristics of the pre-service teachers (e.g., department, class level) and their usage patterns regarding AI tools (e.g., frequency of use, daily time spent). Open-ended questions in written form and semi-structured interview were analyzed using content analysis. This process involved systematically coding the data and identifying recurring patterns. Codes derived from both written responses and interview data were organized under the themes of performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and risks and concerns. MAXQDA 2020 was used for content analysis. For written form data analysis, descriptive statistical analysis was employed.

Table 1 presents the demographic characteristics and AI tool usage profiles of the participating pre-service teachers.

**Table 1: Demographic characteristics and AI usage patterns of the participants**

| | Item | f | % |
|---|---|---|---|
| Department | Computer Education and Instructional Technology | 33 | 30.2% |
| | Primary Education | 25 | 23% |
| | Early Childhood Education | 16 | 14.7% |
| | Turkish Language Education | 12 | 11% |
| | Science Education | 9 | 8.2% |
| | Guidance and Psychological Counseling | 7 | 6.2% |
| | Elementary Mathematics Education | 4 | 3.7% |
| | English Language Teaching | 2 | 1.9% |
| | Special Education | 1 | 0.9% |
| Class Level | 1 | 20 | 18.3% |
| | 2 | 77 | 70.1% |
| | 3 | 8 | 7.3% |
| | 4 | 4 | 3.7% |
| Have you used AI tools (such as ChatGPT) before? | Yes | 109 | 100% |
| | No | 0 | 0 |
| How often do you use AI tools? | A few times a month | 5 | 4.6% |
| | Once a week | 3 | 2.8% |
| | A few times a week | 54 | 49.6% |
| | Once a day | 8 | 7.3% |
| | A few times a day | 39 | 35.8% |
| How much time do you spend using AI tools daily? | I don't use it at all | 2 | 1.9% |
| | Less than 1 hour | 83 | 76.1% |
| | 1–3 hours | 23 | 21.1% |
| | 4–6 hours | 1 | 0.9% |

According to Table 1, regarding department, the highest participation was from Computer Education and Instructional Technology (30.2%, n = 33), followed by Primary Education (23%, n = 25). In terms of class levels, most of the participants were second-year students (70.1%, n = 77). Crucially, all participants reported having used AI tools such as ChatGPT previously. Regarding the frequency of use, nearly half of the participants (49.6%, n = 54) utilized AI tools a few times a week, while a significant portion (35.8%, n = 39) reported using them a few times a day. Despite this high frequency, 76.1% (n = 83) of pre-service teachers spent less than one hour a day on these platforms. Although all students reported having used AI tools before, the two students who answered "I don't use it at all" likely no longer use them on a daily basis.

## 3. Findings

This section presents the findings derived from both the written opinion forms and the semi-structured interviews. To ensure participant anonymity and confidentiality in the presentation of the interview data, students were assigned codes such as P1, P2, and P3. The distribution of findings obtained from the written opinion forms is presented in Table 2. These findings have been structured according to the UTAUT framework and additional emerging dimensions.

**Table 2: Codes derived from pre-service teachers' written opinions regarding AI acceptance**

| Theme | Code | f | % |
|---|---|---|---|
| Performance Expectancy | Fast and easy access to information | 36 | 33% |
| | Simplifying understanding | 23 | 21.1% |
| | Time saving | 20 | 18.3% |
| | Homework support | 10 | 9.1% |
| | Summarization | 8 | 7.3% |
| | Question generation | 7 | 6.2% |
| | Research and idea exchange | 6 | 5.5% |
| | Offer a different perspective | 6 | 5.5% |
| | Personalized learning | 5 | 4.6% |
| | Visual and material creation | 5 | 4.6% |
| | Language learning | 3 | 2.8% |
| | Others | 2 | 1.9% |
| Effort Expectancy | Ease of use | 89 | 81.7% |
| | Effort required to verify accuracy | 7 | 6.2% |
| | Difficult to use in complex tasks | 7 | 6.2% |
| Social Influence | Positive social impact | 47 | 43.1% |
| | Social media effect | 15 | 13.8% |
| | Limited social influence | 9 | 8.2% |
| | Guidance from instructors | 8 | 7.3% |
| | Negative impact of others' intensive ai use | 3 | 2.8% |
| Facilitating Conditions | Need for training and curriculum integration | 45 | 41.2% |
| | Prompt writing skill | 23 | 21.1% |
| | Providing paid ai versions free to students | 12 | 11% |
| Future Behavioral Intention | Content generation | 33 | 30.2% |
| | Activity / task design | 20 | 18.3% |
| | Interactive / advanced design | 12 | 11% |
| | Lesson plan preparation | 7 | 6.2% |
| | Personalized learning | 5 | 4.6% |
| | I do not plan to use it | 5 | 4.6% |
| | Preparation of assessment | 5 | 4.6% |
| | Assignment grading and feedback | 2 | 1.9% |
| | Others | 2 | 1.9% |
| Risks and Concerns | Risk of cognitive laziness | 51 | 46.8% |
| | Risk of false or biased information | 24 | 22% |
| | Concerns about reduced creativity | 12 | 11% |
| | Data privacy and security | 11 | 10.1% |
| | Academic integrity | 7 | 6.2% |
| | Information pollution | 2 | 1.9% |

According to interview findings, the content analysis of the data revealed several core factors influencing pre-service teachers' acceptance and future use of AI, as illustrated in Figure 1.

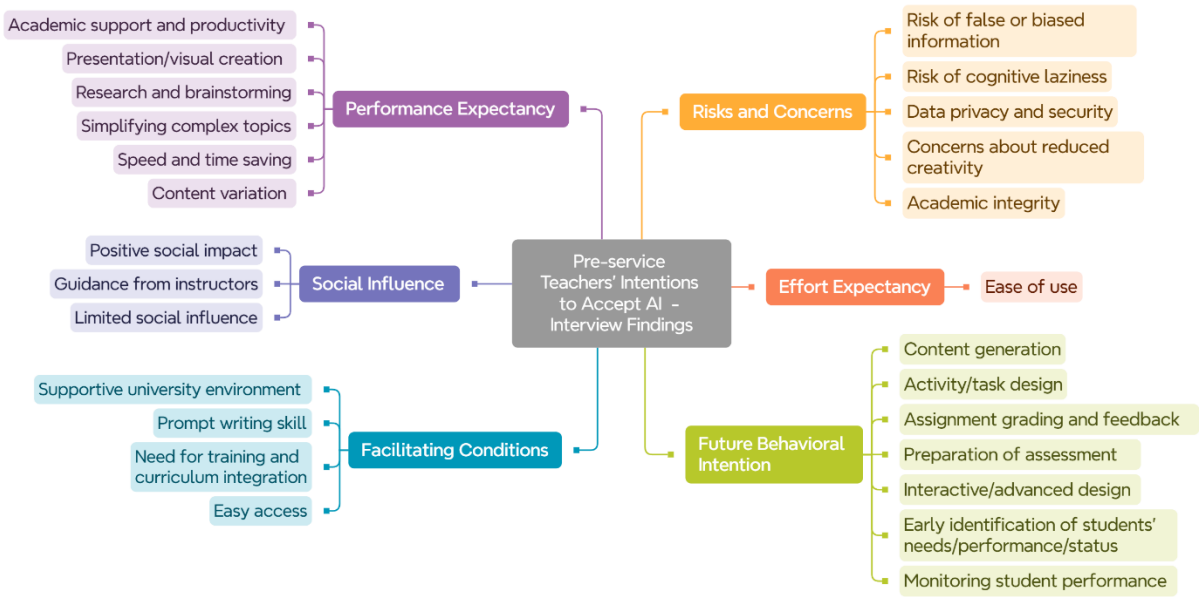



**Figure 1: Pre-service teachers' perceptions regarding the intention to adopt AI**

The written opinion form (Table 2) and interview data (Figure 1) were described below, categorized by the UTAUT framework and "risks and concerns" theme.

## 3.1 Performance Expectancy

Table 2 shows the themes that emerged from the written opinion forms, which were organised according to the UTAUT framework and additional emerging dimensions. Within the "performance expectancy" theme, "fast and easy access to information" was the most common response (33%, n = 36), followed by "simplifying understanding" (21.1%, n = 23) and "saving time" (18.3%, n = 20). In addition to these, AI is also used for purposes such as summarization, question generation, research and idea exchange, visual and material creation, and language learning. These results suggest that pre-service teachers primarily value AI for its efficiency in managing information and providing cognitive support. According to interview findings for "performance expectancy", participants emphasized the multifaceted advantages of AI in enhancing academic productivity. The data suggested that AI significantly facilitates learning processes by bridging information gaps and structuring experimental or project phases. Moreover, it streamlines academic tasks such as reporting, correspondence, and material preparation thereby increasing overall efficiency. This capability further supports students' autonomous study processes. Pre-service teachers specifically noted that AI tools facilitate research and brainstorming, simplify intricate topics, and provide significant time and cost savings. Additionally, the capacity of AI to assist with presentation design, visual creation, and content diversification was identified as a primary motivating factor for its integration into the learning process. Within the context of performance expectancy, representative participant responses are as follows:

> *"AI creates flashcards. For example, I learn quickly using double-sided cards, and it's great. It also presents me with more organized data, making learning easier. Besides that, I can tell it to explain a topic in more depth, specifying the features myself. It designs the explanation accordingly, and I learn faster that way." (P3)*

> *"AI is very effective in saving us time because it scans online resources, articles, or books we don't have in physical form much faster and provides quicker results, helping us understand, learn, and apply topics in practice. It allows us to do things in a shorter time." (P5)*

## 3.2 Effort Expectancy

Regarding "effort expectancy", most participants associated AI tools with "ease of use" (81.7%, n = 89). However, a small number of participants noted concerns regarding the "effort required to verify accuracy" (6.2%, n = 7), suggesting that, while the tools are easy to operate, the workload related to data validation remains a factor.

The interview findings also directly support the written interview form findings. Teacher candidates predominantly associated AI tools with "ease of use," without encountering technical barriers. This suggests that

when AI tools are perceived as user-friendly, the effort required to learn them decreases, thus encouraging their adoption. In this regard, the view of the participant coded as P6 is as follows: "*To learn how to use ChatGPT, I initially used to give commands and things like that. After that, I understood how to use it. I got used to it quickly. It didn't take long." (P6)*

### 3.3 Social Influence

"Social influence" dimension revealed that "positive social impact" (43.1%, n = 47) is a significant driver, whereas "guidance from instructors"(7.3%, n = 8) appears to play a smaller role in the current adoption phase. Participants reported that their AI awareness and usage are shaped significantly by their social environment, particularly by peers and social media. However, nearly all of the pre-service teachers interviewed emphasized the importance of guidance from instructors rather than peers. Some participants stated that their social environment did not play a significant role in their acceptance of artificial intelligence. Example participant responses are as follows:

> *"There was a time when it became very popular. Seeing it frequently in the news and on social media, I immediately downloaded ChatGPT. After trying it, I liked it." (P3)*

> *"Rather than being influenced by my social environment, I started using artificial intelligence because I saw its benefits firsthand. My surroundings do not have much impact on me in this regard, as I know what kind of outcomes I can achieve when I use AI myself." (P5)*

### 3.4 Facilitating Conditions

Regarding "facilitating conditions", the "need for training and curriculum integration" was the most frequently cited requirement (41.2%, n = 45). This finding underscores the necessity for context-oriented practical training to ensure the effective and efficient use of these tools, emphasizing how they should be integrated with appropriate pedagogies.

In interview data, "supportive university environment" and "easy access to tools" were identified as critical facilitating conditions. However, as highlighted in the participants' responses, there is also a clear need for formal training on AI. In addition, participants suggested incorporating AI-related courses into the current curriculum to enable them to integrate this technology into education in the future. Some students, rather than advocating for a standalone course, emphasized that AI could be integrated across existing courses. Furthermore, "prompt writing skills" emerged as a specific technical competency necessary for effectively leveraging AI capabilities in educational contexts. Example views are as follows:

> *"Most students use it, and they are already encouraged to do so. However, instructors emphasize that while its use is inevitable as technology advances, students should verify the accuracy of the information and incorporate their own thinking into the process." (P3)*

> *"I think students should be informed about how much they should use AI and in which areas it is appropriate to use it. They should also be taught how to use it effectively when preparing course materials. In addition, it is important to emphasize that AI should not be used for harmful purposes and that students should be guided to avoid using it in ways that undermine skills such as creative thinking and problem-solving." (P6)*

### 3.5 Behavioral Intention

According to written interview form data, participants' "future behavioral intention" focused heavily on "content generation" (30.2%, n = 33) and "activity/task design" (18.3%, n = 20). This suggests that pre-service teachers envisage AI more as creative assistants for instructional materials than for administrative tasks such as assessment preparation (4.6%, n = 5). The interview data also supported the form findings. All pre-service teachers interviewed expressed behavioral intentions to use AI in education in the future. Participants strongly associated AI with various pedagogical practices. They most frequently reported plans to use AI for "content creation," "activity/task design," and "assignment grading and feedback."

> *"It can assist me in designing infographics. I can prepare more effective materials that are visually oriented, concise, and clear, without taking too much time. Students will naturally tend to choose the easier option, and I think AI is very effective in quickly providing information and enhancing retention of learning." (P3)*

> *"For example, I think that in cases where I cannot directly demonstrate experiments or abstract concepts—such as weather changes or phase transitions—I can make them more understandable for students by visualizing them or using video-based explanations." (P5)*

### 3.6 Risks and Concerns

Finally, while UTAUT framework provides a basis for technology acceptance, participants in this study also articulated several risks and concerns that fall outside the model's core constructs. Under "risks and concerns", the "risk of cognitive laziness" was the most significant apprehension (46.8%, n = 51), far outweighing concerns about "data privacy and security" (10.1%, n = 11) or "academic integrity" (6.2%, n = 7). This indicates that pre-service teachers are more concerned about the impact of AI on their own and their future students' thinking processes than on ethical or technical security issues. The interview findings were consistent with the form findings. All pre-service teachers expressed concerns regarding the risks of "inaccurate or biased information." In addition, concerns were expressed that AI may negatively affect cognitive processes by encouraging "cognitive laziness" and pose risks related to "data privacy and security." Issues related to creativity skills were also raised in connection with cognitive laziness. Some views focusing on AI accuracy and cognitive laziness are as follows:

> *"I do not fully trust the accuracy of AI, definitely. If it is something very general or common knowledge, I tend to trust it; however, if it is something important, I avoid relying on a single source and cross-check the information. I definitely cannot say that I trust it completely." (P1)*

> *"I think we should be trained on how to use AI correctly. Otherwise, it can really make people very lazy. For example, I use it for my assignments and ask it to explain things to me, but I could also have it do the work directly—and sometimes I do. When I feel lazy, I directly upload the assignment and ask it to complete it. This makes me lazy." (P2)*

## 4. In Conclusion

The findings demonstrate that all participating pre-service teachers possess a high level of AI awareness and utilize these technologies for diverse academic purposes. However, evidence from both the survey and interview data highlights a critical consciousness regarding the potential risks and ethical concerns associated with AI. These results confirm a significant need for training, emphasizing that pre-service teachers require structured support to effectively integrate these tools into their future pedagogical practices. Moreover, it highlights that AI literacy should also be embedded at earlier stages of education, starting from K–12, to ensure that future generations develop the necessary competencies from an early age. Consequently, this study suggests the integration of AI literacy into teacher education curricula to better equip future educators for the demands of AI-enhanced classrooms.

In future research, it is recommended to examine the contextual integration of AI tools into teaching across different disciplines. Additionally, investigating the impact of AI literacy training programs on the pedagogical competencies of pre-service teachers would provide valuable insights. Furthermore, developing systematic integration models for incorporating AI tools into teacher education programs is suggested.

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## Ethics Declaration

Ethics committee approval was obtained from Bayburt University Ethics Committee (No: E-19460208-200-364505).

## AI Declaration

During the preparation of this work the authors used DeepL and ChatGPT to translate, improve language clarity and check grammar. After using this tool, the authors reviewed and edited the content and take full responsibility for the content of the published article.

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