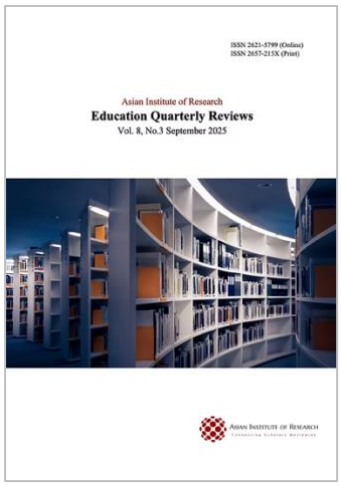

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Artificial Intelligence in Education for Teachers, Academics and Students in Turkey: A Systematic Review

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Abstract
This research aims to examine the current state of integrating artificial intelligence into education and training processes from the perspectives of teachers, academics and students. The systematic review method, a qualitative research approach, was employed in conducting the research. An evaluation was conducted based on research theses in Turkey, focusing on education and training, and including artificial intelligence in education (AIEd) applications for teachers, academics, and students. As a result of the search in the Council of Higher Education (YÖK) thesis center, 71 theses were identified by searching the keyword "artificial intelligence" in the title and abstract sections of the theses related to "Education and Training". The data obtained from the theses were analyzed by the content analysis method. An evaluation was conducted on the use of artificial intelligence technologies in education by examining their distribution according to years, sample groups, study areas, topics, variables addressed, and the results of these variables. According to the findings, there has been a significant increase in the studies on the use of AIEd in the last year. Artificial intelligence is primarily used in language teaching, followed by studies in computer programming and science. Artificial intelligence supported teaching environments, creating course materials with AI, and using tools such as chatbots in teaching processes are among the popular topics. Studies on AIEd have examined numerous variables, examining students' cognitive, skill-based, and affective learning outcomes. While the use of AI has been found to positively impact academic achievement, metacognitive behaviors, and sustained learning, skill-based learning has also yielded positive results in variables such as writing and reading skills in foreign language teaching, problem-solving skills, and creativity, as well as affective learning outcomes such as attitude, satisfaction, and motivation. While teachers and academics' awareness of AI is high, their readiness and anxiety levels are moderate. While teachers stated that they need practical in-service training on the educational use of AI, they have been identified as having some pedagogical, ethical, and technical concerns regarding the use of AIEd. These results are thought to guide new research on the use of AIEd.

Keywords: Artificial Intelligence, Artificial Intelligence in Education, Graduate Theses, Systematic Review

1. Introduction

The integration of artificial intelligence (AI) into the education system and classrooms offers a vision for teachers and students to acquire valuable skills (Pandey, 2023). For contemporary education to be creative, analytical,

competitive, and research-oriented, teachers and students need to utilize AI in the educational environment to meet current needs (Marrone, Taddeo & Hill, 2022). Although new technologies have been introduced into educational classrooms and the use of technology in education has been utilized for decades, it is revealed that a large percentage of teachers are not able to ensure the use of digital tools in their lessons fully, in this case, the lessons continue to be taught with traditional methods such as rote learning or repetition, so some students have difficulty in adequate critical thinking and creating new ideas (Castro & Pajares, 2022). Most students report using digital technologies to communicate with their peers, but not to develop sustainable lifelong learning skills (Krikun & Krikun, 2023). The fact that many current teachers do not provide pedagogical support for the use of technology in lessons is seen as a barrier to adequate digital transformation in educational settings in the future (Monteiro & Leite, 2021). To eliminate these barriers, teachers and students must be familiar with new technologies and know how to utilize them effectively. Technologies such as augmented reality, virtual reality, 3D printers, cloud technologies, the Internet of Things, humanoid and educational robots, and AI, which entered our lives with Education 4.0, which means the realization of digital transformation in the world of education, and the contributions that these technologies can offer to education cannot be ignored. Education 4.0 is significant in that it promotes creativity and innovation in teaching, enhances research opportunities, and aligns educational practices with technological advancements, ultimately preparing students for evolving industrial processes (Ulloa-Duque et al., 2020). In this respect, it is inconceivable that education and AI do not coexist in the age of information and technology.

Users who first encountered AI when OpenAI published the first demo of ChatGPT on November 30, 2022, discovered what they could do in this AI chat environment that can generate text in response to natural language inputs. The use of the ChatGPT chatbot increased rapidly as users shared examples of AI use on social networks (Avisyah et al., 2023). This increase allowed users to explore the potential of AI and gain experience in various AI application areas. In the process, various AI-based applications, including chatbots, virtual assistants, productivity tools, and language translation tools, have emerged. AI simulates human cognitive functions, such as logical reasoning and learning, and automates tasks that require human intelligence (Morandín-Ahuerma, 2022). This reveals the potential for AI to permeate and have a significant impact on various sectors. The education sector is one area that is likely to be significantly impacted by AI (Timms, 2016). Upon examining the literature, it becomes apparent that studies on AI applications in education have gained momentum in recent years (Du Boulay, 2023). These technologies have the potential to personalize learning and offer the opportunity to create a teaching environment that is more adaptive to the individual needs of students (Meylani, 2024). For example, with AI, we can analyze students' learning patterns and provide simultaneous feedback, which allows for more accurate and effective pedagogical interventions (Chichekian & Benteux, 2022). The integration of AI into education can be critical for students' future career success by increasing their digital literacy (Sağlam, 2024). To capitalize on these opportunities, it is essential to create environments that facilitate AI integration in schools, implement policies that support these environments, and address the ethical use of AI for both teachers and students (Abdulmunem, 2023).

1.1. Artificial Intelligence and Teachers, Academics

The primary task in integrating AI into education falls on teachers and academics at universities. It is essential to consider their views, past experiences, and expectations to ensure the successful integration of AI into lessons (Holmes et al., 2019). In order to achieve this, teachers need to have AI awareness and skills to use AI by blending it with pedagogical infrastructure and be willing to integrate it into the educational environment. The transformation of the roles and pedagogical practices of teachers and academics by AI is something that will become clear over time, as a result of ongoing research. While the question "Is AI a threat that will completely change the role and value of the teacher, or is it a powerful enabler to increase his/her impact and student achievement?" is being debated, OECD (2021) reports emphasize that the integration of AI-enabled tools into classrooms is accelerating. Similarly, many studies have been conducted in recent years on the impact of AI on the teaching profession (Luckin, 2018; Holmes et al., 2019, Mujiono, 2023; Meylani, 2024, Tillman et al., 2024). Beyond a simple technological adaptation, this question is a pedagogical issue that requires addressing pedagogically and necessitates deep reflection on teacher competencies and the fundamental human values of education. The concerns and negative views of teachers and academics about the use of AI in classes will

negatively affect the effective collaboration that should be established between them and AI. On the one hand, research reveals the opportunities offered by AI in educational settings: personalized learning environments can be provided by analyzing student data through algorithms (Holmes et al., 2019), and AI can be utilized to create teaching materials for courses (Chang et al., 2022).

Administrative burdens such as grading and reporting can be automated (Luckin, 2018), and real-time feedback systems can respond to students' immediate needs. These developments offer teachers the opportunity to dedicate their time to strategic and creative activities, such as in-depth discussions, social-emotional guidance, and project-based learning design (Zhang & Zhang, 2024). On the other hand, significant challenges and controversies remain. Ethical concerns such as student data privacy, the risk of algorithmic bias (Baker & Xiang, 2023; UNESCO, 2019), the importance of "human-specific" skills such as critical thinking, creativity, empathy, ethical reasoning (Hamilton et al., 2023), and the inequalities that the digital divide may cre-ate in access to AI tools are frequently highlighted in the literature (Gellai, 2022, Luan et al., 2020). Moreover, some critics are concerned that over-reliance on AI may lead to a weakening of the fundamental pedagogical and emotional bond between teacher and student (Selwyn, 2022). Teachers' concerns about AI need to be addressed by resolving the ethical, egalitarian, and readiness issues surrounding its use in the classroom, recognizing that it has the potential to completely transform teacher education (Suna et al., 2025). The effective use of AI in education is crucial for enhancing the quality of education and ensuring that educators are prepared for the digital age (Singh & Ram, 2024).

1.2. Artificial Intelligence and Student

Intelligent tutoring systems and personalized learning algorithms. The use of AI in education enables content to be tailored to individual student needs, providing opportunities to promote higher student engagement in lessons while creating a personalized learning environment that meets the unique needs of each student (Singh, 2025). Furthermore, AI contributes to a more effective learning experience by providing immediate feedback, facilitating interactive learning environments, and creating more dynamic and engaging learning experiences (Harry, 2023). Providing timely feedback allows students to understand their progress and areas for improvement (Mallillin, 2024). By addressing individual learning needs, AI can enhance students' academic performance by providing adaptive learning mechanisms that improve student attitudes towards learning, increase motivation, guide students and provide feedback for better academic outcomes (Londoño, 2024; Zhang, 2024; Sasikala & Ravichandran, 2024; Elbadiansyah et al., 2024). However, while challenges such as data privacy, ethical concerns, and the need for equal access to technology persist, practical applications that utilize the transformative potential of AI may be complex to realize. Existing studies show that students foresee the role of AI in shaping their career prospects and see it as a transformative force in education (Almaraz-López et al., 2023). However, their concerns about the ethical use and potential disadvantages of AI persist and effective strategies are needed to integrate AI into educational settings (Dzhanigizova, 2024). Consequently, while the integration of AI into education provides numerous benefits, it is necessary to move the process forward by addressing the negative consequences and ethical considerations that may be encountered to ensure a holistic approach to enhancing student learning experiences (Singh, 2025).

Examining AI research on teachers and students, and making general assessments of their use cases, integration processes, and effectiveness, will benefit educators. AIEd use cases, teacher and student approaches, and teacher approaches in developing countries, such as Turkey, should be evaluated within their context (Hakimi & Shahidzay, 2024). Recent studies in the literature have examined AI research under general headings (Ateş, 2025; Yılmaz & Kaleci, 2025). No detailed studies have been found that include AIEd applications focusing on teachers, academics, and students. Analyzing the variables addressed for teachers and students, as well as the results related to these variables, will reveal the current situation and contribute to AIEd. For scientific development to occur, existing knowledge must be developed and new knowledge added to it. Today, this task is undertaken by universities, other scientific research institutions, and individuals interested in scientific studies. Theses prepared by university faculty members are among the most important primary sources that contribute to science. Theses are crucial for interaction among scientific communities, the dissemination of knowledge, collaboration, the development of science, and the pursuit of innovation. Theses contribute to the formation of collaborative networks

necessary for knowledge sharing and innovation by encouraging researchers to engage in discussions, share findings, and foster communication that enhances the overall scientific endeavor (Andrade et al., 2018). Innovation in sustainable education can significantly benefit from the integration of artificial intelligence, and AI technologies can play a significant role in achieving sustainability goals. Within the framework of social sustainability, where sustainability encompasses both "eco-nomic" and "environmental" and "social" dimensions (Elkington, 1994) the understanding that "technology is a tool for social benefit, rather than an end in itself" has emerged. Sustainable AI is a framework that fosters change with new ideas and applications in education and training throughout the lifecycle of AI products, emphasizing economic, environmental, and social integrity (Saheb et al., 2022). Therefore, discussing the use of AI in education is a necessity for exploring alternative paths to sustainability.

The purpose of this study is to examine the distribution of AI-related theses on teachers, academics and students in the field of Education and Training in Turkey between 2000 and 2024, their sample groups, fields of study and topics, the variables examined in these studies on teachers, academics and students, and the learning outcomes related to these variables. We evaluated how learning outcomes affect three fundamental dimensions: cognitive, skill-based, and affective (Kraiger et al., 1993; Wan et al., 2012). Cognitive outcomes include the acquisition of interdisciplinary knowledge and the development of cognitive processes. Skill-based outcomes focus on progress from skill acquisition to proficiency, while affective outcomes reflect students' attitudes, values, and motivations.

The study sought to answer the following questions:
In this context, the following questions were sought in this study:
Distribution of theses on "artificial intelligence" in the field of education and training in Turkey with teachers, academics and students as the sample:

1. What is their distribution by year and the sample groups?
2. What are the study areas and topics?
3. What are the variables examined and the results related to these variables?

To answer these questions, first examine in which fields and for what purposes artificial intelligence has been used, and then focus on the data obtained from teachers, students, and academics regarding the use of artificial intelligence in learning processes.

2. Method

2.1. Study Design

In this study, a systematic review method was used. A systematic review is defined as identifying scientific studies related to the research question, examining these studies in detail, and synthesizing the data obtained to answer a specific research question, taking into account predetermined criteria (Munn et al., 2018; Yılmaz, 2021). The process steps of systematic reviews are defining a research problem, clearly determining the inclusion and exclusion criteria of the studies to be examined according to the research problem, conducting a comprehensive literature review, and analyzing, interpreting and reporting all the studies selected according to these criteria in an unbiased and objective manner (Lasserson et al., 2019). The reason for using a systematic review in this study is to reveal the current state of research on "Artificial Intelligence" in the field of education and training.

2.2. Search Strategy

The systematic review was conducted by the PRISMA reporting guidelines developed by Page and friends (2021). After determining the research problem, the criteria for including and excluding studies were established.

The inclusion criteria for the thesis included in the systematic review were as follows:
1. Thesis conducted between 2000 and 2024.
2. Thesis in the field of "education and training."
3. Thesis containing the word "artificial intelligence" in the title or abstract.

4. Thesis containing the word "teacher, academic, or student" in the title or abstract and addressing the use of artificial intelligence in education.

The exclusion criteria for studies not included in the systematic review were as follows:
1. Theses without a complete thesis were excluded.
2. Theses containing the word "artificial intelligence" in the title or abstract but not addressing the use of AI in education or the use of AI by teachers, academics and students were excluded.

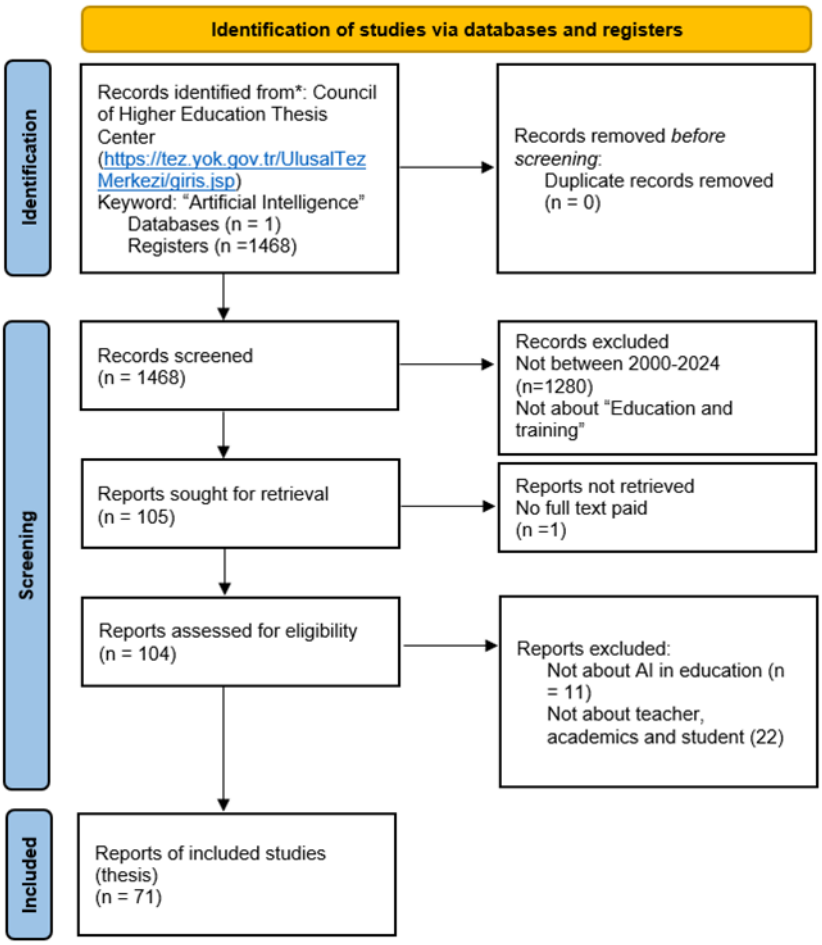

Figure 1: PRISMA flowchart for systematic review

2.3. Population and Sample

The universe of this study consists of all theses on "artificial intelligence" in the field of "education and training" prepared in Turkey between 2000 and 2024. A total of 105 theses were found on the subject of "Education and Training" in the thesis database of the Council of Higher Education Thesis Center (https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp) between 2000 and 2024, which included the keywords "artificial intelligence" and "teacher, academician, or student" in their thesis titles and abstracts. The titles and abstracts of the studies were examined by the PRISMA reporting guidelines. When the theses were examined, it was determined that although 11 theses included the word "artificial intelligence" in their abstracts, they were not directly related to AI. 22 theses abstracts were not directly on AI in education, and a total of 33 theses were not included in the research. One thesis was also removed from the study due to a lack of access to its full content (Figure 1). The total number of theses was 71. Fourteen of these were doctoral theses and 57 were master's theses. The selected theses were saved in PDF format on the Council of Higher Education (YÖK) Thesis Center website.

2.4. Data Analysis

The data obtained from the theses were analyzed according to the content analysis method. Content analysis is a research technique that involves organizing, classifying, comparing, and drawing theoretical conclusions from texts (Cohen et al., 2013). Content analysis is a systematic, unbiased, and repeatable method (Krippendorff, 2004) that involves analyzing, coding, and interpreting data from similar studies within a specific framework of concepts and themes (Cohen et al., 2013). All the theses were examined in detail, and common themes were identified for analysis. This allowed for the revelation of both similar and different aspects of the studies. All these were examined in detail, and common themes were identified for analysis, thereby attempting to highlight both similar and different aspects of the studies. In this process, the thesis data were entered into an Excel file and shared with the field expert, after which interviews were conducted. Theme suggestions from field experts were received, comparisons were made, and consensus was reached. Data obtained from theses, analyzed through content analysis, were evaluated using descriptive statistical methods.

3. Results

The study's findings are presented below regarding its research purpose.

3.1. *Findings on the distribution of postgraduate theses on AI in the field of education and training according to years*

The distribution of postgraduate theses on AI in the field of education and training, by year, is given in Figure 2 below.

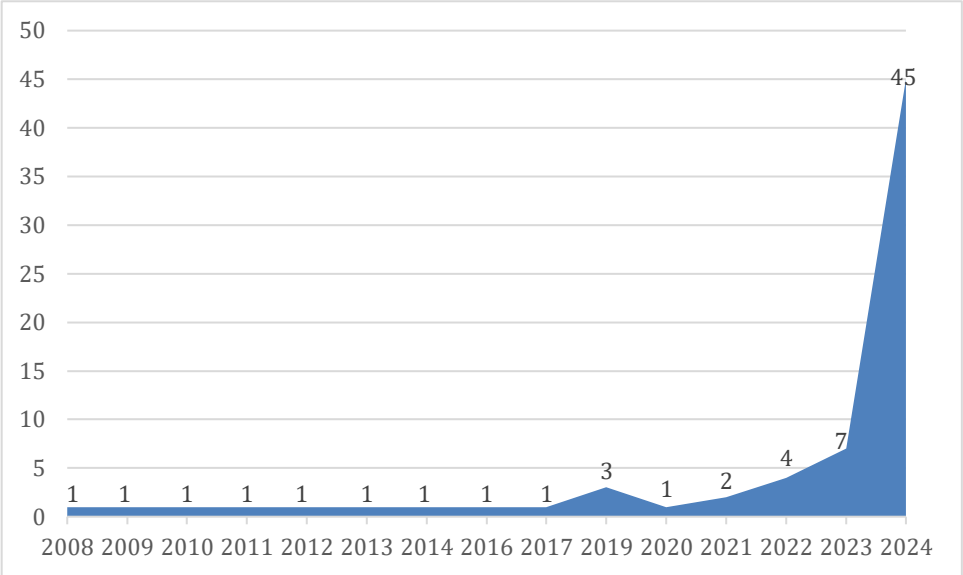

Figure 2: Distribution of theses by year

When Figure 2 is examined, the first study was identified in 2008. It is seen that 71 theses on AI for teachers/academics and students in the field of education and training were published between 2008 and 2024. There has been a significant increase in the number of theses on AI over the last year, with 45 theses published in 2024.

3.2. Findings related to the sample group of postgraduate theses on AI in the field of education and training

The sample groups used in postgraduate theses on AI in the field of education and training are given in Figure 3.

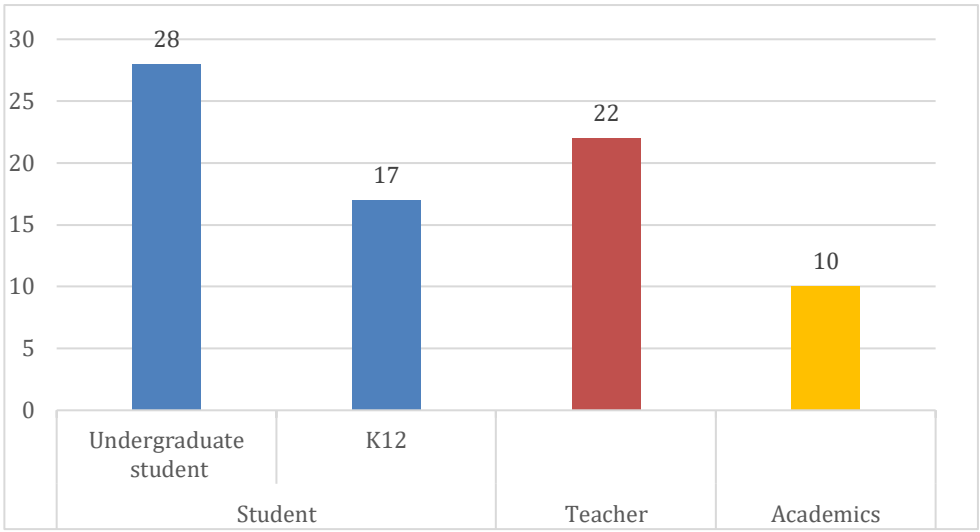

Figure 3: Distribution of sample groups

In these study on AI, data were mainly collected from students in 45 theses, while data were collected from teachers in 22 theses and academics in 10 theses. In the studies conducted with students, 28 theses were conducted with undergraduate students, 17 with K12 level students.

3.3. Findings related to the study areas and the topics of postgraduate theses on AI in the field of education and training

Table 1: Areas and topics of AI study in theses

Category	Theme	Theses number
Language teaching (f=23)	-Using the ChatGPT application in foreign language teaching (9)	36, 40, 41, 43, 47, 56, 58, 66, 68
	-Creating and using course materials with artificial intelligence (8)	11, 27, 28, 31, 43, 46, 59, 68
	-Examining the effects of using AI in language teaching on students' writing skills (9)	11, 27, 28, 41, 43, 56, 58, 59, 68
	-Gathering the opinions of teachers, academics, and students in foreign language teaching (5)	17,37,50,55,63
	-Using generative AI tools in foreign language teaching (2)	46, 59
	-Comparing ChatGPT/Generative AI feedback and teacher feedback in foreign language classrooms (1)	69
Computer Programming (8)	-Evaluation of the creation and implementation of intelligent tutoring systems (3)	1, 6, 32
	-Creation and implementation of machine learning models (2)	15, 26
	-Use of learning environments defined by fuzzy logic (2)	2, 8
	-Evaluation of generative AI-supported programming education in terms of different variables (1)	57
Science (5)	-Design and implementation of an AI-supported teaching and e-learning environment (2)	23, 64
	-Analysis of course literacy using an artificial neural network (1)	12
	-Development of AI-supported mobile application software (1)	42
	-Creating lesson plans with ChatGPT (1)	61

Mathematics (2)	-The effect of an artificial intelligence-supported learning environment on problem-solving skills (1)	7
	-Students' mathematical proof orientations with an artificial neural network model (1)	9
Art (Music, Painting, etc. (2)	- AI-supported solfege lesson planning (1)	29
	- An examination of AI's contribution to painting in fine arts education (1)	52
Social Studies (2)	-Artificial Intelligence-Supported Social Studies Teaching (1)	19
	- Predicting Achievement Test Results Using Artificial Intelligence Methods (1)	38
Physical Education (1)	-Obtaining the opinions of prospective teachers regarding artificial intelligence applications (1)	65
Pre-school (1)	-AI-based smart toy designs for pre-school children (1)	10
Special education (1)	-Intelligent teaching system design for the visually impaired (1)	4
Other (26)	-Obtaining the opinions of teachers, academics, and students regarding the use of AI and generative artificial intelligence and examining them with specific variables (14)	21,22,30,34,35,44,45,48,49,51, 53,54,62,70
	-Developing a teacher AI readiness and awareness scale and a student AI attitude scale (3)	14, 53, 67
	-Using artificial intelligence chat agents as student support services in distance education (1)	3
	-Analysis of learning styles and strategies used in e-learning environments using web usage mining (1)	5
	-Using ChatGPT in measurement and evaluation (1)	70
	-Creating a strategy decision model with AI in open and distance education (1)	13
	-Preparing a course plan for artificial intelligence education in schools (1)	18
	-Document analysis of the innovative effects of AI on teacher education (1)	16
	-Ethical use of artificial intelligence in teaching (1)	71

An examination of these theses on the use of AI in educational environments revealed that 23 theses focused primarily on foreign language teaching. The most common studies focused on the use of the ChatGPT chatbot in language teaching, the creation of course materials using AI, and the examination of AI's effects on writing skills. Additionally, the opinions of teachers, academics, and students were collected on foreign language teaching, and the use of generative AI tools in language instruction was examined. A comparison of AI feedback and teacher feedback was also conducted. Eight theses in computer programming created and used intelligent tutoring systems, machine learning models, and fuzzy logic learning environments. The effectiveness of generative AI-supported programming training was examined using specific variables. Two theses in science designed AI-supported teaching environments and mobile application software, and used ChatGPT to create lesson plans for science teachers. In mathematics, students' problem-solving skills, mathematical proof orientations, and the use of AI in solfege lessons in art disciplines such as music and painting, as well as the contributions of AI to painting in the fine arts, were examined. An AI-supported social studies course was designed, and another thesis predicted social studies achievement test scores. One thesis addressed the design of smart toys for preschool teachers, and another sought the opinions of physical education teachers on AI applications. An intelligent tutoring system was designed for students with visual impairments in special education. In general, studies not explicitly related to a specific field have primarily focused on gathering the opinions of teachers, academics, and students on the use of AI and generative AI, and examining these opinions in relation to specific variables. There are also scale development studies to assess teacher AI readiness and awareness, as well as to determine student attitudes towards AI. A small

number of studies have explored the use of AI chatbots as student support services in distance education, their use in assessment and evaluation, the creation of strategy decision models using AI, and the analysis of learning styles and strategies used in e-learning environments through web usage mining. When examining the topics of these theses in general, popular topics include AI-supported learning environments, the creation of course materials with AI, the use of tools such as chatbots in teaching processes, and the gathering of teachers' and students' opinions on the use of AI in classrooms.

3.4. *Findings related to the variables addressed for teachers/academics and students and results related to these variables in postgraduate theses conducted in the field of education and training on A*

The findings regarding the variables examined in postgraduate theses for teachers, academics, and students conducted in the field of education and training on AI, are presented in Figure 4.

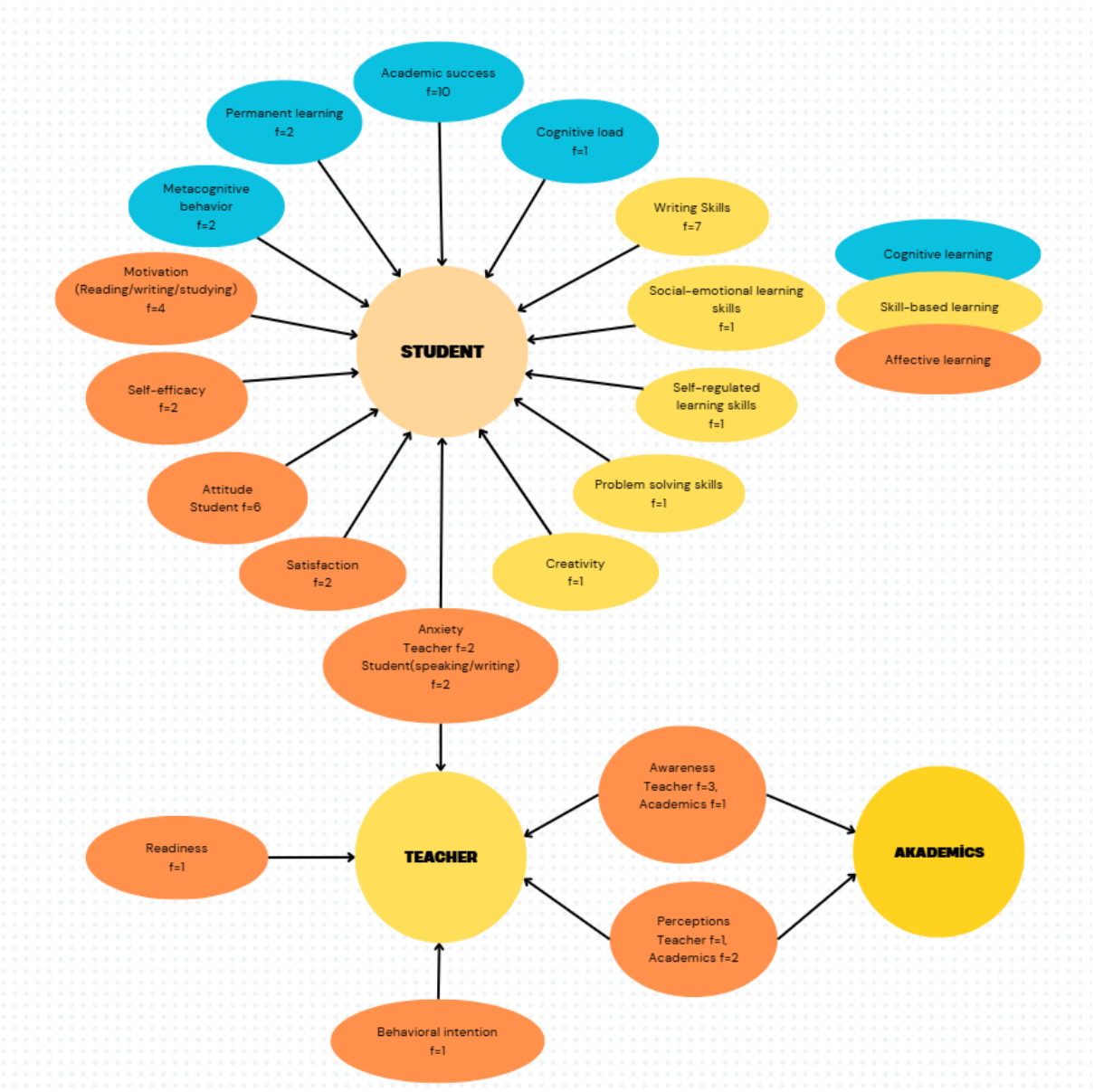

Figure 4: Variables addressed in theses

Studies have examined many different variables related to students. Among cognitive learning outcomes, the impact of AI on academic achievement has been the most frequently studied. Following this, studies have also been conducted to examine its impact on writing skills in language teaching, among skill-based learning outcomes,

and to determine attitudes, among affective learning outcomes. Additionally, among cognitive learning outcomes, metacognitive behavior, cognitive load, and its impact on learning retention have been examined. Among skill-based learning outcomes, problem-solving skills, social and emotional learning skills, self-regulated learning, and creativity have been examined. Among affective learning outcomes, other variables examined include reading, writing, or course motivation, students' self-efficacy perceptions, satisfaction, and anxiety. While teachers' AI awareness has been the most frequently examined, studies have also identified studies examining their readiness, behavioral intentions, anxiety, and perceptions. A limited number of studies have examined AI awareness and perceptions among academics. Teacher and student anxiety, as well as the awareness and perceptions of teachers and academics, have emerged as common variables.

Table 2 and Table 3 presents the main results of postgraduate theses conducted in the field of education and training on AI for students, teachers and academics.

Table 2: Results for students (Learning outcomes and results)

Sample group	Category	Theme	Theses Number
Student	Cognitive learning	There was a significant difference in academic achievement scores (10)	1,2,7,8,12,25,29,38,42,64
		Activities designed to support metacognitive behaviors had a positive impact on students' metacognitive behaviors (2)	18, 28
		Positive results were obtained in the permanent lear-ning of vocabulary in foreign language education.	36,39
		AI increased cognitive load (1)	57
	Skill-based learning	The use of AI had a positive impact on English writing performance/writing skills (8)	11,27,28,41,56,58,59,68
		Students developed problem-solving skills using AI (1)	7
		Social-emotional learning skills were positively affected (1)	32
		AI improved students' self-regulated learning skills (1)	34
		AI increased students' creativity (1)	52
	Affective learning	Students exhibited positive AI attitudes (6)	2,29,41,64,65,67
		Their motivation (reading/writing/study) increased positively (4)	31,38,39,43
		Students' AI self-efficacy levels increased (2)	12, 65
		Students' satisfaction with the use of AI in classes was high (1)	43
		Students' speaking and writing anxiety has decreased with the use of AI in language teaching (2)	40, 43

Studies have shown that the use of AI in educational settings positively impacts academic achievement, metacognitive behaviors, and enduring learning, which are cognitive learning outcomes. Skill-based learning outcomes have been found to positively impact writing skills, problem-solving skills, self-regulated learning skills, social-emotional learning skills, and creativity in foreign language teaching. Students exhibited positive attitudes toward the use of AI in classrooms, indicating increased motivation for writing and reading, increased self-efficacy, higher satisfaction, and decreased speaking and writing anxiety with the use of AI in language teaching.

Table 3: Results for teachers and academics

Category	Theme	Theses Number
Teacher	Teachers' awareness of AI was generally found to be high. These awareness levels were found to vary significantly across variables, including teachers' gender, age, graduation status, field of study, and professional experience (3)	44, 48, 55
	Their anxiety was moderate, decreasing as their awareness and self-efficacy increased. They stated that they needed practical in-service training on the educational use of AI (2)	20, 44

	As teachers' awareness of AI increased, their use of innovative pedagogy also increased (1)	33
	Their readiness was moderate. While their behavioral intentions were positive, they also expressed concerns about AIEd (1)	53
	They have a positive perception towards the use of AI in classes (1)	17
Academician	They have positive perceptions about the integration of AI into educational environments, such as the potential to reduce workload and save time. They also have ethical, technical, and pedagogical concerns regarding the use of AI in academic settings (3)	32, 49,50
	They have a positive perception towards the use of AI in classes (2)	50, 63
	Their awareness is high (1)	70

There are studies showing that teachers and academics have high awareness of AI, and their perceptions are generally positive, but their anxiety levels are moderate. Teachers' readiness for AI use is moderate, and it has been determined that as their awareness increases, innovative pedagogical practices increase. Academics have been identified as having some concerns about the use of AI in educational settings, such as professional responsibilities and ethical issues. However, academics and teachers have a positive perception of AI use in classrooms.

4. Discussion

In Turkey, it is evident that educational studies on AI have reached their highest level over the last year, showing a significant increase. There are many studies in the literature showing that there is a significant increase in the use of AIEd in many countries in 2023-2024 (Batubara et al., 2024; Derinalp, 2024; Doğan & Şahin, 2024; Durak et al., 2024; Kavitha & Joshith, 2024; López-Chila et al., 2023). Numerous studies have been conducted on the use of AI technology in educational environments in various countries, including the UK, India, Spain, and Germany, as well as in China and the USA (Durak et al., 2024; Guo et al., 2024). The reason for this increase is the growing interest in AIEd applications and the diversification of AI technologies, driven by increasing investment in the AI sector over recent years (Kaya, 2024). The opportunities offered by the use of AI tools, such as chatbots, generative AI tools, and intelligent tutoring systems, at every stage of education have been explored (Duarte et al., 2023) and continue to be explored. Upon examining the studies, it is noted that terms such as intelligent tutoring systems, personalized learning, and adaptive learning are frequently used (Durak et al., 2024). In another study, "generative AI" and "ChatGPT" are among the most popular topics (Kavitha & Joshith, 2024). This indicates that AIEd applications will remain popular for a considerable period.

While data were collected primarily from students in AIEd studies in Turkey, it was observed that the majority of them were undergraduate students, followed by students at the K-12 level. Upon examining the literature, it becomes apparent that more studies have been conducted at the higher education level (Guo et al., 2024). Considering the promising role of AI in supporting teachers' professional development for the future (Li & Su, 2020), it would be beneficial to increase the number of studies conducted with teachers, pre-service teachers, and academics in Turkey. Universities should increase participation in studies and guide to support the use, acceptance, and adoption of AI (Brown et al., 2025). This guidance will also contribute to the diversification of AIEd usage areas.

When the areas where AI is used in education are examined, it is found that most applications are made in foreign language teaching, and AI-supported courses are also taught in science and computer programming fields. Similarly, in the literature, it has been observed that AI studies are primarily focused on English language education, computer science, as well as science, technology, engineering, and mathematics (STEM) and language disciplines (Guo et al, 2024). The fact that AI is highly preferred in language teaching may be because chatbots such as ChatGPT and AI are highly knowledgeable in language processing and translation, work error-free, and provide fast turnarounds (Shi et al., 2020). This makes it possible to utilize them as an effective tool in language education processes, offering students a more interactive learning experience. In recent years, there have also been language learning applications in which you can chat with avatar characters in AI infrastructure in the language of your choice (Vy & Pham, 2024). Achieving positive results in reading and writing skills through correct

pronunciation, identifying deficiencies promptly, and correcting them supports the growth of AI-supported language learning platforms and their application in course environments (Aleedy, 2022). In another study, it was observed that fields such as computer science and social sciences stand out in AI studies in higher education, with a steady growth in these fields (López-Chila et al., 2023). In this study, it was observed that there are no existing studies on the application of AI in the field of social sciences in Turkey. In programming education, AI can provide efficient and effective solutions for identifying code errors and writing code in the desired software language according to prompts (Becker et al., 2023). Although studies exist in various fields, including mathematics, art, health, special education, pre-school, and physical education, these studies are limited in number. Considering that the primary purpose of using AI in education is to facilitate progress in education and learning, AI can be applied in various fields to provide solutions that offer convenience and save time for both teachers and students (Luckin & Cukurova, 2019). Although it is a concern to access cognitively ready information, it is an important point that AI can be utilized in every field as a supportive role in education (Xue & Wang, 2022).

It is believed that incorporating AI into course material creation processes can enhance practical teaching activities and interaction (Chang et al., 2022). Studies are showing that ChatGPT helps pre-service teachers, especially in generating ideas, and can be effectively used in courses during the digital material development process (Avşar Erümit & Yılmazer, 2024; Kartal, 2024; Bettayeb et al., 2024). Educators using ChatGPT-supported curriculum were found to have higher levels of creative ability and better performance compared to teachers in the control group (Liu et al., 2023). ChatGPT transforms the roles of educators, providing them with personalized help and guidance, allowing pre-service teachers to access innovative ideas and resources, improve their teaching strategies, and foster a more engaging learning environment for students (Jayasinghe, 2024; Kim & Adlof, 2024; Kiryakova, 2024). In Turkey, studies have been conducted that utilize AI in courses, primarily in language teaching, science, and programming, using ChatGPT and generative AI. Generative AI tools can increase student engagement by making the learning process more effective, fun and motivating by providing opportunities to create interactive learning experiences tailored to students, produce content in different languages, and quickly create high-quality educational materials in many formats such as videos, images, and presentations (Jadán-Guerrero vd., 2024; Sağın, et al., 2024). While generative artificial intelligence supports teachers in interacting more with their students by saving time and effort, it also facilitates teachers' lesson plan preparation processes (Nartgün & Kennedy, 2024). In addition, thanks to AI technology, teachers can accurately predict students' academic performance and benefit from AI in assessment and evaluation processes (Crompton, 2023). A limited number of studies have been conducted in this field in Turkey. It is necessary to analyze the challenges of using AI-supported tools in educational assessment and develop strategies to increase the effectiveness of AI in educational assessment (Owan et al., 2023). The application of AI in educational assessment can ultimately transform education, improve learning outcomes, and equip students with the skills needed to succeed in the 21st century. However, it emphasizes the necessity of ethical frameworks, transparent policies, and continuous evaluation to harness AI's potential for personalized learning, effective teaching, and streamlined administrative tasks (Marques-Cobeta, 2024).

The primary application areas of AI encompass educational robots, automated grading, recommendation systems, learning analytics, and intelligent teaching systems (Guo et al., 2024). In the theses examined, minimal studies have been conducted on intelligent teaching systems, creating expert system models, and no studies on educational robots have been found yet. More research is needed on this subject. Intelligent teaching systems assist teachers and students throughout the teaching process, thereby enhancing students' learning efficiency (Xu et al., 2022). For students with special needs, intelligent tutoring systems and generative AI tools can provide an opportunity to create inclusive, adaptive, and personalized learning environments that overcome barriers in the traditional education system (Habib & Janae, 2024). Generative artificial intelligence applications have helped new special education teachers prepare individualized education programs and use their time more efficiently (Rakap, 2024). In this context, the research revealed only one study on intelligent instructional system design for the visually impaired, indicating a gap in studies on AI for special education.

Exploring students' perspectives and experiences with AI will support the development of an innovative and inclusive education system (Dzhanigizova et al., 2024). Students' dispositions towards AI have been examined about various variables. Data have been collected on a variety of cognitive, skill-based, and affective learning outcomes, including the impact of AI on academic achievement, writing skills in language learning, problem-

solving skills, retention, course motivation, critical thinking skills, self-efficacy, and satisfaction, and positive results have been obtained. It has been observed that students with higher awareness of AI report more positive thoughts about integrating AI into their classrooms, while students with low awareness of AI tend to fear it (Marrone et al., 2022). In this context, examining AI by considering social, emotional, technological, and pedagogical factors, and embedding it into students' daily lives, enables them to use it in support of their cultures, course practices, and goals, potentially causing significant change in education (Roll & Wylie, 2016). In this context, it would be beneficial to increase students' AI awareness in studies and to consider it together with other variables. While the use of AI in education supports student-centered teaching (Fu, 2020), students can create personalized learning plans based on the intelligent teaching system, select learning content, and organize the learning process (Fang et al., 2019; Shpolianskaya & Seredkina, 2020). Positive results have been obtained. In these processes, it is important to improve educational processes by overcoming important obstacles such as a lack of basic technology and infrastructure to ensure equal access for all students and to plan educational processes by addressing the challenges and opportunities offered by AI (Farrelly & Baker, 2023; Huang, Saleh & Liu, 2021).

In this study, as in the international literature, the opinions of teachers and academics on the use of AI and its potential impact on their professions were explored in numerous theses (Chapagai & Adhikari, 2024; Plattner, Kosec & Bach, 2024; Ali & Okon, 2024). In this study, it was determined that teachers' AI awareness was high and their readiness was at a medium level. While taking these opinions, data were collected on many variables. In this study, while teachers' AI awareness and self-efficacy were found to be high, it was seen that they had a positive attitude towards AI. Teachers can use AI to fulfill their duties effectively by using AI to assess, improve their performance, and provide all the information needed for their students quickly and effectively (14). They can also use AI to review and grade students' assignments more effectively and efficiently (Chen, Chen & Lin, 2020). These situations support the integration of AI. However, it was found that teachers and academics expressed concerns about AI integration. Educators are uncertain about how to utilize AI pedagogically and its potential to significantly impact education and training processes (Akour, 2023). Similarly, while teachers and academics in Turkey are uncertain about what AI will bring in terms of the future of their profession, they have expressed concerns about how to integrate AI into their classrooms from a technical perspective, how to ethically ensure student information privacy, and how to incorporate AI into lesson plans pedagogically. For AI technologies to be utilized efficiently in educational management, training programs should be organized, and AI awareness activities for teachers and students should be increased. Additionally, ethical principles should be clearly defined. The need for teachers to possess the necessary skills for the effective use of AI is becoming increasingly evident, and the necessity of comprehensive teacher education programs that emphasize digital literacy and ethical considerations in technology use is emerging (Gomez-Trigueros, 2023; Meylani, 2024). At this stage, it is essential to discuss how to update teacher education programs on AI integration and how to enhance pre-service teachers' AI self-efficacy, awareness, and perceptions. This view is also supported by Tillman and friends (2024).

As a result, it is anticipated that AIEd studies will continue to grow, and the fields of study and application will diversify. Numerous variables, including teachers/academics and students' views, awareness, and readiness for AI, have been examined, and positive results have been obtained. Furthermore, some concerns about AIEd have been identified. In this context, based on the results of the current study, some recommendations for future research in the field of AIEd applications are as follows:

- While this study examines AIEd research in terms of teachers and students in Turkey, AIEd usage in developed countries and developing countries can be compared in order to reveal and improve the current situation.
- A detailed analysis of AI studies at different levels of education (higher education, high school, special education, etc.) and in different fields of study (social sciences, science, etc.) can help to reveal specific needs and trends in this field.
- Researching how to revise curricula for the use of AIEd for teachers, pre-service teachers, academics, and students can increase the effectiveness of the use of AIEd.

Abbreviations

The following abbreviations are used in this manuscript:

AI: Artificial intelligence

AIEd: Artificial intelligence in education
YÖK: Council of Higher Education

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