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Research Article

Use of Artificial Intelligence (AI) Technologies in Education According to Primary School Teachers: Opportunities and Challenges

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Abstract: Artificial intelligence (AI), which refers to technologies that mimic human cognition, affects many industries. Education is one of these sectors. Artificial intelligence affects many educational environments, from lectures to homework. In this process, both academic and ethical concerns call into question the future of artificial intelligence. These inquiries are essential as they show that the human factor will continue as an integral part of education. Because AI tools, even when best designed, can only partially replace human interaction or quality teaching. However, they can make the teacher's job easier and contribute to more effective learning. Therefore, teachers' awareness of this technology has become essential. This research aims to determine primary school teachers' opinions about using AI tools in education. The research was conducted using a case study. The participants are 16 primary school teachers determined by the criterion sampling method. Data were collected through a semi-structured interview form and analyzed with content analysis. According to the findings, teachers stated that AI tools may have advantages and disadvantages in educational environments. While teachers are concerned about the adverse effects of artificial intelligence tools on students, they also recognize their cognitive and socio-emotional contributions. Teachers also stated that artificial intelligence can make teachers' jobs easier but can only partially replace them. The results help understand primary school teachers' opinions regarding using artificial intelligence tools in the learning process.

Keywords: Artificial Intelligence, AI Tools, Artificial Intelligence in Education, Primary School Teachers

1. Introduction

Today, digital technologies are turning a life that was once considered a dream and described in detail by science fiction writers into reality. Authors such as Asimov (1950) pioneered us to start living these dreams today by establishing these dreams that shape the present and the future. John McCarthy introduced the concept of artificial intelligence (AI) in 1956. With technology developing since 1956, AI has found a more significant place in our lives. Significantly since the early 2000s, the advancement of digital technologies, the internet connecting millions of people and providing easy access and sharing of information, has radically changed human life and pushed people to different pursuits (Erol et al., 2023; Luckin & Cukurova, 2019). Ways of accessing and using information have evolved rapidly due to the rapid advancement of digital technology and increasing knowledge. This evolution has led to AI technologies and tools becoming more prevalent. As in every field, education and training activities have been affected by AI technologies (Zang & Aslan, 2021).

In 1956, John McCarthy described artificial intelligence (AL) as "the science and engineering of creating intelligent machines" (McCarthy, 2007). Mondal (2020) defined AI as the science and engineering of producing intelligent machines that solve different problems through natural language processing, neural networks, and machine learning. In other words, AI can be defined as an information technology that can imitate human cognition. AI represents the capacity of computer tools to perform tasks that often involve human intelligence, such as learning, reasoning, problem-solving, and decision-making (Minkkinen & Mäntymäki, 2023). According to Gondal (2018), AI has a skill set that can perceive human cognition, reason, comprehend, make sense of, generalize, infer, learn, and perform multiple tasks simultaneously.

AI technologies aim to personalize learning materials based on students' abilities, preferred learning styles, and experiences. In this respect, researchers have recently been discussing the reflections of AI on education and training activities (Bayraktar et al., 2023; Eren, 2021; Zhang & Tur, 2023) and

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researching the use of this technology with young children (Su et al., 2023; Yang, 2022; Su & Yang, 2023). This change points to a new paradigm in learning and teaching methods. Within the framework of this changing paradigm, this study focuses on the advantages, opportunities, challenges, and obstacles of using AI in the primary school period from the perspective of classroom teachers. For this purpose, the theoretical part first discusses the phenomenon of AI in education, discusses the advantages, expectations, difficulties, and obstacles of using AI in education in the context of the literature, examines the place of AI in teaching activities from the perspective of classroom teachers, and ends with the importance of the study.

1.1. The age of artificial intelligence in education: Shaping the future

In the digital age, AI is reshaping many industries. It is possible to express one of these sectors as education. In education fields, AI can help teachers predict students' learning status and performance, recommend learning resources, and improve students' learning experience with intelligent teaching systems (Liang et al., 2021; Zheng et al., 2021). The focus of AI in the field of education is AI literacy. AI literacy refers to competencies that enable people to critically evaluate, communicate, and collaborate with AI, as well as being an end user of AI tools (Druga & Ko, 2021; Holmes et al., 2022). However, research focuses little on improving AI literacy in children and its effects (Su et al., 2023). Children may need to learn how to use AI and the basic working principles behind these tools and may need clarification about the technologies (Su et al., 2023). Recently, the development of more age-appropriate software has allowed children to expand their opportunities to learn and explore AI and improve AI literacy (Yang, 2022). Therefore, teachers' professional development of this new technology is essential in their learning processes.

Today, young children are growing up with AI-powered technologies. AI-supported technologies have begun participating in children's lives in every field, from computer games to socialization environments. Focusing on this early interaction with AI systems, researchers have begun to examine the possible effects of AI technologies on children (Edwards, 2023; Williams et al., 2019). At this point, the literature questions whether preschool and primary school students are too young to discover and learn AI knowledge (Su et al., 2022). However, previous studies have shown that AI technologies are promising for children (e.g., Lin et al., 2020; Tseng et al., 2021; Williams et al., 2019). AI education has brought challenges and opportunities to early childhood education, including why children should learn AI in their early years, the subset of basic AI concepts that children can understand, and meaningful learning for children (Yang, 2022). In this respect, since AI is now part of the 'real' world in individuals' lives, including the early years, it is time to consider how and why information is important and how people will use these technologies in the post-digital age (Edwards, 2023).

1.2. Children in the age of artificial intelligence: Opportunities and challenges

AI offers numerous possibilities for innovation, especially in early childhood education (Lomier, 2023). With the increasing number of developmentally well-designed technologies for young children, young children can discover AI through playful experiences (Su et al., 2023). Interaction with AI can help children improve their digital literacy skills and attitudes and accelerate their progress in primary school. However, it is acknowledged that young children have little knowledge or understanding of AI (Su et al., 2023). Supporting students' cognitive development can help develop motor skills, aid speech and language acquisition, and enhance social-emotional learning, which can fundamentally change our approach to early learning (Lomier, 2023; Su & Zhong, 2022). Parents can use AI toys and services to create a digital environment for their children, and this new skill may make them more comfortable using such tools and increase the likelihood that they will use it as part of their instructional designs in the future (Knox, 2019; Su et al., 2023).

Although studies on AI for young children are still in their infancy, researchers have begun to explore how AI applications are used to facilitate student learning and the management of kindergarten and primary school teachers (PST) through intelligent tutoring systems for special education, chatbots for language education, and robotic kits in schools (Su et al. al., 2023). In early childhood education, AI-powered toys allow students to learn robots and kits. It also provides a fun experience for children to interact with them and support their coding skills. With well-designed AI systems, young children can improve their AI literacy even in the early years (Williams et al., 2019). Students with AI skill proficiency can think computationally based on their programming skills (Kim et al., 2021). Young children can explore AI technologies and improve their digital literacy in their daily lives, even if they do not know or understand the knowledge behind it. Education, health, and social opportunities for young children form part of their daily lives and function as components of broader society. AI is now part of the natural world where young children and their families live and, by extension, workplace employees (Edwards, 2023; Yi et al., 2024).

Although studies on AI focus on the many positive contributions of AI technologies for children, there are still various concerns. First, privacy and security concerns examine AI's effects on children's privacy and safety (White, 2018; Akgun & Greenhow, 2022). Identity protection, financial security, and preventing fabricated identities are critical to protecting children from AI technologies (UNICEF, 2019; Zanetti, 2020). In addition, harmful content, location detection, biological security, and the potential effects of AI on health are factors that need to be considered for the safety of children (Chou et al., 2017; UNICEF, 2021). From the perspective of access to services and equity, the risk of AI and machine learning leading to discriminatory outcomes must be considered (Ayala-Pazmiño, 2023; Kavale & Forness, 2019; Mengesha, 2021). The issues of who can access which services, how these decisions are made, and whether they are treated somewhat are essential for children's access to equal opportunities (UNICEF, 2021).

At another point, the contributions AI can make to the social development of children should be examined (Kurian, 2023; Mengesha, 2021). At the same time, potential impacts on how children spend their leisure time and how AI can promote purposeful leisure should also be addressed (White, 2018; Akgun & Greenhow, 2022). Regarding cognitive and psychological effects, the effects of AI on the brain should be examined. Issues such as the effects of this technology on children's psychological health, depression, anxiety, and the development of social skills are essential factors to consider (UNICEF, 2021; Zanetti et al., 2020). The potential risks of cognitive manipulation and the use of AI to direct child behavior should be evaluated (Chou et al., 2017).

1.3. Primary school teachers in the age of artificial intelligence: Responsibilities and expectations

According to the goals of the Ministry of National Education, AI technologies are planned to be used to improve education in Türkiye (Celik et al., 2022; Sevil & Saralar-Aras, 2024). In this context, research containing detailed information about AI's applications in education and its advantages is essential for educators to follow current developments and adapt to technology. Additionally, this research serves as a resource for anyone who aims to understand PST's views on AI-based education by providing up-to-date information (Gordon, 2011). As discussed above, AI has advantages and challenges in education and training activities. Although there are difficulties and obstacles, AI will inevitably occur among today's teaching technologies, considering its advantages. In this regard, it is an important context to examine the technology in question from the perspective of teachers in primary school classes, especially from the early years.

AI technologies, even the best-designed ones, can never replace human interaction or good teaching for the primary school age (Bulut et al., 2024; Kolchenko, 2018). However, they can serve more effective

learning by making the teacher's job easier. Children need caring and knowledgeable adults to help them navigate and learn about the world; This includes the world of technology. In this context, integrating AI technologies into educational environments without neglecting adult support will increase the quality of education (Kolchenko, 2018; Zang & Aslan, 2021). AI technologies can help teachers with many tasks, such as creating lesson plans, helping with homework evaluation, offering personalized support to students, and even creating videos from textbooks. The potential of these applications is quite wide-ranging, and PST should aim to take full advantage of these technological advances (Bowman, 2023).

This study is crucial for several reasons. Firstly, understanding PST's perspectives on integrating AI in education provides invaluable insights into the practical challenges and opportunities of implementing AI technologies in classrooms. Teachers are on the frontline of educational practice, and their experiences and opinions are vital for shaping effective AI-based educational strategies. While previous studies, such as those by Bayraktar et al. (2023), have explored AI's theoretical and broad implications in education, a distinct lack of research focuses on teachers' practical, day-to-day experiences. Secondly, this study addresses a significant gap in the current literature by providing detailed insights into the specific benefits and obstacles of AI from the perspective of PST. This focus is essential because teachers' acceptance and effective use of AI technologies are critical for successfully integrating these tools into education. By identifying teachers' specific needs, concerns, and suggestions, this research can inform the development of more targeted professional development programs and support systems to help teachers adapt to and embrace AI technologies. Lastly, the study's findings can serve as a valuable resource for policymakers, curriculum developers, and educational technology designers. By highlighting AI's real-world challenges and benefits in education, this research can guide the development of policies and tools that support the effective and equitable use of AI in primary education. This is particularly important in ensuring all students have access to high-quality AI education and are prepared to navigate the increasingly digital world.

It can be stated that teachers' perceptions of their skills in digital technologies and AI can affect the activities planned for children and AI applications (Kolchenko, 2024; Seyrek et al., 2024). In this respect, teachers must have good preparation in content and pedagogy so that children can access quality AI experiences. However, current pre-service and in-service training programs must pay more attention to AI training for PST. Determining teachers' perspectives will create the content of professional development programs for teachers and facilitate the integration of AI into primary school education environments. Therefore, this study aims to reveal PST's views on what opportunities and challenges AI technologies will create in educational environments. The questions guiding the research are presented below.

- According to PST, what are the benefits of using AI technologies for children in primary school?
- According to PST, what are the challenges to using AI technologies in primary school?
- According to PST, what is the role of AI technologies in the educational environment in primary school?

2. Method

2.1. Research model

This study used a case study to determine PST's thoughts on using AI tools. A case study is a research method used to examine a specific situation, event, group, or community in detail (Merriam, 2015). The situation examined in this study is teacher opinions regarding AI tools. Researchers often collect in-depth data during the research process to understand events or processes occurring at a particular time and place. Researchers widely use case studies to understand complex and real-life situations,

understand a specific context, and investigate cause-effect relationships (Patton, 2015). This study conducted in-depth interviews to understand better teachers' mental structures, experiences, and interactions with AI technologies (Merriam, 2015).

2.2. Participants

The study group of the research was determined by the criterion sampling method, one of the purposeful sampling types. Criterion sampling is a method in which researchers select participants based on specific criteria when determining the study group. Researchers use this method to include individuals who meet predetermined criteria in the sample. These criteria depend on the research aims, scope, and hypotheses. This method allows researchers to narrow the study group, conduct more in-depth analyses in a specific context, and reach more specific results (Patton, 2015). Determined criteria;

a) *Being a primary school teacher*: This criterion constitutes the study's main context because the focus is to examine the opinions of PST.

b) *Working in public primary schools in Istanbul*: This criterion is essential for access to the study group. Reaching teachers in other cities may cause a loss of time and effort, so the criterion for working in public primary schools in Istanbul has been determined.

c) *Knowledge about AI systems*: This criterion is essential for teachers to answer researchers' questions more effectively. Getting in-depth information from a teacher who does not know the subject is impossible. Teachers were asked the following questions: Have you attended a training on AI before? If you attended, could you give us brief information about it?

d) *Using an application that includes AI systems*: This criterion was determined to ensure teachers have gained experience with AI systems. In this way, teachers can provide more qualified and in-depth information about AI systems.

The study group consists of 16 PST's who teach in public primary schools in different districts of Istanbul. The table below presents demographic information about the study participants.

Table 1

Demographic Information of the Study Group

Variables		*f*
Gender	Female	9
	Male	7
Age	25-30	5
	31-35	4
	36-40	4
	41-45	1
	46 +	2
Professional Seniority	1-5	3
	6-10	5
	11-15	5
	16 +	3

2.3. Data collection

A semi-structured interview form was used since this study wanted to examine teachers' opinions about AI systems. The interview form is structured in two stages. The first stage consists of questions about gender, age, and working hours to determine teachers' demographic characteristics. The second stage

consists of a form with five questions, including semi-structured interview questions. While preparing this form, the relevant literature was examined, and expert opinion was sought. After the experts gave their views, some questions were renewed, and the final form was provided. In this context, the interview method was preferred to reveal PST's ideas and feelings about AI and whether they would replace the teacher. Sample questions in the interview form are as follows: 1) What are the advantages of using AI tools in educational environments? 2) Could Al replace the teacher one day? To increase the richness of the data in the interview questions and deepen the participants' opinions, some additional questions, described as probes, were asked by the flow of the research. Probes provide accommodations to ask more questions about details, ask for clarification, or obtain examples (Merriam, 2015). The interviews were held in a quiet environment at the schools where the participants worked and were recorded with the help of a voice recorder.

During the data collection process, PST were determined first. Necessary permissions were obtained from the designated teachers' institutions. In addition, written consent was obtained from the study participants. Among the teachers reached, 16 teachers who used AI systems in their classrooms at least once constituted the study's participants. Participants were informed about the purpose and outcomes of the research. As a result of the information provided, three teachers wanted to refrain from participating in the research. After the participants were determined, interviews were conducted using the interview form in a quiet environment (teachers' room, etc.). The interviews lasted an average of 29.8 minutes with each teacher. The phone's voice recording feature prevented data loss during the interviews. The data obtained were transcribed, and all audio recordings were examined.

2.4. Data analysis

The analysis of the data obtained through semi-structured interviews was carried out using the content analysis method. Content analysis is expressed as a dimension, such as scanning the qualitative text in line with recurring words and themes, reducing and making sense of qualitative data by taking the voluminous qualitative material, and determining its essential consistency and meaning (Patton, 2015). Coding was first done in line with content analysis, and themes were reached through this coding (Merriam, 2015). In this regard, coding was created as small notes in the study. By combining repeated coding, themes (categories) emerged (Yıldırım & Şimşek, 2013). Internal validity was ensured by examining the compatibility of the results obtained from the analysis with the previously established conceptual framework and theories. In the research, direct quotes were made from the interviews for internal reliability. After the data obtained from the interview was transcribed, it was sent to the participants in writing, and external reliability was ensured by asking whether the data accurately reflected their perceptions. In data analysis, abstraction was made using an inductive method, coding the data and reaching themes from the coding. First, all interview documents were transcribed. Transcripts were read, and each statement related to the experience was identified. All variables related to AI systems are listed. Then, variables with the same meaning were grouped, and meaning units were created. The themes were re-read after a specific interval, and new themes were obtained. In addition, the themes obtained from the analysis processes were presented under headings in the findings section and discussed with the findings of other studies in the literature.

2.5. Credibility and transferability

Two researchers conducted the coding processes in the data analysis at different times to ensure inter-coder reliability and expert opinions supported the determined themes and codes. The inter-coder agreement coefficient was examined with Kappa and was found to be .93. Care was taken to enrich the content while creating codes and themes using direct quotes from teacher interviews. Additionally, leaving 35 days between the data collection and analysis process minimized the possibility of researchers' individual opinions interfering with the analysis process. To ensure the external validity of the research, the criterion sampling method was chosen using the purposeful sampling method of the

study group. The interviews were conducted face-to-face with the teachers. Additionally, to increase the research's external reliability, a literature review was conducted to prepare the interview questions, pilot interviews were held with teachers, and the questions were reshaped based on expert opinions.

2.6. Role of Researchers and Ethics

Before starting the research, approval was obtained from the university's social and human studies ethics committee (Meeting Date: 04.03.2024; Meeting Number: 2024.03). The ethics committee document for this study was obtained from Yıldız Technical University Social and Human Sciences Research Ethics Committee with the decision dated 04.03.2024 and numbered 2024.03. The research's purpose, process, and potential risks were clearly explained to the participants, and their consent was obtained. Consent forms were filled out and signed by the participants in understandable language. It was notified in advance that the interviews would be audio recorded. The personal information of the participants was kept confidential and was used only during the research process. Participants' identities were not used in research reports or presentations. Participants' names or other personal identifying information were not shared anywhere without their consent. Researchers informed participants that they could leave the study at any time and not talk about questions they did not want to answer. Care was taken during the data collection process to conduct the interviews as objectively as possible. In this regard, care was taken not to judge the behavior and words of the participants and not to create any expectations for them. Additionally, to ensure participant control over the findings, observations were made throughout the research process, the researcher was enabled to state his prejudices, and time was spent with the participants in the same environment for a certain period.

3. Findings

This section focuses on classroom teachers' views on using AI tools in education. The data analysis findings obtained from the teachers were explained with three themes: 1) Negative Effects of AI Technologies on Students, 2) Advantages of AI technologies, and 3) The Role of AI in the Educational Environment. Below, the themes, sub-themes, and codes obtained from the teachers' opinions are presented verbatim from the teachers' statements.

3.1. Theme 1: Negative effects of AI technologies on students

This theme considers the potential adverse effects of AI tools on students through teachers' eyes. Based on the data obtained, we can say that, according to teachers, the tools may negatively affect students' health and learning processes. Teachers have stated that the widespread use of AI tools will negatively affect students' cognitive, emotional, and value development. They are especially concerned about its unconscious use. P1 emphasized this situation: "*I think that when used unconsciously, it can prevent the development of thinking ability, questioning and make people lazy.*" Teachers also think that the awareness of responsibility in students will decrease: P14 "*Failure to understand the importance of working hard for success and weakening of the awareness of responsibility*." According to teachers, the adverse effects of AI tools on students are summarized in Table 2 through themes, sub-themes, and codes.

Table 2

Adverse Effects of AI on Students

Themes	Sub-themes	Codes	f
Adverse Effects of AI on Students	Affects Thinking Skills	Reduces creativity	9
		Socialization problems	8
		Reduces students' curiosity	8
		Inhibits reasoning	7
		It inhibits the thinking process	7
		Negatively affects your critical thinking skills	6
		Writing skills are negatively affected	6
		Idea generation decreases	3
	Socialization Problems	It causes laziness	13
		Negatively affects friendship skills	10
		The bond between child and teacher is not strengthened	10
		Social rules are not learned	9
		Students fail to realize their responsibilities	9
		The child becomes numb	7
		Negatively affects empathy development	6
		Negatively affects emotion regulation skills	5
		Negatively affects self-efficacy	4
	Worthlessness	Education of national values becomes difficult	7
		Acquisition of social values becomes difficult	6
		Values such as loyalty, friendship, and compassion are difficult to learn.	2
		A worthless society is born	1
		The importance of school disappears	8
		The importance of education decreases	7

Table 2 shows that teachers have opposing views on the use of AI tools in education. Most teachers think AI tools will reduce creativity in students, negatively affect friendship skills, reduce national values, and cause laziness. Teachers' opinions are explained with three sub-themes: 1) impacts on thinking skills, 2) socialization problems, and 3) worthlessness.

3.1.1. Affects thinking skills

Teachers think that with the increasing use of AI tools, students' creativity will decrease, social problems will become more challenging to solve, reasoning will be hindered, critical thinking skills will be negatively affected, writing skills will be negatively affected, and idea generation will decrease. According to teachers, if AI is used unconsciously, students' thinking and questioning skills may be negatively affected. P11 emphasized this situation: "*It may negatively affect students' thinking skills*." In addition, teachers stated that humans might evolve into machines when they have an insufficient understanding of emotions, are incompatible with dynamic changes in human interaction, and ignore sincerity and emotion. A teacher expressed his views as follows.

> *P3: It may be insufficient to understand emotions during the education and training. Human interacting beings change and develop thanks to this interaction. In addition, the human mind is dynamic, and sensitive thoughts constantly change. He cannot understand this and look at the student with the same eyes and understand the student's mind. It is insufficient to react. Classical coding or mathematical approaches. This ignores sincerity and emotion. "This situation may lead humans to evolve towards mechanization.*

On the other hand, according to teachers, the concern that AI will negatively affect students' thinking skills and the thought of hurting the education process and the whole of life come to the fore. They stated that AI may cause students to succeed in homework assignments without putting in thought and effort

and that it may prevent process-oriented education by reducing research and questioning skills, which will negatively impact cognitive development. For example;

> *P1: It will hurt the whole of life along with education. "It causes people to take it easy in fulfilling their duties and responsibilities and to fulfill them in a way that is far from reaching the goal, without giving due importance, especially the inability to express feelings and thoughts accurately and impressively.*

On the other hand, teachers have also expressed concerns that AI will lead people to ready-made habits, cause the imagination to dull, the learning process may cease to be a pleasant experience, and may reduce kinesthetic skills. P3 explains this situation as follows.

> *P3: Al can get people used to the present and dull their imagination. One of the most essential characteristics of a human being is the ability to dream; if everything is done with Ali, the human development process will be blocked. The learning process is pleasurable if you do and experience it. As a person does things on his own and achieves things, his desire increases, his self-confidence rises, and his kinesthetic skills develop. These developing processes have a positive effect on other areas of life as well.*

Finally, teachers also expressed their concerns that with the widespread use of AI tools, children's analysis and synthesis skills will be negatively affected, their awareness of effort and responsibility will weaken, students will have difficulty expressing themselves, their writing skills will decline, and their thinking abilities will disappear. These statements reflect concerns that AI may have a wide range of effects on education and that these effects may have negative consequences on student development. Some teacher opinions that support these statements are as follows;

> *P2: The purpose of these assignments is to encourage students to think. The student does not do the homework using AI. It gives the impression that someone else has done his work instead of him. In this way, the desired outcome does not reach the student. Process-oriented education, which requires students to research and question, is disrupted. The contribution of the assigned work to student success is significantly reduced.*

> *P5: The participant's subjective judgments will decrease. It will also negatively affect children's analysis and synthesis skills in the long term.*

> *P16: Students may have difficulty expressing themselves. Writing skills may decline. "Thinking, ideation, and problem-solving skills may be lost.*

3.1.2. Socialization Problems

According to teachers, AI tools also bring about socialization problems for students. For example, P1's statement, "*I think that AI tools will become widespread in the near future and students will move away from society*," supports this situation. In particular, the unconscious use of AI tools brings many problems, such as negatively affecting friendship skills, difficulty learning social rules, not being aware of responsibilities, desensitization, negatively affecting empathy development and emotion regulation skills, and negatively affecting self-efficacy. P7 expressed this situation as follows:

> *P7: The spread of AI means a decrease in social relations. It adds to the countless children who are stuck at home with technology today. Do we really want this as educators?*

> *P8: With AI, children will encounter many negativities such as difficulty learning social rules, not being aware of responsibilities, desensitization, and adverse effects on empathy development. This situation will deepen with applications such as Metaverse.*

> *P2: With AI, children's emotion regulation skills will be negatively affected, and their self-efficacy will be negatively affected. Because it is a virtual world for children, they will be emotionally depressed by moving away from reality.*

3.1.3. Worthlessness

According to teachers, AI tools may make the education of national values difficult for students, the acquisition of social values may be complex, values such as loyalty, friendship, and compassion may be difficult to learn, a worthless society will arise, and the value of education and school may decrease. Values are learned formally or informally in the society we live in. AI tools will negatively affect this situation, making it difficult to transfer our cultural values to future generations. The teacher's opinion supporting these statements is as follows;

> *P9: With the widespread use of AI tools, education of national values will become difficult, acquisition of social values will become difficult, and values such as loyalty, friendship, and compassion will lose their importance because children will get used to loneliness in this process.*
>
> *P5: The widespread use of AI could shift societal dynamics, potentially resulting in a devaluation of education and schools.*
>
> *P14: "Values are essential and unwritten rules for the continuation of society. Just as their tools will reduce the importance of culture, they will also reduce the acquisition of these values. What will people want from now on in a worthless society?*

When the adverse effects of artificial intelligence are examined according to teachers' views, the following conclusions can be made. It can lead to independent thinking in education, socialization problems, difficulty acquiring national and cultural values, and weakening problem-solving skills. Although these technologies can provide students instant information and automatic responses, their constant dependence on such tools can dull their critical thinking abilities and prevent creative thinking processes. In addition, the promise of personalized learning by artificial intelligence can negatively affect the development of group work and communication skills by reducing competition and social interaction among students. In the long run, this situation can cause students to become dependent on technologies and individuals with difficulty developing a critical perspective on the information these technologies provide.

3.2. Theme 2: Advantages of AI technologies

According to teachers, this theme examines the advantages AI tools can bring to students. Teachers have stated that AI tools can enhance or support students' learning experiences in certain areas. P7 emphasized this situation: “AI is inevitable; it will offer many new opportunities. If our students can use it well, their learning experiences will expand”. Another teacher stated that "AI is not actually scary, it should be seen as an opportunity to expand learning environments" (P9). The advantages of AI tools compared to teachers are summarized in Table 3 through themes, subthemes, and codes.

Table 3

Advantages of AI technologies

Themes	Sub-themes	Codes	f
Advantages of AI Tools	Cognitive Contribution	Supports learning	10
		Makes teaching easier	9
		Improve academic success	9
		Contributes to problem-solving	9
		Makes teaching reading and writing easier	8
	Socio-Emotional Contribution	Increases motivation	7
		Increases interest in the lesson	7
		Develop a positive attitude toward the lesson	7
		Reduces prejudice	6
		Used in the communication process	6
		Increases curiosity	3
	Other contributions	Provides fun time	8
		It can be used as educational material	7
		Helps students while doing homework	6
		Provides equal opportunity in crowded classes	6
		Saves time and space	5
		Speeds up access to information	4

When Table 3 was examined, teachers stated that AI positively contributes to cognitive, socio-emotional, and other fields. According to teachers, the positive effects of AI tools manifest themselves in various dimensions. These effects are explained with three sub-themes: 1) Cognitive Contribution, 2) Socio-Emotional Contribution, and 3) Other Contributions.

3.2.1. Cognitive contribution

Teachers emphasized that access to information will be easier with AI tools and, as a result, will contribute to children's cognitive development. According to teachers, AI tools can primarily support learning in the educational process, facilitate teaching, and increase academic success in children. Additionally, it contributes to students' problem-solving skills. On the other hand, according to teachers, AI can make teaching reading and writing easier. The following statements support these explanations.

> *P2: Al can be used for appropriate purposes. The opportunities provided by AI can be used in science, in fields that require three-dimensional work, or in situations where there is a material shortage.*
>
> *P3: It should be used as an auxiliary tool at school and home. It should be used as a tool to accelerate or facilitate the student's learning process, sometimes while doing homework at home, and sometimes in the classroom, as a different method and technique.*
>
> *P4: Al can be used. It provides great convenience in terms of speed of access to information. It can be used by teachers in the course planning process, course preparation process, searching for articles by subject, and providing quick access to related articles.*
>
> *P16: Access to information is accelerated, education is easily supported with visual and audio materials, time and space are saved, the educational environment becomes fun, and the memorability of the acquired knowledge increases.*

3.2.2. Socio-emotional contribution

According to teachers, interacting with AI tools contributes to children's cognitive development and provides many social-emotional contributions. First, AI tools can positively affect children's learning by increasing their motivation, attracting interest in the lesson, and developing positive attitudes. The following statements of teachers support this situation.

P11: We can attract students' attention to lessons with AI tools. In this way, we serve more effective learning.

P15: The current generation was born in the age of technology. It is almost impossible to keep them away from technology. Instead of keeping them away from children, we can use technology-supported AI tools to increase their motivation for lessons. These tools can motivate children to use creative solutions and make the lesson effective.

3.2.3. Other contributions

Teachers stated that AI tools can help students while doing homework and that students can use these tools in the communication process. In addition, according to teachers, advantages such as providing equal opportunities in crowded classes, reducing the education gap between villages and cities, and saving time and space are some of the positive contributions of AI in education. According to participant statements, it is also emphasized that AI provides rapid access to information, supports the education process with visual and audio materials, offers alternative learning methods, and increases the memorability of the acquired knowledge. These statements reflect a generally positive perspective that AI can offer many positive educational outcomes. Some of the teacher opinions supporting these statements are as follows;

P14: AI tools can serve individual learning in crowded classes."

P13: Using AI tools in education has advantages such as reducing the education gap between villages and cities and saving time and space. We will witness educational environments changing shortly.

P9: AI tools can save time and space by bringing learning environments into the classroom around the world.

P8: AI tools will serve to accelerate access to information. In particular, supporting the education process with AI tools and visual and audio materials will offer alternative learning methods and increase the memorability of the knowledge students acquire.

3.3. Theme 3: The role of AI in the educational environment

This theme focuses on the role of AI in educational environments. Teachers think that AI tools will make their jobs easier. Additionally, teachers believe that it is not possible for AI tools to replace teachers. According to teachers, the role of AI tools in the educational environment is summarized in Table 4 through themes, subthemes, and codes.

Table 4

The role of AI in the educational environment

Themes	Sub-themes	Codes	f
The Role of AI in the Educational Environment	Al makes the teacher's job easier	Makes teaching easier	12
		Teachers can monitor student's progress	10
		Reduces teacher workload	10
		Adds speed and practicality to the teacher	9
		It enriches learning	9
	Al cannot replace the teacher	Education is a human business	9
		Machines cannot touch people	7
		Education cannot be achieved with only cognitive knowledge.	7
		It mechanizes students	6
		Al cannot give emotional education	5
		Teaching is a matter of conscience	3

When Table 4 is examined, some teachers stated that they could replace teacher Al, while others said that they would not replace the teacher at all. According to teachers, the role of AI in educational environments occurs in two contexts. 1) AI makes the teacher's job more accessible, and 2) AI cannot replace the teacher.

3.3.1. AI makes the teacher's job easier

In the context of this sub-theme, teachers emphasized that AI tools facilitate teachers' teaching and learning tasks. According to teachers, AI can make it easier for the teacher to teach the lesson, allow the teacher to monitor the student's progress, reduce the teacher's workload, add speed and practicality to the teacher, and enrich children's learning. For example;

> *P1: Although Al cannot replace the teacher, it will make his job easier and provide effective teaching. Teachers can monitor students with AI. It will be easier to evaluate and follow up with children. It will also deepen children's learning.*

> *P8: "The teaching profession has undergone many transformations over the years. Technology-supported training is inevitable in our lives. "AI will be inevitable, and we must look for ways to use it more effectively.*

3.3.2. AI cannot replace teachers

According to teachers, digital technologies are becoming widespread today, and the education sector is also changing. Although some teachers stated that AI could replace the teacher with this change, others noted that the human factor is still needed in basic education (preschool and primary school education) and that it will be difficult for AI to replace the teacher. Teachers stated that cultural transfer and supporting students' socialization skills would be possible with teachers. For example;

> *P6: Although Al may replace the teacher in the future, I think that the teacher cannot be given up in order to transfer the culture and socialize the students in basic education.*

> *P13: The pandemic showed us that the lack of teachers in primary education prevented children's development of many skills. This will be the case in AI. Although it is a problematic possibility in primary education, it will replace the teacher in the upper grades.*

Teachers who stated that it could not replace the teacher stated that education is a human job, that students should be provided with cognitive knowledge and affective skills, and that education is a matter of conscience. Therefore, it is difficult for AI to replace the teacher. P6 emphasized his views on this issue: "The teacher is a biopsychosocial being, I do not think he can replace the teacher." In addition, the teachers' opinions stated below also support this situation.

> *P2: I do not think AI can replace the teacher. The teaching profession is more than just a job of transferring information. AI cannot undertake a profession that requires one-to-one communication and where emotions and behaviors are at the forefront. "Al will always ignore the conscientious side of a person.*

> *P4: It can be integrated into educational environments. "It may save time for teachers and students, but I do not think it can replace the teacher since learning environments are not based solely on information exchange.*

> *P5: Even if Al can make emotional analyses and understand the characteristics of the students, he cannot empathize and remains artificial. This does not work in young children." Therefore, AI cannot replace the teacher based on young children.*

> *P13: Just as all machines and robots reduce human power, it is also possible for this to happen in education. However, since the teacher is also someone who has an emotional side, I do not think that he can completely replace him in this aspect.*

4. Discussion

In this study, which aims to determine teachers' views on using AI tools in learning environments, teachers primarily focused on the adverse effects of AI tools. Most PST emphasize that AI technologies may hurt students' health and learning processes. These adverse effects are generally classified as thinking skills, socialization problems, and worthlessness. There are studies in the literature that support our findings. For example, Schiff (2020) noted concerns about using AI systems in education. One of these concerns is that AI systems could manipulate students by deeply analyzing them. Additionally, AI will likely standardize teachers, alienating them from their creativity and appreciation of students' diversity. A system that can understand all the characteristics of students has the potential to guide the students to make decisions on various issues. These concerns are essential factors preventing AI from fully integrating into teaching. Therefore, AI's role in education must be carefully considered, and appropriate measures must be taken (Akyel & Tur, 2024).

Since AI systems are based on extensive data analysis, they can sometimes produce incorrect results for specific cases (Chassignol et al., 2018). As Stephen Hawking and his colleagues noted in research published in The Independent in 2014, the short-term impact of AI may depend on who will use it and how it will benefit. However, in the long term, it is essential to determine whether the impact of AI can be controlled and whether individual and collective measures should be taken to prevent related risks (Hawking et al., 2014). Therefore, it is important to consider ethical concerns and ensure security during the development and use of AI (Yılmaz, 2023). Therefore, concerns about AI systems accelerate the taking of some precautions. Software developers who develop AI strive to reduce the margin of error and maintain ethical boundaries. For example, Microsoft introduced the "responsible AI" concept in 2017, identifying six ethical principles developers and institutions must meet: fairness, reliability and security, privacy, inclusivity, transparency, and accountability. Studies on ethical firsts can be shown as a promising effort in AI (Öztürk Dilek, 2019).

On the other hand, using artificial intelligence (AI) tools in education while offering innovative opportunities also brings various ethical concerns. The most important concerns are the privacy and security of students' data, AI systems' transparency, algorithms' unfairness, and the weakening of social interactions. In order to address privacy concerns, clear policies should be established regarding the data collection and use methods of AI tools, and these policies should be regularly audited. In order to ensure transparency, teachers, students, and parents should be informed about how AI systems work, and training should be organized. In addition, fair algorithms should be developed, data diversity should be ensured, and discrimination should be prevented. In order to prevent the weakening of social interactions, it is essential to balance the use of AI tools with activities that develop social skills. These solutions aim to ensure the ethical use of AI tools and to support students' academic and social development (Huang, 2023; Liang, 2023).

According to another finding, teachers also stated that there are advantages to using AI tools in education and training environments. These advantages are generally examined under three sub-themes: cognitive contribution, socio-emotional contribution, and others. Teachers think AI tools can facilitate access to information, support learning, and increase students' motivation. It has also been stated that artificial AI can assist students in the homework process and provide equal opportunities. AI is an information technology that can perceive human cognition, reason, comprehend, make sense of, generalize, infer, learn, and successfully perform multiple tasks simultaneously (Gondal, 2018), in a sense, imitating human Intelligence. Both participant opinions and related research indicate that using AI integrated with the teacher in all processes in the classroom and acting as an assistant will be more effective in classroom management (Bryant et al., 2020; Zhao & Lui, 2018). Studies conducted on AI tools in education Have shown that they can be used in grading and evaluation, student absenteeism and school dropout prediction, student performance prediction, personalized teaching, emotion analysis,

recommendation systems, innovative education systems, classroom monitoring, brilliant school, school evaluation and management, supervision, and analysis systems (Ahmad et al. al., 2020; Chen et al., 2020). AI technology can be used as a learning tool that provides practical learning experiences and supports learning by reducing the workload of both teachers and students in education. Studies are being carried out in this direction (Loeckx, 2016).

For example, AI contributes directly to school management and education, including course schedules, personnel schedules, exam management, cyber security, facility management, and security (Holmes et al., 2019). According to Edwards & Cheok (2018), if AI completes its development in educational presentation, personality, pedagogical approach, movement system, and emotional areas, another benefit will be that countries will eliminate the teacher shortage. AI is used in education as a support tool to automatically predict the development of students using their past performances and provide innovative teaching by improving education (Siegle, 2023). As a tool that contributes to creativity, AI provides advantages to teaching capabilities when used in art education (Caramiaux & Fidili Alaoui, 2022). While AI helps the student collaborate with technology, it places the learning process at the center of the student. It encourages him to take an active role by keeping him in a leadership position (Ezzaim et al., 2022). Teachers should determine a roadmap for students to use AI responsibly, safely, and effectively. This road map should include elements such as determining boundaries regarding AI, monitoring use, encouraging critical thinking, emphasizing responsible use, and providing guidance for the effective use of AI (Siegle, 2023).

Finally, in the evaluations made on the role of AI in educational environments, most teachers think that AI can make the teacher's job easier but cannot completely replace the teacher. In other words, teachers emphasized that education is human work, and the human factor is essential. According to teachers, although AI can partially replace the teacher in education, the teacher is the most critical factor in the education process. Therefore, AI will not be able to replace the teacher in primary education because basic education is a level where education is at the forefront rather than education. To motivate students to learn, the teacher is an integral part of the learning process and cannot be completely isolated from education. Some researchers support these findings in the literature. In a study, Kolchenko (2018) emphasizes that artificial intelligence will be insufficient in creating the templates formed in students due to student-teacher interaction. Therefore, the literature supports our results.

Similarly, Felix (2021) states that AI cannot teach cultural values, history, and social norms and that human teaching is necessary. He states that he is one step ahead with his posture, voice, gestures, and facial expressions and that AI cannot replace the teacher with its abilities, such as establishing eye contact, changes in tone of voice, and active use of the body. AI cannot imitate these features, so it is unlikely to displace the teacher. Bryant et al. (2020) state that having an assistant role would be more beneficial. The teacher will spend more time on education. Zhao & Liu (2018) state that AI will not replace the teacher in education but will remain an assistant to the teacher and state that education is a unique concept. It states that education is provided by transferring knowledge, developing character, discovering the unknown, and encouraging creativity. In this context, the literature supports our results.

5. Limitations and Recommendations

This study has some limitations. First, the number and profiles of teachers included in the study are limited. The experience and knowledge levels of the teachers participating in the study vary. This can lead to a need for more diversity and depth in the assessments and conclusions made. A study can use a larger sample, including different teacher profiles. Evaluating the opinions of students, parents, administrators, and teachers from different schools and regions can provide a more comprehensive perspective. A more detailed understanding of AI tools' potential effects and applications in education can be developed by examining teachers' concerns and suggestions.

Understanding the transformative potential of AI in education is a crucial starting point for this exploration. This understanding should delve into how AI-based tools can be seamlessly integrated into student learning processes, bolster teaching strategies, and foster personalized learning experiences. Equally important is the identification of the requisite support and training mechanisms for teachers to proficiently utilize these technologies. In this vein, regular professional development programs for teachers, along with guidelines on how to effectively align AI tools with pedagogical practices, and real-world examples of classroom applications, will all play a pivotal role in facilitating technology integration and enhancing the quality of education. A practical implementation strategy can then be devised to harness the full potential of these innovations and opportunities in education, ensuring that teachers perceive technology as a tool and an integral part of their teaching processes.

6. Conclusion

The results of this study broadly evaluate and discuss teachers' views on using AI tools in educational settings. Findings focus on the potential impacts of AI tools on students, their advantages, disadvantages, and their role in education. Teachers are concerned about the adverse effects of AI tools on students. These concerns are examined under themes such as the impact on thinking skills, socialization problems, and weakening of values. However, teachers also see the advantages of AI tools. These benefits include cognitive contribution, socio-emotional contribution, and other benefits. Finally, teachers also evaluated the role of AI in education. Most think AI can simplify the teacher's job but cannot completely replace it. In other words, AI can partially replace the teacher in the teaching process, but an education without a teacher is unthinkable in the education process, especially in primary education. These findings highlight the need to carefully consider the role of AI tools in education and the importance of creating appropriate guidance and policies for teachers to use AI effectively and responsibly. To maximize the potential of AI in education and minimize possible risks, ethical boundaries must be determined, and security measures must be taken. In this context, it is essential to conduct further research on AI tools' role in education and develop guidance materials that will enable teachers to use this technology effectively.

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