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Research Article

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Examining the views of primary school teachers on the use of artificial intelligence in education

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ABSTRACT

In today's rapidly advancing world, science and technology impact every aspect of our lives. Therefore, this study aims to reveal the views of primary school teachers on the use of artificial intelligence (AI) technologies in education, which are rapidly gaining popularity and leading to competition among major companies and countries. In this study, the basic qualitative research design, which is part of the qualitative research paradigm, was adopted. For this purpose, the study group consisted of 16 primary school teachers working at the Board of Education. The findings of the study revealed that while the views of primary school teachers on the use of AI in education are generally positive, it is emphasized that these technologies should not replace teachers but should be supportive tools in the teaching process. Another finding of the study is that primary school teachers' views on the advantages of using AI in education include providing personalized learning experiences, rapid feedback, individual performance evaluation and monitoring, time saving, practicality, preparing effective and engaging learning materials, and increasing student motivation during the learning process. On the other hand, it was found that primary school teachers' views on the disadvantages of using AI in education include making students lazy, data privacy and ethical issues, reducing social interaction, and making human minds lazy. Based on the findings of the research, teachers' opinions considering the potential positive impacts of AI-supported education suggest that AI-supported tools should provide feedback by identifying students' strengths and weaknesses and focus on individual learning differences and needs. According to teachers' opinions considering the potential negative impacts of AI-supported education, such as causing laziness, ready-made solutions, reduced socialization skills, decreased interaction both in and out of the classroom, and suppression of research, exploration, and creativity skills, it is recommended to allocate time for emotional and intellectual sharing in teacher-student relationships, support and encourage students' creative thinking and artistic talents, and organize activities that provide opportunities for socialization.

Introduction

In today's rapidly advancing world, science and technology impact every aspect of our lives. This rapid change and innovation in technology also affects our educational processes, changing our approaches and understanding of education. Consequently, technology and technological tools are frequently incorporated into our educational processes and learning-teaching environments. Artificial intelligence, which is rapidly gaining popularity and leading to competition among major companies and countries, is one of these technologies. Google Gemini, Chat GPT, Devin AI, and the unmanned intelligent vehicles produced by Elon Musk are just a few examples of these technologies. Today, artificial intelligence is used in almost every area of our lives, including finance, transportation, healthcare, education, banking, information processing, and security. It is believed that the use of artificial intelligence in learning processes will increase in the future.

John McCarthy, considered the inventor of the definition of artificial intelligence, defined artificial intelligence as a computer's ability to perform high-level cognitive tasks (McCarthy, 2004). However, the origin of the concept of artificial intelligence dates back to Alan Turing's question, "Can machines think?". The most distinctive feature of human intelligence is the ability to learn. Therefore, the goal of artificial intelligence is to endow machines with the ability to learn, inspired by human intelligence. The most important feature of artificial intelligence is its ability to learn quickly and permanently and to apply what it has learned very rapidly (Öztürk & Şahin, 2018). Chassignol, Khoroshavin, Klimova and Bilyatdinova defined artificial intelligence as the way computers solve problems similarly to human intelligence. Nils Nilsson (1990) defined artificial intelligence as intelligent systems or programs that can react to new and complex situations, not just predefined problems. Elmas (2003) described artificial intelligence as the imitation of the functioning of intelligence using software and hardware. Obschonka and Audretsch (2020) defined artificial intelligence as the imitation of human intelligence principles in solving complex problems and making decisions under different conditions. Despite various definitions in the literature, artificial intelligence is generally defined as intelligent programs or systems that can respond similarly to humans. Moreover, due to the capacity of artificial neural networks—an integral component of artificial intelligence—to absorb knowledge from existing data and generate solutions to previously unseen events, artificial intelligence technologies have become prominent in various areas of life (Atasoy, 2012; Yılmaz, 2012). Education is also one of these areas.

Teachers being the sole source of information during lessons and students being passive listeners is far from the educational understanding required by this era (Kozikoğlu & Çamuşçu, 2019). One of the qualities required by this era is for students to gain learning autonomy (Castle, 2008). Accordingly, traditional teacher-centered methods and practices are being abandoned in favor of technology-supported and student-centered approaches. Research on the integration of artificial intelligence technologies into education and the development of online learning platforms using these technologies can aid in analyzing student behavior and enhancing learning experiences by considering various factors. It is recommended that artificial intelligence technologies be used as an assistant in the learning process for both teachers and students (Khare, Stewart, & Khare, 2018; Popenici & Kerr, 2017; Taşçı & Çelebi, 2020). The use of artificial intelligence technologies in education has the potential to contribute to making students' learning experiences more effective and efficient by personalizing them. According to Chopra (2019), artificial intelligence technologies can personalize learning materials according to each student's abilities, learning styles, and experiences. Currently, AI technologies are actively used in education in countries like the USA, Australia, and China (Zhou & Liu, 2019). According to Chen et al. (2010), the use of AI in education is expected to become more widespread in the future. AI tools can process data on how

individuals learn, think, and the various factors affecting their learning to provide personalized learning experiences (Luckin, Holmes, Griffiths, & Forcier, 2016; Zanetti, Rendina, Piceci, & Peluso, 2020). AI technologies are important for further developing elements such as teacher and student feedback, individual tracking systems, automatic grading systems, personalized learning, distance learning, and predictable success (Limna & Jakwatanatham, 2022; Kengam, 2020; Huang et al., 2021; Zhang et al., 2023). Furthermore, AI technologies can provide diversity in teaching methods through personalized learning assistants (Kengam, 2010). Murphy (2019) emphasized that AI technologies can provide opportunities for individual performance tracking and evaluation. In summary, the use of AI technologies in education can offer many opportunities, such as providing personalized learning experiences, designing teaching materials and processes tailored to the individual, giving instant feedback, and establishing individual grade tracking systems.

In addition to the advantages brought by the influence of AI on almost all areas of our lives, it also brings some disadvantages and concerns. Concerns include what will happen to the data collected by AI's influence on all areas of our lives, who will have access to this data, how the data will be used, and what kind of operations will be performed on this data, such as the risk of data being intercepted or sold to unauthorized individuals (Oliveira, Lopes, Soares, Pinheiro, & Guimaraes, 2020). Additionally, some futuristic commentators discuss concerns about AI getting out of control, being used in wars, leading to significant human losses (Fast & Horvitz, 2017). There are also discussions about AI potentially replacing humans in many professions, leading to widespread unemployment.

Studies examining the use of AI technologies in education (Aşık, Yıldız, & Kılınç, 2023; Chen, Chen, & Lin, 2020; Bayraktar, Gülderen, Akça, & Serin, 2023; Dülger & Gümüşeli, 2023; Khare, Stewart, & Khare, 2018; Popenici & Kerr, 2017; Şanlı, Ateş, Bayburtlu, Bektaş, & Özdemir, 2023; Özer, Yazıcı, Akgün, & Yıldırım, 2023; Taşçı & Çelebi, 2020; Zhao & Liu, 2019; Kolchenko, 2018; Işık et al., 2023) have shown that AI technologies contribute to personalizing students' learning experiences by analyzing their behaviors and learning. Therefore, it is crucial to understand the views of primary school teachers, who are most familiar with classroom dynamics, on the use of AI technologies in education to understand how these technologies can be used most effectively and efficiently in the classroom and how they function in practice. Teachers, having the opportunity to closely observe students' needs and expectations, can provide valuable insights on integrating AI technologies into learning experiences. This study aims to examine primary school teachers' views on the use of AI in education by seeking answers to the following questions:

1. How do primary school teachers evaluate the role of AI technologies in education?
2. How do primary school teachers think AI technologies affect or can affect students' learning processes?
3. What are primary school teachers' views on the advantages of using AI technologies in education?
4. What are primary school teachers' views on the disadvantages of using AI technologies in education?

Method

Research design

In this study, the basic qualitative research design, which is part of the qualitative research paradigm, was adopted. The basic qualitative research design focuses on how people interpret

their lives, construct their worlds, and make sense of their experiences. The primary objective of this design is to uncover and interpret these meanings constructed by individuals (Merriam, 2009). This research examines the perspectives of classroom teachers on the use of artificial intelligence in education and how they interpret its application in educational settings. Therefore, a basic research methodology has been employed. The basic qualitative research design is one of the most commonly used designs in education and other fields (Merriam & Tisdell, 2016). In this study, a questionnaire consisting of four open-ended questions was used as the data collection tool. A thorough analysis process was followed on the obtained data set to understand and explain the perspectives revealed through the data collection tool.

Study group

The idea behind qualitative research is to purposefully select participants who will best help the researcher understand the research problem and research questions (Creswell, 2017). The participants in this research were determined using the convenience sampling method, one of the appropriate sampling methods. This method was chosen for its speed and practicality since it selects cases that are close and easily accessible to the researcher (Yıldırım & Şimşek, 2021). This method is frequently used when researchers can easily access a specific population (Merriam, 2013). For instance, convenience sampling can be utilized for studies involving individuals living in the researcher's locality, school students, or employees at a particular workplace. This method is often preferred for its practicality and accessibility. Researchers may choose this method when they wish to minimize the time and financial resources required for sampling. Additionally, convenience sampling may be employed when researchers have easy access to a particular group or when sampling from that group is deemed more appropriate. Therefore, the primary school teachers employed at the Board of Education and Discipline, where the researcher serves as a National Education Specialist (i.e., teachers assigned annually to the institution and actively working in the field), constituted the study group for this research. Accordingly, the study group consisted of 20 primary school teachers working at the Board of Education. The demographic characteristics of the primary school teachers participating in the research are given in Table 1.

Table 1 Demographic characteristics of the primary school teachers participating in the research

Gender	f	Age	f	Seniority	f	Educational Status	f
Female	7	20-30	1	0-5y	1	Bachelor's	6
Male	9	31-40	7	6-10y	1	Master's	8
		41-50	4	11-15y	2	Doctorate	2
		50^{+}	4	16-20y	3		
				$21y^{+}$	9		
Total	16		16		16		16

Data collection tools

Interview types in the literature are gathered under three main categories: structured, semi-structured, and unstructured (Merriam, 1998). During the development process of the data collection tool, similar data collection tools that were designed for analogous purposes in the literature were examined in terms of content and structure (Bayraktar, Gülderen, Akça, & Serin, 2023; Taşçı & Çelebi, 2020). Following this process, a questionnaire consisting of 12 questions was developed, addressing the four dimensions that form the sub-problems of the research (teachers' perspectives on the use of artificial intelligence in education, teachers' views on the impact of artificial intelligence use on students' learning processes, teachers' perspectives on the advantages of artificial intelligence in education, and teachers' perspectives on the disadvantages of artificial intelligence in education). Based on expert feedback, adjustments were made to ensure that the expressions in the data collection tool were universally understood, focusing on

language and clarity requirements. Additionally, repetitive and overlapping phrases identified in the questions were removed. Finally, the questionnaire was finalized after obtaining expert approval to ensure alignment between the questions in the data collection tool and the research sub-problems.

The data collected during the study were obtained through face-to-face interviews. The interviews were conducted at the Board of Education, with interview durations ranging from 40 to 50 minutes.

Data analysis

The data collected within the scope of the research were analyzed using descriptive analysis and content analysis techniques in a computer environment. The qualitative data collected during the study were analyzed using content analysis in the MaxQDA 2020 program. During the data analysis process, main codes and sub-codes were determined based on common views. Content analysis involves coding the data, finding themes, organizing codes and themes, defining findings, and interpreting them (Yıldırım & Şimşek, 2021).

The data analysis in the study was carried out in four stages: The data obtained within the scope of the study were coded to form a meaningful whole. Themes that generally explain the coded data and gather the codes under distinct categories were found. The data were organized and defined according to the obtained codes and themes. In the final stage, the detailed defined findings were interpreted by the researchers, and some conclusions were drawn. Additionally, for data security purposes, the participants' names have been anonymized and coded as Ö1, Ö2, and so forth.

Validity and reliability

The findings of the study were coded by two different researchers, and inter-coder reliability was calculated. The "Agreement/(Agreement + Disagreement) x 100" formula proposed by Miles and Huberman (1994) was used to calculate inter-coder reliability. Reliability calculations above 70% are considered reliable for the research (Miles & Huberman, 1994). As a result of the calculation, the reliability of the research was found to be 92%.

Results

Findings related to the first sub-problem

The themes and codes formed based on the answers given by the participants to the question "How do you evaluate the role of AI technologies in education?" in the semi-structured interview form developed by the researchers are presented in Table 2.

Table 2 Teachers' views on the role of AI technologies in education

Theme	Category (Sub-Theme)	Code	f
Efficiency Increase	Increasing efficiency in teaching processes	Easy and quick access to information	5
Feedback	Quick feedback	Providing instant feedback and correction	6
		Quick feedback	1
Personalized Learning	Opportunity to provide personalized learning experiences	Designing intelligent learning systems tailored	2
	Opportunity for individual tracking evaluation	To the individual monitoring	2
	Designing intelligent learning systems tailored to the individual	Monitoring student performance	2

	Opportunity to prepare learning materials and activities tailored to the individual	Planning according to one's learning style	4
		Personalizing learning experiences	5
Learning Material	Opportunity to prepare learning materials and activities tailored to the individual	Developing effective educational materials	6

As seen in Table 2, the views of the participating primary school teachers on the role of AI technologies in education were gathered under four themes: efficiency increase, feedback, personalized learning, and learning material preparation. Under the theme of efficiency increase, two sub-themes were identified: increasing efficiency in teaching processes and easy and quick access to information. Under the theme of feedback, the sub-theme of quick feedback was identified. Under the theme of personalized learning, four sub-themes were identified: opportunity to provide personalized learning experiences, opportunity for individual tracking and evaluation, designing intelligent learning systems tailored to the individual, and opportunity to prepare learning materials and activities tailored to the individual. Under the theme of learning material preparation, the sub-theme of developing effective educational materials was identified. Some of the teachers' statements on the subject are as follows:

"Artificial intelligence technologies are gaining attention in the field of education due to their potential to provide personalized learning experiences, enhance student engagement, and support teachers. Intelligent learning systems that can adapt to the individual needs of students allow each student to progress at their own pace, while also enabling teachers to make more effective interventions by analyzing student performance. Furthermore, AI-powered educational tools can be utilized across a broad spectrum, from language learning to coding education, making learning materials more accessible and interactive." – Ö8

"For instance, AI can make significant contributions in areas such as monitoring student performance, providing personalized learning experiences, offering better feedback to teachers, and enhancing educational materials. However, I believe that these technologies can truly add value to education only when they are used correctly and applied in accordance with ethical standards." – Ö3

"This is fantastic! I'm glad to hear that you're finishing the AI course for teachers. It's amazing how you can create incredible products and materials through this training. Sharing the useful parts of your learning with your students is a great approach. AI is indeed an excellent tool for exploring new ideas, creating materials, planning based on your learning style, and developing activities." – Ö5

Findings related to the second sub-problem

The themes and codes formed based on the answers given by the participants to the question "How do you think AI technologies affect or can affect students' learning processes?" in the semi-structured interview form developed by the researchers are presented in Table 3.

Table 3 Teachers' views on the impact of AI technologies on learning processes

Theme	Category (Sub-Theme)	Code	f
Permanence	Making information permanent	Providing effective learning	6
		Ensuring permanence	2
Motivation	Increasing learning desire Providing learning motivation	Motivating learning	2
		Keep motivation high	2
		Motivating towards education	2
Personalized Learning	Preparing learning materials tailored to the individual	Providing personalized learning experiences	5
	Providing personalized learning experiences	Individual student participation	4
		Personalized learning experiences	3

	Easy access to information Individual student participation	Providing learning experiences tailored to students'	1
Learning Material	Preparing engaging learning materials	Preparing engaging learning materials	8

As seen in Table 3, the views of the participating primary school teachers on the impact of AI technologies on learning processes were gathered under four themes: permanence, motivation, personalized learning, and learning material preparation. Under the theme of permanence, two sub-themes were identified: making information permanent and providing effective learning. Under the theme of motivation, three sub-themes were identified: increasing learning desire, motivating learning, and providing learning motivation. Under the theme of personalized learning, four sub-themes were identified: preparing learning materials tailored to the individual, providing personalized learning experiences, easy access to information, and individual student participation. Under the theme of learning material preparation, the sub-theme of preparing engaging learning materials was identified. Some of the teachers' statements on the subject are as follows:

"Students are very interested in technology. At a TÜBİTAK exhibition, we created both a book and a digital game related to my project topic together with our students. When elementary school students visited the exhibition, they preferred watching and playing the game on the tablet rather than engaging with the book. Despite the fact that the subject was related to learning Turkish and Arabic, which was above their level, their motivation was high, and they learned easily. After all, the key in education is to maintain high motivation, increase the desire to learn, and facilitate the learning process." – Ö7

"Artificial intelligence technologies can significantly influence and transform students' learning processes in various ways. By offering personalized learning experiences, AI can adapt to each student's individual learning style and needs. AI algorithms can analyze students' performance data, identify areas of weakness, and provide support in those areas, while also encouraging the further development of their strengths. AI-powered platforms can offer students real-time feedback, making the learning process more interactive and helping students learn from their mistakes quickly. Moreover, AI can enable teachers to more effectively monitor student performance and intervene on an individual or group basis. AI technologies can also provide students with richer and more diverse learning materials. For instance, AI integrated with technologies like virtual reality (VR) and augmented reality (AR) can offer concrete and interactive learning experiences in subjects such as history, geography, or science. This can help students gain a deeper understanding of the topics and enjoy the learning process more. Lastly, AI can play a crucial role in overcoming learning barriers. By offering adaptive learning tools and assistive technologies, AI can maximize the potential of each student, including those with special educational needs. However, the effective use of AI requires careful consideration of ethical and data privacy issues." – Ö3

"By offering personalized learning experiences, AI can better adapt to students' diverse learning styles and needs. Additionally, it can track student progress to provide more effective feedback and recommendations. These technologies can also enhance motivation and make the learning process more enjoyable by delivering more engaging and effective learning materials to students."- Ö5

Findings related to the third sub-problem

The themes and codes formed based on the answers given by the participants to the question "What are your views on the advantages of using AI technologies in education?" in the semi-structured interview form developed by the researchers are presented in Table 4.

Table 4 Teachers' views on the advantages of using AI technologies in education

Theme	Category (Sub-Theme)	Code	f
Permanence	Making information permanent	Providing effective learning	3
		Ensuring permanence	3
Motivation	Increasing learning desire	Motivating learning	2
	Providing learning motivation	Keeping motivation high	2
	Making the learning process fun	Motivating towards education	1
	Drawing attention	Making the learning process more enjoyable	2
Personalized Learning	Preparing learning materials tailored to the individual	Providing personalized learning experiences	6
		Providing learning experiences tailored to students'	2
	Individual student participation	Individual needs and learning styles	2
		Providing feedback tailored to the individual	2
		More effective tracking and evaluation of student performance	2
Feedback	Individual tracking and evaluation	Providing quick feedback	8
	Providing quick feedback	Providing feedback tailored to the individual	5
		More effective tracking and evaluation of student performance	6
Inclusivity	Providing learning experiences tailored to special needs students	Saving time	11
Time Management	Reducing workload	Quick and practical learning	5
	Saving time	Reducing workload	8
Learning Material	Preparing engaging and enjoyable learning materials	Preparing materials tailored to individual differences	8

As seen in Table 4, the views of the participating primary school teachers on the advantages of using AI technologies in education were gathered under seven themes: permanence, motivation, personalized learning, feedback, inclusivity, time management, and learning material preparation. Under the theme of permanence, one sub-theme was identified: making information permanent. Under the theme of motivation, five sub-themes were identified: increasing learning desire, motivating learning, providing learning motivation, making the learning process fun, and drawing attention. Under the theme of feedback, three sub-themes were identified: individual tracking and evaluation, providing quick feedback, and providing feedback tailored to the individual. Under the theme of inclusivity, one sub-theme was identified: providing learning experiences tailored to special needs students. Under the theme of time management, three sub-themes were identified: reducing workload, saving time, and quick and practical learning. Under the theme of learning material preparation, one sub-theme was identified: preparing engaging and enjoyable learning materials. Some of the teachers' statements on the subject are as follows:

"The integration of artificial intelligence technologies in education offers a range of advantages that can contribute to the learning process. These technologies can provide customized learning experiences, allowing each student to progress according to their individual abilities and needs. Algorithms can continuously analyze student performance and support learning processes with personalized feedback, thereby helping students maximize their academic potential. AI can also assist teachers with time management and instructional strategies. Through big data analytics, teachers can gain a better understanding of classroom dynamics and make more effective interventions. Additionally, AI technologies can reduce teachers' routine workloads, allowing them to focus more on

individualized attention with students. AI-powered tools can make educational content more interactive and accessible. With the help of virtual and augmented reality applications, students can experience learning opportunities, which can enhance the retention of information. These technologies have the potential to deepen students' conceptual understanding across various fields, from language learning to the sciences, and significantly improve their academic performance." – Ö7

*"Personalized Learning**:** AI can enhance the learning experience by providing content tailored to students' individual needs and learning styles, making the learning process more effective. Increasing Student Success: AI can track student progress to identify weak areas and offer better support, thereby improving student success. Support for Teachers: AI can offer teachers more effective ways to monitor and assess student performance, allowing them to focus better and provide improved feedback. Improving Educational Materials: AI can assist in analyzing educational materials to develop more effective and engaging resources. Enhancing Student Motivation: AI-powered learning materials and interactive applications can boost student motivation and make the learning process more enjoyable." – Ö15*

"We can consider the following aspects: preparing materials suited to individual differences among students, creating learning plans, developing teaching plans, designing activities, ensuring practicality, saving time, making learning enjoyable, boosting student self-confidence through the products produced, and meeting the needs required for inclusive education." – Ö5

"It provides practicality and saves time. It can also reduce the workload for teachers." – Ö4

Findings related to the fourth sub-problem

The themes and codes formed based on the answers given by the participants to the question "What are your views on the disadvantages of using AI technologies in education?" in the semi-structured interview form developed by the researchers are presented in Table 5.

Table 5 Teachers' views on the disadvantages of using AI technologies in education

Theme	Category (Sub-Theme)	Code	f
Social Effects	Reducing student-teacher and student interaction	Reducing personal interaction between teachers and students	3
	Making the teacher passive	Reducing student socialization	3
	Reducing in-class interaction	Increasing technology addiction	2
Individual Effects	Reducing student socialization Reducing in-class interaction	Motivating learning	2
		Keeping motivation high	3
		Motivating towards education	3
		Making the learning process more enjoyable	2
Personalized Learning	Preparing learning materials tailored to the individual Individual student participation	Providing personalized learning experiences	6
		Providing learning experiences tailored to students'	2
		Individual needs and learning styles	2
		Providing feedback tailored to the individual	2
		More effective tracking and evaluation of student performance	2
Feedback	Individual tracking and evaluation Providing quick feedback	Providing quick feedback	8
		Providing feedback tailored to the individual	5
		More effective tracking and evaluation of student performance	6

Inclusivity	Providing learning experiences tailored to special needs students	Saving time	11
Time Management	Reducing workload Saving time	Quick and practical learning Reducing workload	5 8
Learning Material	Preparing engaging and enjoyable learning materials	Preparing materials tailored to individual differences	8

As seen in Table 5, the views of the participating primary school teachers on the disadvantages of using AI technologies in education were gathered under three themes: social effects, individual effects, and ethical issues. Under the theme of social effects, three sub-themes were identified: reducing student-teacher and student-student interaction, making the teacher passive, and reducing in-class interaction. Under the theme of individual effects, five sub-themes were identified: causing laziness, ready-made solutions, reducing creative thinking abilities of students, technology addiction, and suppressing mental activities. Under the theme of ethical issues, two sub-themes were identified: inability to ensure data privacy and personal data security. Some of the teachers' statements on the subject are as follows:

"It can lead to teacher passivity in classroom management and trigger technology dependency." – Ö1

*"The use of artificial intelligence technologies in education offers numerous advantages but also presents some disadvantages. These can be outlined as follows: Data Security and Privacy Concerns**:** AI systems process large amounts of personal data when handling students' performance data. Inadequate protection or misuse of this data can jeopardize students' privacy rights. Inequitable Access: Unequal distribution of technological infrastructure may result in some students lacking full access to AI-supported educational tools. This situation can lead to disparities in learning opportunities and exacerbate educational inequalities. Reduction in Teacher and Human Interaction: The importance of human interaction in education is significant. Excessive use of AI technologies might diminish personal interactions between teachers and students, potentially negatively impacting students' social skills and emotional intelligence. Risk of Standardization: AI systems' tendency to standardize educational materials may lead to monotonous learning processes and limit the development of students' creative thinking skills. Changing Role of Teachers: Increased integration of AI tools in teaching processes might alter teachers' roles. This change could require teachers to reassess their professional identities and teaching methodologies, which might be challenging for some. Ethical Issues: Ethical concerns related to the use of AI in education include protecting students' privacy rights during data collection and processing, designing unbiased and fair algorithms, and ensuring transparency and comprehensibility in decision-making processes. The risk of bias may increase if AI systems are trained on data that does not represent diverse demographic groups, potentially disadvantaging certain student groups."- Ö7*

"It may encourage complacency and reduce freedom, potentially leading to mental inactivity and laziness." –Ö11

"It may offer standardized learning experiences without fully understanding students' individual needs. Additionally, there are risks of increased dependency on technology and reduced human interaction."- Ö15

Discussion, conclusion and recommendations

In this study, which aimed to examine the views of primary school teachers on the use of AI technologies in education, participants were asked questions about how they evaluate the role of AI technologies in education, how AI-based educational tools affect or can affect learning processes, and their views on the advantages and disadvantages of using AI-supported

technologies in educational processes. The data obtained from the answers to these questions were analyzed and evaluated.

Based on the analysis and evaluation of the views obtained from the primary school teachers participating in the study, the following findings were reached: Based on the opinions of primary school teachers, the most frequently cited on the role of AI technologies in education include: Easy and quick access to information, personalizing learning experiences, providing instant feedback and correction, developing effective educational materials personalizing learning experiences, planning according to one's learning style. Similar results were reached in the study conducted by Tissenbaum and Lane (2023), which emphasized the significant impact of AI on personalized learning in schools and noted that AI can provide engaging materials that increase learning speed and student motivation. In the study conducted by Çam, Çelik, Turan, Güntepe and Durukan (2021) with teacher candidates, it was stated that AI technologies could be used in the educational process to support teaching, conduct in-class teaching practices, support teachers, conduct individual evaluations, and address students' individual deficiencies. In the study conducted by Özer, Yazıcı, Akgün and Yıldırım (2023), teachers expressed that the use of AI in education could offer opportunities such as providing learning experiences and materials tailored to different learning styles, skills, and needs of students, as well as opportunities for individual tracking and evaluation. Under the theme of learning material preparation, the sub-theme of developing effective educational materials was identified. Additionally, AI can help students focus more effectively on their work. In the study conducted by Pekmez, Coşkun, Çoban, Kılıç and Murat Duman (2024), it was determined that the views of participating teachers on the role of AI technologies in education were gathered under three themes: improvement and personalization of the learning experience, accessibility and equality, and reflections on the learning process. Among the sub-themes of these themes were personalized learning options, quick feedback, individualization of learning, and student-centered education. Therefore, this study's results are consistent with our research findings. Similarly, Sheikh (2020) stated that AI technologies could be applied in teaching processes to improve engaging, flexible, and personalized learning. These studies are consistent with our research findings.

Based on the opinions of primary school teachers, the most frequently cited on the impact of AI technologies on students' learning processes include: Providing personalized learning experiences, individual student participation, preparing engaging learning materials, providing effective learning. The study by Nabiyev and Erümit (2020) stated that AI technologies could assist in grading, attendance management, and lesson preparation. The impact of AI technologies in education ranges from adapting students' learning experiences to increasing motivation and engagement. The study by Hindawi (2020) emphasized that AI technologies could actively involve students in learning processes by offering personalized learning experiences. In the study conducted by Pekmez, Coşkun, Çoban, Kılıç and Murat Duman (2024), the views of participating teachers on the role of AI technologies in learning processes highlighted the potential of AI to improve learning experiences, provide personalized learning opportunities, and ensure equality. In the study conducted by Tissenbaum, M, and Lane, H. C. (2023) and Nabiyev Erümit (2020), it was stated that the use of AI technologies in education could support teachers during the teaching process, select appropriate teaching materials for students, increase students' motivation, and provide permanent learning experiences. In the study conducted by Çam, Çelik, Turan, Güntepe and Durukan (2021) with teacher candidates, it was expressed that the use of AI technologies in education could provide personalized learning opportunities.

Based on the opinions of primary school teachers, the most frequently cited advantages of using artificial intelligence in education include: Saving time, reducing workload, keeping motivation

high, preparing materials tailored to individual differences, providing personalized learning experiences, more effective tracking and evaluation of student performance. Kumar, Rajan, Venkatesan and Lecinski (2019) stated that the use of AI technologies in education could offer personalized learning experiences. In the study conducted by Dülger and Gümüşeli (2023), teachers expressed that the use of AI technologies in education could prepare personalized learning plans. In the study conducted by Chen, Chen, and Lin (2020), it was stated that AI technologies could provide many advantages, such as preparing personalized learning programs, providing quick feedback, identifying individual learning deficiencies, and individual evaluation. Luckin, Holmes, Griffiths and Forcier (2016) emphasized the opportunity to prepare more personalized learning experiences and engaging learning materials with AI technologies. In the study conducted by Şanlı, Ateş, Bayburtlu, Bektaş and Özdemir (2023), teachers expressed that the use of AI in education could personalize learning processes, increase diversity and variety in teaching processes, and prepare materials tailored to the individual. These results are consistent with our research findings.

Based on the opinions of primary school teachers, the most frequently cited disadvantages of using artificial intelligence in education include: technology addiction, a decrease in interaction between teachers and students, increasing technology addiction, rendering teachers passive, and hindering students' creative thinking skills. In the study conducted by Pekmez, Coşkun, Çoban, Kılıç and Murat Duman (2024), the views of participating teachers on the disadvantages of using AI technologies in education were gathered under themes such as causing laziness, ready-made solutions, reducing student creativity, reducing teacher-student and student-student interaction, and making equal access difficult due to socioeconomic reasons. In the study conducted by Dülger and Gümüşeli (2023), teachers expressed that the use of AI technologies in education could cause students to become lazy. In the study conducted by Özer, Yazıcı, Akgün and Yıldırım (2023), teachers stated that the disadvantages of using AI in education included access issues due to high costs, causing laziness, ready-made solutions, reducing social interaction, and reliability issues. These results are consistent with our research findings.

In this study, which aimed to examine the views of primary school teachers on the use of AI technologies in education, participants were asked questions about how they evaluate the role of AI technologies in education, how AI-based educational tools affect or can affect learning processes, and their views on the advantages and disadvantages of using AI-supported technologies in educational processes. The data obtained from the answers to these questions were analyzed and evaluated, and based on the analysis and evaluation of the data obtained from the primary school teachers participating in the study, the following recommendations were made:

- According to the opinion primary school teachers' considering the potential positive impacts of AI-supported education on students, AI-supported tools should provide feedback by identifying students' strengths and weaknesses and focus on individual learning differences and needs.
- According to the opinion primary school teachers' considering the potential negative impacts of AI-supported education on students, such as causing laziness, ready-made solutions, reducing socialization skills, reducing in-class and out-of-class interaction, and suppressing research, exploration, and creativity skills, it is recommended to allocate time for emotional and thought sharing in teacher-student relationships, support and encourage students' creative thinking and artistic talents, and organize activities that provide opportunities for socialization.

- Since this study was conducted with primary school teachers, different studies on the use of AI in education can be conducted with different sample groups.

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References

Akyel, Y., & Tur, E. (2024). The potential of artificial intelligence in educational sciences: Challenges and future trends. *Kırşehir Eğitim Fakültesi Dergisi, 25*(1), 645-711. https://doi.org/10.29299/kefad.1322341

Aldosari, S. A. M. (2020). The future of higher education in the light of artificial intelligence transformations. *International Journal of Higher Education*, 9(3), 145-151. https://doi.org/10.5430/ijhe.v9n3p145

Aşık, F., Yıldız, A., & Kılınç, S. (2023). The effects of artificial intelligence on education. *International Journal of Social and Humanities Sciences Research (JSHSR), 10*(98), 2100-2107. https://doi.org/10.5281/zenodo.8307107

Atasoy, S. (2012). *Performance management modelling with artifical neural network and fuzzy neural network in human resources* [Unpublished master thesis]. Yıldız Teknik University

Bayraktar, B., Gülderen, S., Akça, S., & Serin, E. (2023). Teachers' views on the use of AI technologies in education. *Ulusal Eğitim Dergisi, 3*(11), 2012–2030. Retrieved from https://uleder.com/index.php/uleder/article/view/380

Baidoo-anu, D., & Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (ai): understanding the potential benefits of ChatGpt in promoting teaching and learning. *Journal of AI*, 7(1), 52-62. https://doi.org/10.61969/jai.1337500

Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2018). *Scientific research methods*. Ankara: Pegem Akademi.

Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial intelligence trends in education: A narrative overview. *Procedia Computer Science, 136*, 16–24. https://doi.org 10.1016/j.procs.2018.08.233

Chatterjee, S., & Bhattacharjee, K. K. (2020). Adoption of artificial intelligence in higher education: A quantitative analysis using structural equation modeling. *Education and Information Technologies, 25*(5), 3443-3463. https://doi.org/10.1007/s10639-020-10159-7

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access, 8*, 75264-75278. https://doi.org/10.1109/ACCESS.2020.2988510.

Chen, L., Chen, Z., Zhang, Y., & et al. (2023). Artificial intelligence-based solutions for climate change: A review. *Environmental Chemistry Letters, 21*(4), 2525–2557. https://doi.org/10.1007/s10311-023-01617-y

Chopra, A. (2019). 21 vital chatbot statistics for 2019. Retrieved from https://outgrow.co/blog/vital-chatbot-statistics. Accessed on: 16.10.2023

Çam, M. B., Çelik, N. C., Turan Güntepe, E., & Durukan, Ü. G. (2021). Determining the awareness of teacher candidates about AI technologies. *Hatay Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 18*(48), 263-285.

Çetin, M., & Aktaş, A. (2021). Artificial intelligence and future scenarios in education. *OPUS International Journal of Society Researches, 18*, 4225-4268. https://doi.org/10.26466/opus.911444

Demir-Dülger, E. & Gümüşeli, A. İ. (2023). The perspectives of school principals and teachers on the use of artificial intelligence in education. *ISPEC International Journal of Social Sciences & Humanities*, *7*(1), 133-153. http://doi.org/10.5281/zenodo.7766578

Elmas, Ç. (2003). *Fuzzy logic controllers*. Seçkin Publishing.

Fast, E., & Horvitz, E. (2017). Long-term trends in the public perception of artificial intelligence. *Proceedings of the AAAI Conference on Artificial Intelligence*, 31(1). https://doi.org/10.1609/aaai.v31i1.10635

Fahimirad, M., & Kotamjani, S. S. (2018). A review on application of artificial intelligence in teaching and learning in educational contexts. *International Journal of Learning and Development, 8*(4), 106-118. https://doi.org/10.5296/ijld.v8i4.14057

Güzey, C., Çakır, O., Athar, M. H., Yurdaöz, E., & Saad, S. (2023). Content analysis of studies on AI in education. *Bilgi ve İletişim Teknolojileri Dergisi, 5*(1), 66-77. https://doi.org/10.53694/bited.1060730

Hindawi. (2020). How will artificial intelligence (AI) power new learning in education?. *UIUC*. Retrieved from https://www.hindawi.com/journals/complexity/2021/8812542/. Accessed on: 11.01.2024

Huang, J., Saleh, S., & Liu, Y. (2021). A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies, 10*, 206. https://doi.org/10.36941/ajis-2021-0077

Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles, and research issues of artificial intelligence in education. *Computers and Education: Artificial Intelligence, 1*, 100001.

Işık, M., & Dari, A. B. (2023). The Semiotic Analysis of Artificial Intelligence Movie Posters: A Case Study of Artificial Intelligence, Frank & Robot and Ex Machina. *Turkish Studies, 18*(1), 63-82. https://doi.org/10.7827/TurkishStudies.64322

Kengam, J. (2020). Artificial intelligence in education. *Research Gate, 18*, 1-4.

Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. https://doi.org/10.1186/s41039-017-0062-8

Khare, K., Stewart, B., & Khare, A. (2018, December 1). Artificial intelligence and the student experience: An institutional perspective. *IAFOR Journal of Education, 6*(3), 63-78. https://doi.org/10.22492/ije.6.3.05

Kolchenko, V. (2018). Can modern AI replace teachers? Not so fast! *Artificial Intelligence and Adaptive Learning: Personalized Education in the AI Age, HAPS Educator, 22*(3), 249-252. https://doi.org/10.21692/haps.2018.032

Kumar, V., Rajan, B., Venkatesan, R., & Lecinski, J. (2019). Understanding the role of artificial intelligence in personalized engagement marketing. *California Management Review, 61*(4), 135-155. https://doi.org/10.1177/0008125619859317

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. London: Pearson Education. https://static.googleusercontent.com/media/edu.google.com/en//pdfs/Intelligence-Unleashed-Publication.pdf

Limna, Pongsakorn, Jakwatanatham, Somporch and Siripipattanakul, Sutithep and Kaewpuang, Pichart, Sriboonruang., & Patcharavadee. (2022). A Review of Artificial Intelligence (AI) in Education during the Digital Era (July 2022). *Advance Knowledge for Executives, 1*(1), 1-9. https://ssrn.com/abstract=4160798

McArthur, D., Lewis, M., & Bishary, M. (2005). The roles of artificial intelligence in education: Current progress and future prospects. *Journal of Educational Technology, 1*(4), 42-80. https://doi.org/10.26634/jet.1.4.972

McCarthy, J. (2004). What is artificial intelligence?. Retrieved from http://wwwformal.stanford.edu/jmc/whatisai/. Accessed on: 11.01.2019

Merriam, S. B. (2013). *Qualitative research.* Ankara: Nobel Publishing.

Merriam, S. B., & Tisdell, E. J. (2016). Qualitative *research: a guide to design and implementation* (4th ed.). San Francisco, CA: Jossey Bass.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage Publications.

Murphy, R. F. (2019). *Artificial intelligence applications to support K–12 teachers and teaching: A review of promising applications, opportunities, and challenges*. Santa Monica, CA: RAND Corporation. https://www.rand.org/pubs/perspectives/PE315.html

Nabiyev, V., & Erümit, A. K. (2020). The foundations of artificial intelligence. In V. Nabiyev & A. K. Erümit (Eds.), *Artificial intelligence in education: From theory to practice* (pp. 2-37). Pegem Akademi Publishing.

Nilsson, N. (1990). *The mathematical foundations of learning machines*. San Mateo: Morgan Kaufmann. https://papers.cnl.salk.edu/PDFs/Introduction%201990-3222.pdf

Obschonka, M., & Audretsch, D. B. (2020). Artificial intelligence and big data in entrepreneurship: A new era has begun. *Small Business Economics, 55*(2), 529–539. https://doi.org/10.1007/s11187-019-00202-4

Oliveira, M., Lopes, C., Soares, F., Pinheiro, G., & Guimaraes, P. (2020). What can we expect from the future? The impact of artificial intelligence on society. *15th Iberian Conference on Information Systems and Technologies (CISTI),* 1-6. https://doi.org/10.23919/CISTI49556.2020.9140903

Öztürk, K., & Şahin, M. E. (2018). An overview of artificial neural networks and artificial intelligence. *Takvim-i Vekayi, 6*(2), 25-36.

Pekmez, S., Çoşkun Çoban, T., Kılıç, M., & Murat Duman, Y. (2024). Teachers' views on the use of AI technologies in education. *Ulusal Eğitim Dergisi, 4*(2), 601-619. https://doi.org/10.5281/zenodo.10668144

Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning, 12*(1), 1-13. https://doi.org/10.1186/s41039-017-0062-8

Reyes, M., Meier, R., Pereira, S., Silva, C. A., Dahlweid, F. M., von Tengg-Kobligk, H., Summers, R. M., & Wiest, R. (2020). On the interpretability of artificial intelligence in radiology: Challenges and opportunities. *Radiology: Artificial Intelligence, 2*(3), e190043. https://doi.org/10.1148/ryai.2020190043

Şanlı, A., Ateş, E., Bayburtlu, N., Bektaş, M., & Özdemir, K. (2023). Teachers' tendencies in the use of artificial intelligence. *Uluslararası Sosyal Bilimler Dergisi, 8*(34), 206-222. https://doi.org/10.52096/usbd.7.28.15

Sheikh, S. (2020). Understanding the role of artificial intelligence and its future social impact. IGI Global. https://books.google.com/books/about/Understanding_the_Role_of_Artificial_Int.html?id=tjJ5zQEACAAJ

Taşçı, G., & Çelebi, M. (2020). A new paradigm in education: Artificial intelligence in higher education. *OPUS–Uluslararası Toplum Araştırmaları Dergisi, 16*(29), 2346-2370. https://doi.org/10.26466/opus.747634

Tissenbaum, M., & Lane, H. C. (2023). How will artificial intelligence (AI) power new learning in education? *UIUC*. Retrieved from https://education.illinois.edu/about/news-events/news/article/2023/02/08/the-power-of-ai-in-education. Accessed on: 11.01.2024

Turing, A. M. (1950). Computing machinery and intelligence. *Mind, 59*(236), 433-460. http://www.jstor.org/stable/2251299

Yıldırım, A., & Şimşek, H. (2008). *Qualitative research methods in social sciences* (6th ed.). Ankara: Seçkin Publishing.

Zanetti, M., Rendina, S., Piceci, L., & Cassase, F. P. (2020). Potential risks of artificial intelligence in education. *Form@re - Open Journal Per La Formazione in Rete, 20*(1), 368-378. https://doi.org/10.13128/form-8113

Zhang, T., Lu, X., Zhu, X., & Zhang, J. (2023). The contributions of AI in the development of ideological and political perspectives in education. *Heliyon, 9*(3). https://doi.org/10.1016/j.heliyon.2023.e13403

Zhao, Y., & Liu, G. (2018). How do teachers face educational changes in the artificial intelligence era. *Advances in Social Science, Education and Humanities Research (ASSEHR), 300*, 47-50. https://doi.org/10.2991/erss-18.2019.9

Zhou, T. (2023). Application of artificial intelligence in geography. *Journal of Physics: Conference Series, 2646*(1), 012006. https://doi.org/10.1088/1742-6596/2646/1/012006