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RESEARCH ARTICLE

Teachers' perspectives on artificial intelligence in education

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Abstract: Artificial intelligence (AI) is rapidly transforming various aspects of society, including education. Understanding teachers' perspectives on this disruptive technology is essential, given its potential to revolutionize the teaching and learning process. A comprehensive study involving 74 educators utilized the Opinion Scale on Artificial Intelligence in Education to gather valuable insights. The research outcomes reveal a predominantly favourable view of AI in education, albeit accompanied by significant apprehensions regarding ethical and privacy-related issues. This study contributes significantly to the ongoing discourse on the role of AI in education, emphasizing the necessity for a balanced approach that maximizes the benefits of AI while ensuring the protection of the rights and interests of all stakeholders.

Keywords: artificial intelligence, teacher views, AI in education

1 Introduction

In an era marked by unprecedented technological advancements, the field of education has witnessed a paradigm shift driven by Artificial Intelligence (AI) (Karaca & Kılcan, 2023). AI-powered tools and technologies have the potential to personalize learning, provide real-time feedback, and automate tasks that can free up teachers to focus on more important things, such as building relationships with students and providing individualized instruction (Abell, 2006).

As AI continues to weave its way into classrooms and educational institutions worldwide, it is essential to understand educators' perspectives on this transformative force. This research explores teachers' nuanced views and attitudes toward integrating AI into education, focusing on their perceptions, preferences, and apprehensions.

The transformative power of AI in education is undeniable (Fullan et al., 2023). With the capacity to analyze vast datasets, adapt instruction to individual student needs, and automate administrative tasks, AI promises to enhance educational outcomes and make learning more personalized and accessible. However, this potential is accompanied by ethical and privacy concerns that raise crucial questions about the responsible adoption of AI in educational settings. As AI continues to revolutionize the teaching and learning process, it is essential to comprehend educators' viewpoints. Alam (2021) states that comprehending educators' perspectives on AI in the teaching and learning process is crucial, given educators' pivotal role in shaping the educational landscape for future generations.

This study comprehensively examines teachers' perspectives by administrating the Opinion Scale on Artificial Intelligence in Education. By engaging 74 teachers in interviews, we seek to provide a multifaceted understanding of how educators perceive AI's role in their classrooms and institutions. The findings presented in this research illuminate the duality of enthusiasm and caution surrounding AI in education, highlighting its potential and the ethical and privacy considerations that demand careful attention.

The research is structured first to explore the positive aspects teachers associate with AI in education. Subsequently, it delves into the ethical and privacy concerns raised by educators. Through this balanced analysis, we aim to contribute to the ongoing discourse on AI's integration in education and advocate for a holistic approach that harnesses the benefits of AI while safeguarding the values and rights integral to the educational process.

The findings of this study have important implications for policymakers, educators, and technology developers. It is essential to develop and implement AI-based educational tools and technologies in a way that considers the opinions and concerns of teachers. Teachers should be involved in the development and implementation of AI in education from the beginning, and

they should be provided with the training and support they need to use AI effectively in the classroom.

1.1 Literature review

AI technologies encompass a range of computer systems and algorithms designed to simulate human intelligence, including the ability to learn from data, reason, solve problems, and interact with the environment (Kok et al., 2009). Artificial Intelligence (AI) is increasingly being integrated into educational settings, prompting a need to understand teachers' views on this technological advancement (Karakose et al., 2023).

Integrating AI into classrooms is reshaping teachers' roles and attitudes towards technology. Several studies have examined how educators perceive AI and the implications of AI technologies for their profession (Athanassopoulos et al., 2023). Polak et al. (2022) employed the Will, Skill, Tool model to guide their study to facilitate AI integration in education. They identified the need for an AI-supportive online educational platform through focus groups and surveys. Results showed that teachers had a positive attitude and strong motivation for AI education (Will factor). While they possessed basic digital skills, their AI-related skills were limited (Skill factor). Resource availability was generally not an issue, but further research on tool readiness is recommended.

The study of Chounta et al. (2022) aimed to explore how Estonian K-12 teachers perceive AI and its relevance within the Fairness, Accountability, Transparency, and Ethics (FATE) framework. Through a survey of 140 teachers, they found that although educators have limited knowledge about AI, they see it as a valuable opportunity for education. The study highlights the need for AI support to improve teacher productivity. Moreover, teachers see AI as a tool to help them access and use multilingual content. Kim and Kim (2022) investigated teachers' perceptions of an AI-enhanced scaffolding system for STEM education. Most STEM teachers viewed AI positively for enhancing scaffolding support. However, concerns were raised about changes in the teacher's role in the classroom and the need for transparency in AI decision-making.

The studies on teachers' views on AI in education have made valuable contributions, but there are still several gaps and areas for further exploration (Papadakis et al., 2023). Many studies need to sufficiently address the diversity of educational contexts and demographics of teachers. There is a need for research that considers variations in school types, grade levels, and teachers' workspaces to provide a more comprehensive picture. This research aims to investigate educators' perspectives regarding AI and ascertain if these perspectives differ based on their teaching years and subject specializations.

2 Research model

This study employed a survey research model to investigate teachers' perspectives on integrating AI in education. The survey model was chosen as it offers a structured and systematic approach to collecting quantitative data from a diverse sample of educators. The research model was carefully designed to address specific research objectives, which included understanding teachers' attitudes towards AI, assessing their readiness for AI integration, and exploring their perceptions of both the benefits and challenges associated with AI in educational contexts.

2.1 Data collection tool

The Opinion Scale on Artificial Intelligence in Education developed by Dülger and Köklü (2003) was used in this study. Dülger and Köklü (2003) developed a scale to determine the opinions of school administrators and teachers on using AI in education. They conducted a study in which they examined the psychometric properties of the questionnaire. The study group the research consists of school principals and teachers working in public high schools. During the development phase of the scale, 62 items (items) were created and submitted to expert opinion. Exploratory (EFA) and confirmatory (CFA) factor analyses were performed for the scale. As a result of the EFA, a 28-item and four-dimensional scale was formed. The total explained variance rate is 56.58%. As a result of the analysis, the dimensions of the scale were determined: The benefits of the use of artificial intelligence in education, the prejudices about the use of artificial intelligence in education, the views on the scope of artificial intelligence and the definitions of artificial intelligence. Confirmatory factor analysis was performed considering these dimensions. As a result of this analysis, the values of the goodness of fit x^2: 1017,416 df: 344, GFI = 0.862, RMSEA = 0.07, GFI = 0.86, CFI = 0.91, NFI = 0.84. As a result of these

values, a valid and reliable scale was developed to determine the opinions of school principals and teachers on using AI in education.

The scale consists of two sections. The first section includes questions to determine the participants' gender, type of school, graduation status, field of study, and years of service. The second section, comprising 28 items, focuses on determining teachers' views on artificial intelligence. This section utilizes a 5-point Likert scale ranging from "1 Strongly Disagree" to "5 Strongly Agree" to assess the teachers' perspectives on artificial intelligence.

The scale consists of 16 items related to the benefits of artificial intelligence, six items related to the drawbacks of artificial intelligence, two items related to the scope of artificial intelligence, and three items related to the definition of the concept of artificial intelligence.

2.2 Participants

The sampling method employed in this study was purposive sampling. The researchers selected participants based on specific criteria to ensure that the sample represented a diverse range of educators with varying experiences and perspectives on integrating artificial AI in education. The purposive sampling allowed the researchers to target individuals who could provide valuable insights into the research objectives, including understanding teachers' attitudes towards AI, assessing their readiness for AI integration, and exploring their perceptions of the benefits and challenges associated with AI in educational contexts. Information on the participants' gender, type of school they work in, years of service, and graduation rates are given in Table 1.

Table 1 Distribution of participants

		Gender		Type of school		Years of service		Graduation Status		
		Male	Female	Public	Prive	4-20	21-37	Master's degree	Doctorate	Bachelor's degree
Teachers	f	20	54	62	12	37	37	16	5	53
	%	27	73	86.8	16.2	50	50	20.5	6.8	72.6

The sample consisted of 27% (n = 20) male and 73% (n = 54) female participants. 16.2% (n = 12) of the participants work in private schools, and 83.8% (n = 62) work in public schools.

The low number of male participants may be because most individuals who perform the teaching profession are women. The statistics published by the Ministry of National Education (2021) stated that the number of teachers working in schools within the scope of formal education was 1 million 139 thousand 673. Of these teachers, 455,294 were male, and 684,379 were female. In addition, there are also fewer teachers working in private schools than in public schools, 975 thousand 698 teachers worked in public schools and 163 thousand 975 in private schools.

20.5% Of the participants have a master's degree, 6.8% have a doctorate, and 72.6% have a bachelor's degree. The low number of participants with doctorate and master's degrees is the low number of teachers who continue their education after undergraduate education.

New-generation teachers were defined as teachers working between 4 and 20 years, while teachers working between 21 and 37 years were defined as the old generation. As can be seen, the distribution is equal. The participants are from 11 different fields in the study. Table 2 shows the information on the participants' branches.

Table 2 Teachers' field of study

Teachers' field of study	*f*	%
English	25	33.8
Classroom Teacher	8	8.1
Science and Technology	8	10.8
Counsellor	7	10.8
Mathematics	6	9.5
Turkish	6	8.1
Social Science	5	6.8
Technology and Design	4	5.4
Physical Education	3	4.1
Music	1	1.4
Special Education	1	1.4
Total	74	100

2.3 Data collection

The data collection process for this study involved utilizing a Google Form questionnaire, which was distributed to teachers via WhatsApp. The questionnaire was designed to gather quantitative data on teachers' perspectives regarding integrating AI in education. Using Google Forms facilitated the efficient and organized collection of responses from a diverse sample of educators. Subsequently, the Google Form questionnaire link was disseminated to the target participants via WhatsApp. WhatsApp, as a communication platform, facilitated the swift and direct distribution of the questionnaire to the intended recipients. The participants were provided with clear instructions and guidelines for completing the questionnaire, ensuring consistency in the data collection process.

Upon receiving the questionnaire link, the teachers could access and complete the survey at their convenience. Using an online platform such as Google Forms allowed for flexibility in data collection, enabling participants to respond to the questionnaire at a time and place of their choosing.

The data collection process adhered to ethical considerations, ensuring the confidentiality and anonymity of the participants' responses. Additionally, the research team remained available to address any queries or concerns raised by the participants during the data collection period.

2.4 Data analysis

The data was initially analyzed using percentages (%), frequencies (f), standard deviation (S), and mean ($\overline{x}$). These measures provided valuable insights into the distribution and central tendency of the data.

Furthermore, the data's normality was rigorously assessed by examining the Komolgrov Smirnov test. These analyses allowed for a comprehensive understanding of the shape and symmetry of the data distribution and its adherence to the normal distribution assumption. In addition, Levene's test was conducted to determine the homogeneity of the data.

Upon confirming that the prerequisites for parametric testing were met, the one-way ANOVA and Independent sample t-test were employed to determine whether teachers' views on artificial intelligence changed according to their years of employment and field of study.

Statistical analyses and computations were performed using the Statistical Package for the Social Sciences (SPSS) software. SPSS is a widely used software for statistical analysis and data management in various social sciences and psychology fields.

3 Findings and interpretation

This section presents the findings derived from the statistical analysis of the data collected via the Opinion Scale on Artificial Intelligence in Education. The scale aimed to determine teachers' opinions on using artificial intelligence in education. Table 3 summarises the positive aspects (benefits) of artificial intelligence.

Based on the provided data, it is evident that a significant proportion of teachers hold positive views on AI in education. It was found that a substantial 43% believe that AI is essential for the individualization of education, while 33% remained undecided on this matter. Moreover, a significant majority (65%) of teachers believed AI would positively impact the economy. Additionally, 52% of teachers agreed that AI would increase productivity, although 30% were undecided. Furthermore, an overwhelming 90% of teachers opined that AI has the potential to save time.

Regarding its role in the educational process, 66% of teachers consider AI necessary for monitoring the learning process, while 77% believe it will contribute to individualized learning. Moreover, 75% of teachers think AI can effectively follow students' learning processes and provide more effective learning materials. Additionally, 80% of teachers believe that AI can offer different methods according to students' needs and is a complementary resource for teachers. Furthermore, a significant majority (90%) of teachers view AI as a valuable source for accessing information and has the potential to save time. Most teachers think AI makes learning more enjoyable and facilitates more accessible learning experiences.

Regarding the long-term impact of AI on education, 58% of teachers believe that AI will lead to more permanent learning, while 30% remained undecided on this issue. Finally, 65% of teachers believed that AI would contribute to achieving the education system's goals.

Table 3 Findings about positive aspects of AI

Positive aspects (benefits) of Artificial Intelligence		1	2	3	4	5	Mean	SD
6. It is necessary for the individualization of education.	f	1	16	25	19	13	3.36	1.05
	%	1.4	21.6	33.8	25.7	17.6		
7. Contributes to the economy.	f	0	4	21	34	15	3.81	0.82
	%		5.4	28.4	45.9	20.3		
8. Increases productivity.	f	4	9	22	30	9	3.42	1.03
	%	5.4	12.2	29.7	40.5	12.2		
9. Saves time.	f	0	2	1	46	25	4.20	0.62
	%		2.7	1.4	62.2	33.8		
10. It is necessary to monitor the learning process.	f	2	7	15	34	16	3.75	0.99
	%	2.7	9.5	20.3	45.9	21.6		
11. Contributes to individual learning.	f	1	2	13	39	19	3.99	0.81
	%	1.4	2.7	17.6	52.7	25.7		
12. It follows students' learning process.	f	0	6	13	37	18	3.91	0.86
	%		8.1	17.6	50	24.3		
13. Provides more practical materials.	f	0	5	13	35	21	3.97	0.866
	%		6.8	17.6	47.3	28.4		
14. Offers different methods according to their needs.	f	0	0	13	41	20	4.09	0.66
	%			17.6	55.4	27		
15. It is a complementary resource for teachers.	f	0	3	5	46	20	4.12	0.7
	%		4.1	6.8	62.2	27		
16. It is a source for teachers to access information.	f	0	3	4	46	21	4.15	0.7
	%		4.1	5.4	62.2	28.4		
17. it is a source for teachers to access information.	f	0	2	6	45	21	4.15	0.68
	%		2.7	8.1	60.8	28.4		
18. it is a source for teachers to access information	f	1	8	22	29	14	3.67	0.95
	%	1.4	10.8	29.7	39.2	18.9		
19. It contributes to achieving the goals of the education system.	f	0	6	20	35	13	3.74	0.84
	%		8.1	27	47.3	17.6		
20. It makes learning more fun.	f	1	2	9	40	22	4.8	0.8
	%	1.4	2.7	12.2	54.1	29.7		
21. It makes learning easier.	f	3	1	10	44	16	3.93	0.88
	%	4.1	1.4	13.5	59.5	21.06		

These findings underscore teachers' diverse perspectives regarding the potential benefits of AI in education. Considering these viewpoints in the ongoing discussions and implementations of AI in educational settings is crucial.

The findings from the teacher survey regarding the potential benefits of AI in education highlight the diverse perspectives educators hold on this matter. A significant portion of teachers expressed optimism about the potential positive impact of AI on individualized learning, productivity, and the economy. Moreover, many teachers believe AI can save time, monitor the learning process, and contribute to achieving the education system's goals. These viewpoints underscore the potential value of AI as a complementary resource for teachers and a source for accessing information, ultimately making learning more enjoyable and efficient.

However, it is essential to acknowledge that a notable portion of teachers also harbor concerns about the use of AI in education. Table 4 presents the specific findings related to these concerns.

According to a survey among teachers, a significant majority (60%) expressed concerns that integrating AI into the educational environment may lead to a lack of emotional connection. Additionally, 47% of teachers raised apprehensions regarding the potential threat to security posed by AI. Notably, a considerable portion (33%) of the respondents remained undecided. Furthermore, 47% of teachers expressed scepticism about AI's ability to safeguard the confidentiality of information, with 36% remaining undecided on this matter.

Regarding the impact on teaching and learning, most teachers (51%) believe that AI may lead to passivity among individuals. However, 60% of teachers do not share the concern that AI will make teachers lazy. Moreover, 70% of teachers think that AI will not diminish the researcher

Table 4 Findings about the harms of AI

Negative aspects (harms) of Artificial Intelligence		1	2	3	4	5	Mean	SD
22. It will lead to an emotionless educational environment.	f	5	6	18	28	17	3.60	1.13
	%	6.8	8.1	24.3	37.4	23		
23. It threatens security.	f	2	12	25	25	10	3.39	1.00
	%	2.7	16.2	33.8	33.8	13.5		
24. It cannot ensure the confidentiality of information.	f	1	11	27	25	10	3.41	1.00
	%	1.4	14.9	36.5	33.8	13.5		
25. Makes the individual passive.	f	2	17	17	25	13	3.38	1.10
	%	2.7	23	23	33.8	17.6		
26. Makes the teacher lazy.	f	2	26	16	25	5	3.07	1.03
	%	2.7	35.1	21.6	33.8	6.8		
27. Dulls the research-oriented personalities of teachers.	f	7	27	19	17	4	2.78	1.07
	%	9.5	36.5	25.7	23	5.4		
28. Creates ethical gaps	f	4	14	21	24	11	3.32	1.11
	%	5.4	18.9	28.4	32.4	14.9		

personality of teachers. Nevertheless, 50% of teachers believed that integrating AI may create an ethical gap in the educational setting.

These findings shed light on teachers' diverse perspectives regarding the implications of AI in education. It is essential to consider these viewpoints in the ongoing discourse surrounding the integration of AI in educational settings.

AI encompasses a wide range of applications, including its role as an auxiliary system for education and as a tool for knowledge management. Teachers' opinions about the scope of AI can be seen in Table 5.

Table 5 Findings on the scope of AI

Scope of Artificial Intelligence		1	2	3	4	5	Mean	SD
3. It is an auxiliary system for education.	f	0	1	14	39	20	4.05	0.71
	%		1.4	18.9	52.7	27		
4. It is a tool that can be used in knowledge management	f	0	0	5	44	25	4.27	0.58
	%			6.8	59.5	33.8		

According to the survey results, most teachers (58%) perceive AI as a beneficial system that supports and enhances the educational process. Additionally, an overwhelming 90% of teachers view AI as a valuable tool for knowledge management. The findings about the concept of AI can be seen in Table 6.

Table 6 Findings on the concept of AI

The Concept of Artificial Intelligence		1	2	3	4	5	Mean	SD
5. It is a computer-controlled robot designed to perform tasks.	f	3	4	6	39	22	3.99	0.98
	%	4.1	5.4	8.1	52.7	29.7		
1. It is high-level technology.	f	0	2	4	34	34	4.35	0.71
	%		2.7	5.4	45.9	45.9		
2. It is a computer program.	f	1	3	3	42	25	4.18	0.80
	%	1.4	4.1	4.1	56.8	33.8		

Teachers contend that AI represents advanced technology, a computer program and a computer-controlled robot designed to execute various tasks.

An Independent sample t-test was used to determine whether teachers' views on AI changed according to their length of service. Teachers' years of service were divided into two groups. Teachers who worked between 4 and 20 years were defined as the new generation, while those who worked between 21 and 37 years were defined as the old generation. Descriptive findings for this data set are given in the participant's section. Teachers' views on AI were determined with a Likert-type scale. The sum of the scores from 1 to 5 was taken and used in the independent

sample t-test. Descriptive findings regarding the total score of teachers' views on AI are given in Table 7.

Table 7 Descriptive findings of the total score of teachers' views on AI

	Min	Max	Mean	SD	Kolmogrov Smirnov
Total points	84	138	106	9.5	0.198

The lowest total score of the responses to the scale is 84, and the highest is 138. While the mean of the total scores is 106, the standard deviation is 9.5. Kolmogrov-Smirnov was used to examine the normality of the distribution of total scores. When Table 7 is examined, the distribution of the total scores of teachers' opinions about AI is normal. Since the prerequisites for parametric testing were fulfilled, the independent sample t-test was used to determine whether teachers' views on AI differed according to their experience. Findings about independent sample t-test can be seen in Table 8.

Table 8 Findings about independent sample t-test

	Years of service	N	Mean	SD	t	df	p
Total points	1 (21-37)	37	106	10	0.375	72	0.709
	2 (4-20)	37	105	8			

When Table 8 is analyzed, it is seen that teachers' views on artificial intelligence do not change according to their years of service.

One-way ANOVA was used to test whether teachers' ideas about artificial intelligence vary according to their branches. One-way ANOVA was preferred since data were collected from teachers from 11 different branches. Before conducting a one-way ANOVA test, meeting the test's assumptions is essential. This includes checking for the homogeneity of variances among the groups and the normality of the data (Kim & Cribbie, 2017). The normality test is shown in Table 7. Levene's test was conducted for the homogeneity of the data. The levene test is presented in Table 9.

Table 9 Levene's test

Levene Statics	df1	df2	Sig
2.48	8	63	0.783

When Table 9 is examined, it is seen that the Levene test result for the items is not significant ($p > 0.05$). In this case, it can be stated that the data set is suitable for the ANOVA test. The findings can be seen in Table 10. Teachers' opinions about artificial intelligence do not vary according to their field of study.

Table 10 Findings on One way ANOVA

Total points	Sum of Squares	df	Mean Square	F	Sig.
Between groups	1356.645	10	135.664	1.609	0.125
Within groups	5311.207	63	84.305		
Total	6667.851	73			

4 Discussion and conclusion

The study on teachers' perceptions of AI in education provides valuable insights into the multifaceted views on AI as an auxiliary system for education. The data suggests that many teachers express favourable opinions regarding AI, viewing it as a valuable supplementary tool for enhancing education. Teachers perceive AI as a tool for educational support, enhancing individualized learning, contributing to the economy, improving productivity, and aiding in tracking the learning process. Teachers also acknowledge AI's potential to provide complementary resources, facilitate access to information, assist in material development, enhance learning outcomes, and contribute to achieving educational goals. However, some teachers have expressed concerns regarding the use of AI in education, including fears of creating a sterile emotional environment, threats to security and privacy, and the potential to render individuals

passive. Additionally, reservations exist about the impact of AI on teachers' roles, ethical considerations, and the potential to undermine the development of an inquisitive mindset.

The positive perception of AI among teachers aligns with the broader trend of recognizing the potential benefits of technology in education. For instance, increased research interest was found in digital addiction and academic achievement, indicating a growing awareness of the impact of technology on educational outcomes (Karakose et al., 2023). Collectively, this study underscores the growing importance of understanding the impact of technology, including AI, on educational processes and outcomes.

The findings from the study on teachers' perceptions of AI in education align with earlier research, corroborating the positive sentiment towards AI as an auxiliary system for education. The study indicates that many teachers view AI as a valuable supplementary tool for enhancing education, resonating with the broader trend of recognizing the potential benefits of technology in education. This sentiment is further supported by the research of Chiu et al. (2022) and Zhao et al. (2022), emphasizing the need to explore the development of AI literacy for teachers in diverse educational contexts. The study also reinforced the consistent positive perception of AI across different experience levels and academic backgrounds (Chiu & Chai, 2020). It found that teachers' opinions about AI do not vary according to their years of service or field of study. This suggests a consistent positive sentiment towards AI as an auxiliary system for education, irrespective of experience or academic background.

Furthermore, the multifaceted nature of AI, encompassing computer-controlled robotics, high-level technology, and sophisticated computer programming, is well understood by teachers, reflecting a comprehensive awareness of AI's potential to revolutionize diverse domains while acknowledging associated concerns. This comprehensive understanding is in line with the study by Hinojo-Lucena et al. (2019), which conducted a bibliometric study on the impact of AI in the scientific literature, indicating a growing awareness of AI's impact in various domains. Additionally, the positive perception of teachers towards AI as a beneficial auxiliary system in education is further supported by the findings of Akgün and Greenhow (2021), which highlight the potential of AI to support students' understanding and use of AI, emphasizing the need to develop K-12 teachers' instructional practices regarding AI and ethics.

In conclusion, the data indicates that teachers generally perceive AI as a beneficial auxiliary system for education, acknowledging its potential to enhance personalized learning and streamline knowledge management. While concerns exist, especially regarding privacy and the risk of over-reliance, the overall sentiment is optimistic. The nuanced understanding of AI's multifaceted nature and its potential to revolutionize diverse domains, coupled with the consistent positive perception across different experience levels and academic backgrounds, highlights the comprehensive awareness of AI's potential among teachers.

Conflicts of interest

The author declares that there is no conflicts of interest in this study.

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