

Unveiling Educators' Insights on Artificial Intelligence in Education: A Qualitative Study of Potential, Expectations, and Challenges¹

Mehmet Yaman¹ Mehmet Başaran²

To cite this article:

Yaman, M., & Başaran, M. (2025). Unveiling educators' insights on artificial intelligence in education: A qualitative study of potential, expectations, and challenges. *e-Kafkas Journal of Educational Research*, 12, 280–296. doi:10.30900/kafkasegt.1493242

Research article

Received: 25.05.2024


Accepted: 15.04.2025

Abstract

This study investigated teachers' opinions on using artificial intelligence (AI) in education. The aim was to gain insight into teachers' expectations, desires, and concerns regarding AI applications that would be used more frequently in education shortly. Teachers were consulted about the purposes for which AI could be used in their lessons and the current level of AI utilization. A qualitative research method was used in the study. Data on the use of AI in education were collected through semi-structured interviews with teachers. The collected data were analyzed using content analysis. According to the findings, teachers believe AIs can be used for language learning, personalized education, and individual student tracking. All teachers participating in the study had a positive view of the use of AI in education. Moreover, most teachers think that AI applications will increase academic success; however, they expect AI to be suitable for the student level, provide feedback for the student, and evaluate the teaching process. Participants, who stated that teachers also have responsibilities in using AI, emphasized that teachers need to improve by receiving training on this subject. The study revealed teachers' concerns about using AI, bringing these reservations to light. In the study's conclusion, suggestions were given, such as the necessity of using AI in education and considering teachers' concerns. It also addressed what needs to be done to promote the widespread use of AI nationwide.

Keywords: Artificial intelligence, education, teaching, teacher perspectives.

¹ This study was produced from the master thesis of Mehmet Yaman, under the supervision of Doç. Dr. Mehmet Başaran, in the Department of Curriculum and Instruction at Gaziantep University, Institute of Educational Sciences.

¹  Corresponding Author, mehmetyamanakademik@gmail.com, Gaziantep University Faculty of Education, Gaziantep, Turkey

²  Author, Gaziantep University Faculty of Education, Gaziantep, Turkey

Introduction

Rapid advancements in digital technologies have significantly reshaped contemporary societies, particularly in the context of Industry 4.0 and Society 5.0. These developments have paved the way for artificial intelligence (AI) to play an increasingly central role in various sectors, including education. Within the educational sphere, AI holds promise for personalized learning experiences, automated assessment, and enhanced opportunities for both learners and educators. Despite growing scholarly interest in AI-driven education, there remains a need for deeper investigation into teachers' knowledge and perspectives on AI.

Against this backdrop, the present study explores educators' insights on AI in education. By examining teachers' levels of AI awareness and their views on its applications and potential influence on student success, this research seeks to contribute to the literature on AI's expected role in shaping future educational practices.

The Industrial Revolutions

From Industry 1.0 to Industry 4.0

The eighteenth century witnessed a significant transformation when the Industrial Revolution (often referred to as Industry 1.0) emerged in England and later spread across Europe. Societies began transitioning from agricultural to industrial economies during this era. Subsequent phases—Industry 2.0, Industry 3.0, and Industry 4.0—brought notable technological, environmental, and social changes, typically orchestrated or facilitated by governments (Janicke & Jacob, 2009).

Over the past two centuries, societies have integrated mechanization and computer systems into everyday life. Industry 4.0, formalized and supported in Germany by the twenty-first century, has emphasized digitalization across sectors. The Industrie 4.0 Working Group (2013) defines Industry 4.0 as “a new phase of value creation and management throughout the life cycle of products” (Hermann et al., 2015). This period is characterized by digital technologies becoming indispensable, particularly in healthcare, agriculture, economics, and defense, where they enhance speed, efficiency, and innovation (Öztürk, 2013; Firat & Firat, 2017).

Key Features of Industry 4.0

Industry 4.0 includes significant innovations such as:

- Robots with decision-making and mass-production capabilities
- Information networks that communicate among themselves and with humans
- Cyber-physical systems that enable systems integration
- Cybersecurity systems that protect against cyber-attacks
- Internet of Things (IoT) applications facilitating communication across societal spheres
- Cloud computing systems for software and data management
- Augmented reality that bridges digital and natural environments
- 3D printers for on-demand production (Öztemel, 2018)

Society 5.0

Emergence and Conceptualization

While Industry 4.0 continues to advance in Germany, Japan introduced the concept of Society 5.0. First appearing in a national political discourse (Keidanren, 2016; Harayama, 2017), Society 5.0 was officially named by Prime Minister Shinzo Abe in 2017 (Develi, 2017). This new era envisions leveraging the digital revolution's technological achievements for the broader benefit of humanity (Fukuyama, 2018).

Society 5.0 aims to evolve into a “super-smart society” wherein technology is harnessed to solve social, economic, and environmental challenges. Focusing on “technology for society,” this human-centric approach aspires to integrate digital tools seamlessly into daily life, thereby addressing social problems and fostering overall happiness (Mutluol, 2018). Japan has openly endorsed initiatives to realize a super-smart society across various global forums (Fukuda, 2020, cited in Er et al., 2021).

Applications in Society 5.0

Society 5.0 is anticipated to introduce numerous initiatives, notably:

- Smart cities, where crucial urban functions (e.g., communication, transportation, energy, and water) operate autonomously via computer software
- Smart homes featuring devices (e.g., refrigerators that restock automatically) and systems (e.g., climate control that adjusts proactively)

- Driverless cars, aided by AI, for safer and more efficient transportation
- Wearable technologies offer users greater convenience in health monitoring, communication, and more (Öztürk & Ateş, 2021)

Artificial Intelligence

Definitions and Historical Context

Industry 4.0 and Society 5.0 heavily rely on AI, which is generally defined as machine-based intelligence capable of performing tasks that traditionally require human cognition (URL-1). According to the European Parliament (2016), AI systems evaluate surrounding data to achieve specified goals, demonstrate partial autonomy, and exhibit intelligent behaviors. These systems aim to perform abstract thinking, problem-solving, judgment, and learning from experience (Dülger, 2018). Although early notions of artificial intelligence can be traced back to antiquity, the modern foundations of AI were laid in the mid-twentieth century. In 1950, Alan Turing introduced the Test, evaluating machines' capacity to emulate human-like thought and conversation. In 1956, John McCarthy's workshop at Dartmouth College marked a pivotal step in formalizing AI research (Mijwel, 2015; Öteş et al., 2018, cited in Kaya, 2021). Since then, AI-related studies and applications—ranging from search engines to autonomous vehicles and unmanned agriculture—have proliferated (Koroğlu, 2017).

Current AI Applications

Contemporary AI implementations span numerous domains:

- Speech recognition, image processing, and natural language processing
- Navigation systems and recommendation algorithms
- Healthcare services (e.g., patient data analytics)
- Retail and e-commerce (e.g., personalized product recommendations)
- Manufacturing (e.g., robotic systems in factories, automated quality control)
- Transportation (e.g., driver assistance technologies, autonomous vehicles)

AI in Education

Potential Benefits

AI offers substantial benefits in educational contexts, notably through personalized learning. By allowing each student to progress individually, AI can adapt instructional methods to meet diverse needs (Kazu & Özdemir, 2009, cited in Bayburt & Eğin, 2021). Continuous feedback mechanisms, automated grading, and intelligent tutoring systems streamline instructional processes and reinforce student understanding. Additionally, AI enables global connectivity and learning without temporal or spatial limitations, supporting distance education platforms (Murphy, 2019).

AI-driven tools can serve as virtual teachers, delivering targeted explanations, assessing students' comprehension, and revisiting misunderstood concepts. Such systems can alleviate teachers' administrative burden by automating grading and performance tracking (Karaca & Telli, 2019). Moreover, predictive analytics derived from AI systems can help identify students at risk of dropping out or falling behind academically, prompting timely interventions.

Existing Research and Gaps

A growing body of literature highlights AI's importance in education (Arslan, 2017; Coşkun & Gülleroğlu, 2021; İşler & Kılıç, 2021), underscoring both the history and practical classroom applications of AI. However, research explicitly examining teachers' perspectives on AI remains limited. For instance, Çam et al. (2021) explored prospective teachers' awareness of AI, while Aktaş (2021) investigated how school administrators and teachers perceive AI in education. Building on these studies, the present research addresses the gap by focusing on in-service teachers' knowledge of and attitudes toward AI's role in educational settings.

Research Purpose and Questions

This study aims to examine teachers' opinions on the use of artificial intelligence in education. By elucidating their level of AI knowledge and exploring how AI could shape teaching and learning processes, the findings aim to guide relevant stakeholders in effectively integrating AI into educational systems. Specifically, the study seeks to answer the following sub-questions:

1. What are teachers' levels of knowledge about artificial intelligence?
2. What are teachers' opinions on the use of artificial intelligence in education?
3. To what extent are teachers familiar with current AI applications in education?
4. What do teachers believe about the relationship between AI and academic success?

Method

A qualitative research method was employed in this study. Qualitative research utilizes observation, in-depth interviews, and document analysis (Strauss & Corbin, 2014). Additionally, qualitative research is an approach that involves the evaluation of verbal data and aims to explore rather than generalize (Bülbül, 2016. Cited in Aydoğdu et al., 2017).

The study aimed to elucidate teachers' opinions on using artificial intelligence in education. For this purpose, in-depth interviews were conducted based on 10 questions in the data collection tool with 20 teachers and 3 relevant experts. The interviews were recorded, transcribed, and then confirmed by the participants. The verbal data obtained were analyzed through themes and codes to reach accurate conclusions.

Research Design

In this study, the qualitative research method of phenomenology design has been utilized. Phenomenological studies aim to identify and interpret personal perceptions regarding a phenomenon (Yıldırım & Şimşek, 2008). To achieve this, researchers can engage in deep dialogues with participants to explore the topic (phenomenon) (Büyüköztürk et al., 2014). Phenomenological studies enable researchers to gain insights into individuals' thoughts, perceptions, and experiences related to a phenomenon (Kocabıyık, 2015).

The focus of this study is to determine teachers' opinions on the use of artificial intelligence in education. For this purpose, data were collected and evaluated by interviewing science and information technology teachers with specific proficiency levels and artificial intelligence knowledge. Thus, teachers' views, perceptions, and ideas on the subject were obtained.

Study Group

When determining the study group for qualitative research, attention should be paid to aspects such as content, planning, and quality of the data to be investigated. The number of individuals to be interviewed is determined in line with the study's objectives (Morse, 2000). In phenomenological studies, individuals to be investigated should know the subject. The number of selected individuals should be 10-15 (Starks and Trinidad, 2007). In this study, the study group was determined using purposive sampling to determine teachers' opinions on using artificial intelligence in education. The research group was selected through criterion sampling, one of the purposive sampling methods. In criterion sampling, individuals who meet certain conditions or criteria are included in the research group (Büyüköztürk et al., 2008). The researchers can determine the criteria (Marshall & Rossman, 2014). The study on teachers' views on using artificial intelligence in education considered a certain level of knowledge about artificial intelligence as a criterion. Therefore, Computer Science teachers and Science teachers who followed the subject knew about it and participated in projects and competitions related to the topic were selected.

Table 1

Demographic Information of the Participants

Participants	Demographics	Frequency	%
Gender	Male	11	%55
	Female	9	%45
Branch	Science	15	%75
	ICT	5	%25
Education	Undergraduate	16	%80
	Graduate	4	%20
Seniority	Between 0-10 years	8	%40
	Between 10-25 years	12	%60
Age	20-40 years	17	%85
	40-60 years	3	%15

According to Table 1, 55% (11) of the teachers participating in the study are male and 45% (9) are female. While 75% (15) of the teachers are in the Science branch, 25% (5) are in the ICT branch. 80% (16) of the teachers participating in the study have a bachelor's degree, and 20% (4) have a master's degree. Those between 0-10 are 40% (8), and those between 10-25 are 60% (12). Finally, 85% (17) of the teachers are between 20-40, while 15% (3) are between 40-60.

Data Collection Tool

In qualitative research, methods such as observation, structured or semi-structured interviews, focus group discussions, discourse, and textual analysis are used to collect data (Baltacı, A. 2019). Since the study utilized a semi-structured interview technique, a semi-structured interview form prepared by the researcher that was suitable for this method was employed. Necessary literature reviews were conducted during the preparation of the form. Feedback from 3 experts, including two from the field and one linguistics expert, was sought, and necessary revisions were made.

The interview form contains questions through which participants' opinions on using artificial intelligence in education can be accessed. The questions are designed to be objective and non-directive, adhering to the purpose of the study and formulated in an open-ended manner. Open-ended questions provide freedom to respondents during interviews and can help relax the interview environment (MEB, 2012). The questions addressed to the participants in the semi-structured interview form are shown in the appendix (Appendix 1). Through these questions in the form, teachers' opinions were obtained on their knowledge about artificial intelligence, their views on the use of artificial intelligence in education, its impact on academic achievement, and similar topics.

Data Collection Process

This study was conducted using the phenomenological method. In this method, interviews with participants are commonly conducted to collect data (Yıldırım & Şimşek, 2008). Interviewing is a method where the researcher asks participants questions to gather information on a particular topic (Christensen, Johnson, & Turner, 2015; Türnüklü, 2000). In phenomenological studies, oral narratives and written expressions convey human experiences (Van Manen, 1984. cited in Baker et al., 1992). Interview types commonly used in educational research are generally categorized into three groups: unstructured, structured, and semi-structured (Holstein & Gubrium, 1997). When collecting teachers' views on the use of artificial intelligence in education, the semi-structured interview method was employed with the participants. In this method, the researcher asks participants predetermined questions to elicit their opinions and experiences on a particular topic. Semi-structured interviews provide a certain level of standardization while also being flexible, making them a suitable method for research in this field (Türnüklü, 2000). In this study, interviews were conducted with the identified study group. During these interviews, participants were asked the questions from the semi-structured interview form. In-depth discussions were held with the participants. The researcher asked the prepared questions, and participants' responses were recorded as audio. Subsequently, the audio recordings were transcribed into text, and confirmation was obtained from the participants.

Data Analysis

In qualitative research, data analysis focuses on extracting and interpreting meanings from the examined phenomena, constituting the most crucial stage of the research process (Flick, 2013). In this study, data gathered from interviews were analyzed using the content analysis method, a standard procedure in qualitative research. This method entails segmenting the data into meaningful units, or "codes." Once generated, codes are grouped into themes based on shared characteristics. These codes and themes are organized into a coherent framework, facilitating reader comprehension. Finally, in the "interpretation of findings" phase, the interrelations among codes and themes are examined, completing the analysis (Yıldırım & Şimşek, 2013).

All interview data were transcribed verbatim and subsequently confirmed by participants to ensure accuracy. After transcription, the data were coded, and the resultant codes were aggregated into themes and subthemes. Any initial disagreements in theme identification were resolved through consensus, culminating in a finalized thematic structure. To verify the study's reliability, Miles and Huberman's (1994) reliability formula—calculated as $\text{Agreement} \div (\text{Agreement} + \text{Disagreement})$

Agreement÷(Agreement+Disagreement)—was employed. Because the derived value exceeded 70%, the study was deemed reliable. Ultimately, the research team achieved complete consensus on the identified themes, yielding a reliability coefficient of 0.84.

Validity and Reliability

In scientific research, the credibility of the results is crucial. To ensure this credibility, the concepts of validity and reliability are utilized. In quantitative research, validity and reliability are generally achieved by thoroughly testing the data collection tools and sharing this with the readers. However, in qualitative research, validity and reliability are ensured in a slightly different manner (Yıldırım and Şimşek, 2013). Instead of validity and reliability, concepts such as credibility, the accuracy of the results, and the researcher's competence would be more appropriate (Krefting, 1991). According to Guba and Lincoln (1982), credibility should be used instead of validity and reliability in qualitative research. Credibility in the research is grouped under four headings to establish credibility: credibility, dependability, confirmability, and transferability. Long-term interaction interviews were conducted to increase the credibility of the research. The researcher's ideas and opinions were not reflected in the participants throughout the interviews, and an objective process was followed. After the interviews were recorded, they were transcribed, and written participant confirmation was obtained. A purposeful sampling was conducted to ensure the transferability of the research. This study aims to determine teachers' opinions regarding using artificial intelligence in education. Participants included Science and Computer Science teachers with a certain level of knowledge, following the inclusion/exclusion criteria. Furthermore, participants' extensive demographic information was collected to ensure transferability. To ensure the reliability of the study, data were sent to other researchers and experts for researcher triangulation. The reliability coefficient was found to be .84 according to the formula of Miles and Huberman (1994) through code and theme comparison. Finally, methods such as objectivity and researcher triangulation were used to ensure the confirmability of the research.

Findings

In our study on teachers' opinions regarding using artificial intelligence in education, teachers were interviewed and asked questions. Themes and codes were derived from the responses. Below, these themes and codes are presented in table format.

Table 2

Themes and Codes Identified in the Research

Themes	Codes		
Theme 1: Definition of Artificial Intelligence	Learning machines (f=10)	Imitation (f=6)	Computer program (f=8)
Theme 2: Purposes of Using Artificial Intelligence	Language learning (f=8)	Personalized education (f=7)	Student tracking (f=7)
Theme 3: Level of Utilization of Artificial Intelligence	Low level (f=12)		
Theme 4: Examples of Artificial Intelligence Applications in Education	Coursera (f=5)	Education Informatics Network Assistant (f=8)	Python (f=4)
Theme 5: The Use of Artificial Intelligence in Education	Should be used (f=17)	Positive appraisal (f=8)	
Theme 6: The Relationship Between Artificial Intelligence and Academic Achievement	Increasing success (f=13)	Positive relationship (f=6)	Directly proportional (f=4)
Theme 7: Criteria for Artificial Intelligence Implementation	Feedback provision (f=9)	Suitability for student level (f=5)	Evaluation (f=5)
Theme 8: Duties of Teachers	Receiving education (f=6)	Being directive (f=6)	Guiding (f=5)
Theme9: Concerns Regarding Artificial Intelligence	Replacing the teacher (f=8)	Data security (f=7)	Emotional deficiency (f=6)
Theme 10: Future Applications of Artificial Intelligence	Education without teachers (f=7)	Virtual classrooms (f=5)	Vocational guidance (f=6)

Findings Regarding the Definition of Artificial Intelligence

In a question about the definition of artificial intelligence teachers, answers such as self-learning machines, imitation of humans, and computer programs have emerged as prominent. The theme and codes of these answers are shown in table 3 below.

Table 3
Findings Regarding the Definition of Artificial Intelligence

Themes	Frequencies	Example Quote
Learning Machines	T1, T2, T3, T4, T5, T6, T9, T10, T12, T17	T3: "It is a machine that learns based on humans."
Personalized education	T1, T2, T7, T8, T11, T16	T1: "We can say that artificial intelligence imitates human intelligence."
Computer program	T1, T6, T9, T10, T13, T15, T18, T20	T10: "We can also say that computer programs can learn."

According to the data on the definition of artificial intelligence, the most repeated answer is "learning machines." In this regard, T4 stated, "We can refer to pre-programmed learning machines." T9, on the other hand, stated about the code of learning machines, "The key phrase we determined in the definition of artificial intelligence is machine learning." When examining the responses to defining artificial intelligence, imitation comes second. Indeed, T2 stated, "It imitates human intelligence to perform tasks." One of the frequently repeated answers by the interviewees is that artificial intelligence is a computer program. Participant T1 answered this question: "It is a computer program that mimics human intelligence."

Findings Regarding the Use of Artificial Intelligence in Education

In the question posed to teachers, 'What could be the purposes of using artificial intelligence in education?' answers highlighting personalized learning, language acquisition, and student tracking have emerged. Below are the themes and codes extracted from the responses to questions regarding using artificial intelligence in education.

Table 4
Findings Regarding the Use of Artificial Intelligence in Education

Themes	Frequencies	Example Quote
Language learning	T2, T3, T6, T10, T14, T15, T17, T20	T2: <i>"For the student to practice language learning."</i>
Personalized Education	T2, T5, T8, T11, T13, T14, T19	T11: <i>"Artificial intelligence can be used for personalized education."</i>
Student tracking	T1, T4, T9, T11, T15, T17, T18	T4: <i>"They can track students individually."</i>

According to the responses in Table 4, language learning is frequently mentioned. Indeed, respondent T10 stated, "We can use it for language learning." Another commonly repeated response is personalized education. T2 mentioned, "Personalized education can be conducted by preparing

suitable student plans.” Another purpose of using artificial intelligence in education is student tracking. T18 stated, “Artificial intelligence can track individual students.”

Findings Regarding the Level of Utilization of Artificial Intelligence in Education

The responses from participants regarding the current level of utilization of artificial intelligence in education are as follows.

Table 5

Findings Regarding the Level of Utilization of Artificial Intelligence in Education

Themes	Frequencies	Example Quote
Low level	T1, T2, T4, T7, T8, T10, T11, T13, T14, T15, T18, T20	T8: “ <i>I believe it is not adequately utilized in schools.</i> ”

When examining Table 5, it is evident that many teachers perceive the use of artificial intelligence in education to be at a low level. T10 expressed, ‘The use of artificial intelligence in education is currently low.’ T20 stated, “I do not think it has become widespread in education yet.”

Findings Regarding Examples of Artificial Intelligence Applications in Education

The following codes were identified when teachers were asked about examples of artificial intelligence used in education.

Table 6

Findings Regarding Examples of Artificial Intelligence Applications in Education

Themes	Frequencies	Example Quote
Coursera	T1, T10, T13, T16, T19	T1: “ <i>A great artificial intelligence program for one-on-one teaching, individualized learning, and personalized tracking of learning differences.</i> ”
Education Informatics Network Assistant	T3, T6, T9, T11, T12, T14, T17, T20	T6: “ <i>The Education Informatics Network Assistant program, where we can access information and ask questions, is an artificial intelligence application.</i> ”
Python	T11, T13, T15, T18	T10: “ <i>There is a Python program for enhancing foreign language proficiency.</i> ”

When examining Table 6, the Coursera response stands out as one of the artificial intelligence applications currently used in education. T10 mentioned, “We can discuss a program called Coursera, which supports individual education.” Another prominent response is the Education Informatics Network Assistant. Three participants mentioned the Education Informatics Network Assistant as an example of artificial intelligence used in education. Indeed, T11 stated, “There is the Education Informatics Network Assistant program where students can find answers to frequently asked questions.” Another repeated response from participants is Python. T13 responded, “We can give the example of the Python program used in language teaching.”

Findings Regarding Perspectives on the Use of Artificial Intelligence in Education

The participants were asked about their views on using artificial intelligence in education. The codes identified based on the responses to this question are shown in the table below.

Table 7

Findings Regarding Perspectives on the Use of Artificial Intelligence in Education

Themes	Frequencies	Example Quote
Should be used	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12 T13, T14, Ö15, Ö16, Ö18	T5: <i>"I believe that with advancing technology, artificial intelligence should be integrated into the education process."</i>
Positive perception	T3, T4, T7, T9, T10, T12, T17, T19	T3: <i>"There is a positive relationship."</i>

According to Table 7, the most frequently given answer to the question about using artificial intelligence in education was 'should be used.' The majority of participants agreed that artificial intelligence should be used in education. On this matter, T6 stated, 'Since technology is a part of the lives of today's generation, artificial intelligence should be used in education.' At the same time, T18 responded, 'As teachers, I do not think we are 100% sufficient for today's students, so artificial intelligence should be used in education.' Another repeated response by participants was 'positive perception.' T4 answered this question: "Education should be intertwined with technology, and therefore, I view the use of it in education positively."

Findings on the Relationship Between Artificial Intelligence and Academic Achievement

Teachers were asked about the potential relationship between artificial intelligence and academic achievement. Based on the responses to this question, the following codes were developed.

Table 8

Findings on the Relationship Between Artificial Intelligence and Academic Achievement

Themes	Frequencies	Example Quote
Improving Academic Achievement	T2, T3, T5, T7, T9, T10, T11, T12, T13, T14, T16, T18, T20	T4: <i>"Academic achievement can be enhanced through artificial intelligence software."</i>
Positive Relationship	T1, T3, T8, T12, T14, T19	T1: <i>"I believe there will be a positive relationship between artificial intelligence and academic achievement."</i>
Being Proportional	T2, T4, T14, T15	T14: <i>"I believe there will be a direct correlation."</i>

According to Table 8, when teachers' opinions regarding the relationship between artificial intelligence and academic achievement are examined, it is observed that most participants believe that artificial intelligence applications will increase academic achievement. T2 said, "If it is compatible with personalized education plans, academic achievement will increase," while T3 stated, "I think it will significantly increase academic achievement." Another participant's response indicates a positive relationship between artificial intelligence and academic achievement. Indeed, the teacher of T3 stated, "There is a positive relationship." When we examine the table, we also see responses indicating a proportional relationship between artificial intelligence and academic achievement. T2 stated, "If

artificial intelligence is used effectively and accurately, I believe academic achievement will increase in proportion as we focus on personalized education.”

Findings Regarding Criteria for Artificial Intelligence Applications

The following codes have been extracted from the responses to the question, ‘What criteria should be present in artificial intelligence applications that you will implement in your classes?’

Table 9

Findings Regarding Criteria for Artificial Intelligence Applications

Themes	Frequencies	Example Quote
To give feedback	T1, T4, T9, T10, T11, T13, T15, T16, T19	T9: <i>“It should provide the necessary feedback with artificial intelligence support.”</i>
Suitability for student-level	T2, T8, T11, T12, T20	T8: <i>“ I expect it to be at my student’s level.”</i>
Evaluation	T4, T9, T10, T14, T17	T17: <i>“It should make sufficient assessments with the feedback received.”</i>
Identification of learning deficiencies	T4, T7, T11, T15, T16, T18	T11: <i>“What are the learning deficiencies? These should be identified.”</i>

According to Table 9, the most desired criterion for artificial intelligence is its ability to provide feedback. A large majority of teachers want the artificial intelligence they will implement in their classes to have the ability to provide feedback. For instance, T1 stated, “Does the artificial intelligence I implement track my student’s progress and provide feedback to me?” Another criterion highlighted by participants is that artificial intelligence should be suitable for the student level. T11 expressed this viewpoint: “First and foremost, artificial intelligence should be appropriate for the student level.” Another response from the table is regarding the ability of artificial intelligence to conduct assessments. Indeed, T9 mentioned, “I want it to evaluate the overall process based on the data input by the teacher, manage, and advance the teaching process.” The last response in the table is about the ability of artificial intelligence to identify learning deficiencies. T16 expressed this by stating, “It should be able to identify which topics or question types the student is lacking in, which I may not be able to detect.”

Findings Regarding the Responsibilities of Teachers in the Use of Artificial Intelligence in Education

The codes from the responses to the question ‘What responsibilities can teachers have in using artificial intelligence in education?’ are shown in the table.

Table 10

Findings Regarding the Responsibilities of Teachers in the Use of Artificial Intelligence in Education

Themes	Frequencies	Example Quote
Receiving education	T1, T7, T8, T10, T12, T18, T20	T8: <i>“Teachers should use artificial intelligence with the training they receive.”</i>
Being guiding	T3, T6, T9, T11, T17, T19	T3: <i>“They should guide the students.”</i>
Being a guide	T4, T6, T10, T12, T14	T6: <i>“In the 21st century, a teacher who is a guide should also guide in this matter.”</i>

According to Table 10, teachers' responsibilities in using artificial intelligence in education include receiving education/training, being mentors, and guiding students. The most common response based on the questions is to guide the students. T6 stated, "I think guiding the students is a great responsibility." Another repeated response from participants is that of being a mentor. For instance, T14 stated, "I believe the teacher should be in a mentor position here." The last repeated response in the table is that teachers should receive education/training on artificial intelligence. T10 expressed this by stating, "The teacher should improve himself/herself in this regard and should not remain passive."

Findings Regarding Concerns About the Use of Artificial Intelligence in Education

The concerns regarding the use of artificial intelligence in education were asked during discussions with teachers, and the resulting codes from the responses are shown in the table below.

Table 11

Findings Regarding Concerns About the Use of Artificial Intelligence in Education

Themes	Frequencies	Example Quote
Replacing the role of the teacher	T1, T2, T10, T11, T13, T15, T17, T19	T2: "The fear of being replaced by teachers concerns me the most."
Data security	T2, T5, T10, T12, T14, T18, T20	T5: "It could be problematic if the data would be in hackers' hands."
Lack of emotion	T1, T7, T10, T13, T15, T18	T1: "Since our students obtain social and emotional communication from teachers, artificial intelligence may be unable to fulfill this."

When examining Table 11, the most frequently repeated response is the fear of replacing the role of the teacher. T1 responded, "My biggest concern is that artificial intelligence will replace the teacher." Another frequently repeated response in the table is data security. T2 mentioned, "Despite the positive aspects of artificial intelligence, if it educates students on digital platforms, data may become vulnerable." Another frequently repeated response to this question is the potential lack of emotions in students. T18 said, "My concern is the potential lack of emotions that may arise in students."

Findings Regarding Future Artificial Intelligence Applications

The following codes have been formed based on the responses of participants to the question, 'Which artificial intelligence applications would be used in the future?'

Table 12

Findings Regarding Future Artificial Intelligence Applications

Themes	Frequencies	Example Quote
Education without teachers	T7, T8, T10, T12, T15, T16, T19	T8: "It can replace the role of the teacher."
Virtual classrooms	T9, T10, T11, T14, T17	T10: "Virtual classrooms can be created."
Career Guidance	T3, T5, T4, T13, T14, T20	T14: Professional guidance can be provided.

Table 12 shows that future artificial intelligence applications may include education without teachers, virtual classrooms, and career guidance programs. Regarding education without teachers, statement T7 suggests the possibility of teaching classes in a school without teachers using artificial intelligence. As

for virtual classrooms, statement T9 mentions the potential for creating such classrooms. Participants have expressed views on the ability of artificial intelligence to guide students toward professions based on their interests and abilities. Indeed, statement T20 indicates belief in the capability to channel students correctly into suitable careers, stating, “I think students can be channeled into the right careers in the right way.”

Conclusion, Discussion, and Recommendations

In our study on teachers’ perspectives regarding using artificial intelligence (AI) in education, participants described AI primarily as “learning machines” that mimic human intelligence and operate as computer programs. Many teachers highlighted that AI systems learn from data and adapt based on specific characteristics. When discussing the purpose of AI in education, teachers frequently mentioned its potential for personalized learning, language instruction, and student monitoring. They noted that AI could tailor instruction to individual student needs, allowing learners to progress at their own pace. Despite these promising aspects, most teachers expressed low confidence in the current state of AI utilization in schools, perceiving its implementation as inadequate.

Teachers provided examples of AI applications, such as Coursera, Eba Asistan, and Python-based programs. They indicated that Coursera supports individualized education, Eba Asistan addresses frequently asked questions, and Python is employed for language teaching. Unanimously, all participants agreed on the potential benefits of integrating AI into education, suggesting that it could enhance academic achievement by identifying learning deficiencies and enabling personalized instruction.

Regarding their professional roles, teachers emphasized that successful AI integration requires initial training and ongoing mentorship to guide students effectively. However, they also expressed concerns, the most prominent being the fear that AI might eventually replace human teachers. Other concerns included data security risks and the inability of AI systems to replicate the social and emotional aspects of human interaction, which are essential for holistic student development.

Teachers envisioned future AI applications that could support classrooms without teachers, virtual learning environments, and vocational guidance systems. Such innovations, they suggested, would allow education to transcend traditional spatial and temporal constraints and provide early career counseling based on individual strengths.

These findings align with previous research (e.g., Çam et al., 2021; Tekgüç & Adalier, 2019; Sheikh, 2020; Nabiyeve & Erümit, 2020) that highlights AI’s potential for personalized education while also underscoring critical concerns about its current limitations. Although the current use of AI in education remains insufficient, teachers believe that with technological advancements, AI will soon become an indispensable component of educational practice. To facilitate this transition, there is a need for enhanced support systems, including robust infrastructure, targeted teacher training, and rigorous development of AI applications that complement—rather than replace—the role of human educators.

In a research study on teachers’ perspectives regarding using artificial intelligence in education, teachers explained the definition of artificial intelligence, such as learning machines, mimicking human intelligence, and computer programs. Among these explanations, the definition of learning machines was the most commonly given response. Teachers who provided this answer stated that artificial intelligence systems are machines that learn through specific characteristics they possess. Regarding the purpose of using artificial intelligence in education, teachers expressed opinions about language learning, personalized education, and student monitoring. The most common response in this regard was personalized learning, where education tailored to individual needs is conducted. Teachers mentioned that with artificial intelligence, education tailored to the pace and needs of each student can be provided. Almost all teachers expressed low confidence regarding using artificial intelligence in education. Teachers perceive the current level of artificial intelligence utilization in education as inadequate.

Examples of using artificial intelligence in education include programs such as Coursera, Eba Asistan, and Python. It is stated that Coursera can provide individual education, Eba Asistan can offer answers to frequently asked questions, and Python is used in language teaching. When asked about their opinion on using artificial intelligence in education, all participants unanimously agreed it should be

used. All teachers believe that using artificial intelligence in education would be beneficial. When looking at the relationship between artificial intelligence and academic achievement, most teachers said that artificial intelligence would increase academic achievement. It is thought that with artificial intelligence applications, learning deficiencies can be identified, and personalized education can be provided, leading to increased academic success.

Regarding teachers' responsibilities in using artificial intelligence in education, answers related to receiving education, guiding, and being mentors were given. Teachers believe that education is necessary to acquire the ability to use artificial intelligence. However, they also mentioned that guiding and mentoring students should be fulfilled during the process.

When teachers were asked about their concerns regarding artificial intelligence, the most common response was the fear of replacing teachers. Teachers worry that artificial intelligence applications in education could push teachers out of the process as time passes. Another concern expressed by teachers is the security of student-related data. Teachers mentioned their anxiety about data theft being shared in the digital world. Another concern teachers have regarding artificial intelligence is the lack of emotion. Considering that artificial intelligence applications lack social and emotional aspects, there is concern that students may not develop these aspects. Teachers have mentioned that future artificial intelligence applications could include education without teachers, virtual classrooms, and vocational guidance. It has been stated that education can be conducted in a digital environment without the need for teachers. It has been explained that with virtual classrooms created in this environment, education can be conducted without time and space constraints. Another potential application in the future could be vocational guidance. With artificial intelligence applications, students' abilities can be identified from a young age, guiding them toward a suitable profession.

Most teachers have described artificial intelligence as learning machines, which aligns with the findings of Çam et al. (2021). Indeed, the participants in this study also defined artificial intelligence as machines that learn from existing data. The notion that artificial intelligence can provide personalized education is consistent with the findings of the same study. The research above noted that artificial intelligence could address students' deficiencies and provide individualized education by conducting personalized assessments. When teachers were asked about their concerns regarding artificial intelligence in our study, the responses included fears of replacing teachers and emotional deficiencies. These results are similar to the findings of Çam et al. Indeed, the participants in this study also mentioned that artificial intelligence could potentially replace humans and have emotional deficiencies. Artificial intelligence in education may not lead to students' desired social and emotional development. Students with less interaction with their surroundings may experience loneliness and emotional deficiencies. This situation parallels the findings of the studies.

When teachers were asked about their opinions on using artificial intelligence in education, it was observed that all teachers unanimously agreed on the necessity of using artificial intelligence in education. These data align with the findings of Tekgüç and Adalier (2019). The mentioned study also discussed the necessity of using artificial intelligence in education. The purpose of using artificial intelligence in education, as mentioned by teachers, is personalized education. This aligns with the findings of Sheikh (2020). Indeed, it has been noted in this study that artificial intelligence can be used in personalized education.

Nabiyev and Erümit (2020) also explained in their study that artificial intelligence can be used in personalized education. Our study findings are similar to those of Nabiyev and Erümit. Artificial intelligence in various fields will eventually be used in education over time. With the transition of education and teaching to the digital world, the scope of artificial intelligence in education will gradually expand. Individuals can receive personalized education at their own pace and according to their needs. This situation is consistent with the findings of the studies conducted.

Teachers' use of artificial intelligence applications in today's education system is insufficient. However, with the rapid advancement of technology, artificial intelligence will become an indispensable part of education and teaching in a short period of time. Developed countries foresee this and continue their efforts to integrate artificial intelligence systems into education. Our country must also make necessary efforts to avoid falling behind. Universities and scientists producing

artificial intelligence applications should be supported. Units dealing with this issue should be established in private and public institutions, and existing ones should be improved. Careful consideration should be given to integrating prepared artificial intelligence applications into education. When artificial intelligences are used in education, they should be tailored to the level of students. They should provide individual learning opportunities to students and provide them with feedback. Analyzing students' abilities and interests at a young age, they should guide appropriate career choices. Physical infrastructures should be prepared to enable the use of artificial intelligence systems throughout the country. Necessary training should be provided to teachers who will use these systems. Artificial intelligence should never replace teachers; instead, it should be used under teacher guidance to enhance the quality of education.

Acknowledgment

Copyrights: The works published in the e-Kafkas Journal of Educational Research are licensed under a Creative Commons Attribution-Non-commercial 4.0 International License.

Ethics statement: In this study, we declare that the rules stated in the “Higher Education Institutions Scientific Research and Publication Ethics Directive” are complied with and that we do not take any of the actions based on “Actions Against Scientific Research and Publication Ethics.” At the same time, we declare that there is no conflict of interest between the authors, which all authors contribute to the study, and that all the responsibility belongs to the article authors in case of any ethical violations.

Author Contributions: Conceptualization, methodology, validation, M.Y., and M.B.; analysis, M.Y.; writing, review, and editing, M.Y. and M.B.; supervision, M.B.

Funding: This research received no funding.

Institutional Review Board Statement: Ethics committee name: Gaziantep University Ethics Committee. Ethics committee decision date: 06.11.2023, Ethics committee document number: 321029

Data Availability Statement: The authors can make available data generated or analyzed during this study on request.

Conflict of Interest: No conflict of interest exists between the authors.

Generative Artificial Intelligence Statement: During the preparation of this work, the authors used generative AI technology, specifically ChatGPT, to enhance the manuscript’s readability and language. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the manuscript’s content.

References

- Aktaş, A. (2021). Yönetici ve öğretmen görüşlerine göre yapay zekâ: Bir metafor çalışması. In 1. Ulusal Eğitimde Yapay Zekâ Uygulamaları Kongresi tam metin bildiri kitapçığı.
- Arslan, K. (2017). Eğitimde yapay zekâ ve uygulamaları. *Batı Anadolu Eğitim Bilimleri Dergisi*, 11(1), 71–88.
- Aydoğdu, R. Ü., Karamustafaoğlu, O., & Bülbül, Ş. M. (2017). Akademik araştırmalarda araştırma yöntemleri ile örneklem ilişkisi: Doğrulamalı doküman analizi örneği. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, 30, 556–565.
- Baker, C., Wuest, J., & Stern, P. N. (1992). Method slurring: The grounded theory/phenomenology example. *Journal of Advanced Nursing*, 17, 1355–1360.
- Baltacı, A. (2019). Nitel araştırma süreci: Nitel bir araştırma nasıl yapılır? *Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 5(2), 368–388.
- Başkale, H. (2016). Nitel araştırmalarda geçerlik, güvenirlik ve örneklem büyüklüğünün belirlenmesi. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, 9(1), 23–28.
- Bayburt, B., & Eğin, F. (2021). Teknoloji ve sanayideki gelişmelerin yansıması olarak Eğitim 4.0. *Bilgi Ekonomisi ve Yönetimi Dergisi*, 16(2), 137–154. <https://doi.org/10.54860/beyder.1010372>
- Büyüköztürk, Ş., Çakmak, K. E., Akgün, E. Ö., Karadeniz, Ş., & Demirel, F. (2014). *Bilimsel araştırma yöntemleri*. Pegem Akademi.
- Christensen, L. B., Johnson, R. B., & Turner, L. A. (2015). Araştırma yöntemleri: Desen ve analiz (A. Aypay, Trans.). Anı Yayıncılık.
- Coşkun, F., & Gülleroğlu, D. H. (2021). Yapay zekânın tarih içindeki gelişimi ve eğitimde kullanılması. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, 54(3), 947–966. <https://doi.org/10.30964/auebfd.916220>
- Çam, B. M., Çelik, N., Güntepe, T. E., & Durukan, G. Ü. (2021). Öğretmen adaylarının yapay zekâ teknolojileri ile ilgili farkındalıklarının belirlenmesi. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 18(48), 263–285.
- Develi, H. (2017, November 2). Endüstri 4.0'dan Toplum 5.0'a. *Dünya Gazetesi*. <https://www.dunya.com/koseyazisi/endustri-40dan-toplum-50a/389146>
- Dülger, M. V. (2018). Günümüz yapay zekâ teknolojisi ve “robot yargıç/avukat” gerçeği: Mesleğimiz elimizden gidiyor mu? *Hukuk ve Daha Fazlası Dergisi*, 6, 4.
- Er, H., Turan, S., & Kaymakçı, S. (2021). Toplum 5.0 sürecinin gelişimi ve eğitime etkisinin değerlendirilmesi. *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 14(39), 38.
- European Parliament. (2016). Industry 4.0. Directorate General for Internal Policies, Policy Department A: Economic and Scientific Policy. [https://www.europarl.europa.eu/RegData/etudes/STUD/2016/570007/IPOL_TU\(2016\)570007_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2016/570007/IPOL_TU(2016)570007_EN.pdf)
- Flick, U. (2013). Mapping the field. In U. Flick (Ed.), *The SAGE handbook of qualitative data analysis* (pp. 3–18). Sage.
- Fırat, O. Z., & Fırat, S. Ü. (2017). Endüstri 4.0 yolculuğunda trendler ve robotlar. *İstanbul Üniversitesi İşletme Fakültesi Dergisi*, 46(2), 213–219.
- Fukuyama, M. (2018). Society 5.0: Aiming for a new human-centered society. *Japan Spotlight*, 27, 47–50.
- Guba, E. G., & Lincoln, Y. S. (1982). Epistemological and methodological bases of naturalistic inquiry. *Educational Communication and Technology Journal*, 30(4), 233–252.
- Hermann, M., Pentek, T., & Otto, B. (2015). Design principles for Industrie 4.0 scenarios: A literature review (Working Paper No. 01/2015). Technische Universität Dortmund.
- Holstein, J. A., & Gubrium, J. F. (1997). Active interviewing. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (pp. 113–129). Sage.
- İşler, B., & Kılıç, Y. M. (2021). Eğitimde yapay zekâ kullanımı ve gelişimi. *e-Journal of New Media*, 5(1), 1–11.
- Janicke, M., & Jacob, K. (2009). A third industrial revolution? Solutions to the crisis of resource-intensive growth. Freie Universität.
- Karaca, B., & Telli, G. (2019). Yapay zekânın çeşitli süreçlerdeki rolü ve tahminleme fonksiyonu. In G. Telli (Ed.), *Yapay zekâ ve gelecek* (pp. 172–185). Doğu Kitapevi.

- Kaya, M. (2021). Sanayi 4.0'da yapay zekâ ve Türkiye. *İİBF Uluslararası İktisadi ve İdari Bilimler Dergisi*, 5(2), 71–72.
- Keidanren. (2016). Toward realization of the new economy and society: Reform of the economy and society by the deepening of “Society 5.0”. http://www.keidanren.or.jp/en/policy/2016/029_outline.pdf
- Kocabıyık, O. O. (2015). Olgubilim ve gömülü kuram: Bazı özellikler açısından karşılaştırma. *Trakya Üniversitesi Eğitim Fakültesi Dergisi*, 6(1), 55–66.
- Krefting, L. (1991). Rigor in qualitative research: The assessment of trustworthiness. *The American Journal of Occupational Therapy*, 45(3), 214–222.
- Köroğlu, Y. (2017). *Yapay zekânın teorik ve pratik sınırları*. Boğaziçi Üniversitesi Yayınevi.
- Marshall, C., & Rossman, G. B. (2014). *Designing qualitative research*. Sage.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.
- Millî Eğitim Bakanlığı. (2012). Halkla ilişkiler ve organizasyon hizmetleri alanı: Biçimine göre sorular. http://www.megep.meb.gov.tr/mte_program_modul/moduller_pdf/Bi%C3%A7imine%20G%C3%B6re%20Sorular.pdf (Retrieved April 13, 2022)
- Morse, J. M. (2000). Determining sample size. *Qualitative Health Research*, 10, 3–5. <https://doi.org/10.1177/104973200129118183>
- Murphy, F. R. (2019). Artificial intelligence applications to support K–12 teachers and teaching: A review of promising applications, challenges, and risks. RAND. <https://www.rand.org/pubs/perspectives/PE315.html> (Retrieved April 6, 2022)
- Mutluol, F. (2018). Toplum 5.0: İnsan merkezli değer toplumu. <http://www.idemahaber.com/toplum-5-0-insan-merkezli-deger> (Retrieved April 5, 2022, at 21:40)
- Nabiyev, V., & Erümit, A. K. (2020). Yapay zekânın temelleri. In V. Nabiyev & A. K. Erümit (Eds.), *Eğitimde yapay zekâ: Kuramdan uygulamaya* (pp. 2–37). Pegem Akademi Yayınları.
- Önday, Ö. (2019). Japan's society 5.0—Going beyond industry 4.0. *Business and Economics Journal*, 10(2), 1–6.
- Öztemel, E. (2018a). Endüstri 4.0 ve yapay zekâ. *Bilim ve Teknik*, 51(607), 78–85.
- Öztemel, E. (2018b). Eğitimde yeni yönelimlerin değerlendirilmesi ve Eğitim 4.0. *Üniversite Araştırmaları Dergisi*, 1(1), 25–30.
- Öztürk, F., & Ateş, E. (2021). İnsanlık yararına teknolojik dönüşüm: Toplum 5.0. *Bilim ve Teknik Dergisi*, Mart 2021, 35–37.
- Öztürk, M. (Ed.). (2013). *Dijital iletişim ve yeni medyan*. Açıköğretim Fakültesi Yayını.
- Schwab, K. (2016). *The fourth industrial revolution*. World Economic Forum.
- Sheikh, S. (2020). *Understanding the role of artificial intelligence and its future social impact*. IGI Global.
- Skobelev, P. O., & Borovik, S. Y. (2017). On the way from industry 4.0 to industry 5.0: From digital manufacturing to digital society. *International Scientific Journal*, 2(6), 307–311.
- Starks, H., & Trinidad, S. B. (2007). Choose your method: A comparison of phenomenology, discourse analysis, and grounded theory. *Qualitative Health Research*, 17(10), 1372–1380.
- Strauss, A., & Corbin, J. (2014). *Basics of qualitative research techniques*. Sage.
- Türnüklü, A. (2000). Eğitimbilim araştırmalarında etkin olarak kullanılabilecek nitel bir araştırma tekniği: Görüşme. *Kuram ve Uygulamada Eğitim Yönetimi Dergisi*, 6(4), 543–559.
- Wikipedia. (n.d.). Yapay zekâ. In *Wikipedia*. Retrieved March 30, 2022, at 12:50, from https://tr.wikipedia.org/wiki/Yapay_zek%C3%A2
- Yıldırım, A., & Şimşek, H. (2005). *Sosyal bilimlerde nitel araştırma yöntemleri* (5th ed.). Seçkin Yayıncılık.
- Yıldırım, A., & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri* (9th ed.). Seçkin Yayıncılık.