

Research Article

What do students think about artificial intelligence applications? (What was artificial intelligence really?),¹

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ABSTRACT

This study aims to explore the 4th grade primary school students' perceptions regarding the concept of artificial intelligence (AI), how they define this technology, and their views on its use. A semi-structured interview form was administered to the students and were analyzed using thematic analysis. The study group consisting of 20 fourth-grade public school students, was selected through convenience sampling as a purposive sampling technique. The interview form aimed to capture an in-depth understanding of students' knowledge levels, experiences, and perceptions related to AI. The findings revealed that participants primarily learned about AI through mass media, their families, and educational institutions. Most students reported actively using AI applications and primarily engaging with this technology for educational, entertainment, and personal development purposes. However, some participants raised concerns about the excessive and improper use of AI. Students expressed varying views on the future impact of AI; some emphasized its benefits, while others underscored its risks. Primary school students appeared to have a limited perspective on AI. Therefore, integrating concrete examples and hands-on learning is recommended.

KEYWORDS

Artificial intelligence, school student perceptions, AI awareness.

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INTRODUCTION

The advent of big data, cloud computing, artificial neural networks, and machine learning has facilitated the creation of machines capable of simulating human intelligence (Zhai et al., 2021). Advances in computer and information communication technologies, increased data processing capabilities, the complexity of algorithms, and strengthened hardware infrastructure have played a critical role in the emergence of the concept of AI (Chen, Chen & Lin, 2020). AI was initially defined as “the science and engineering of making intelligent machines, especially intelligent computer programs” (McCarthy, 2006). However, the multidimensional nature and complexity of artificial intelligence have made it difficult to define the concept precisely (Brachman, 2006; Fetzer, 1990; Nilsson, 2009).

AI has the capacity to perform tasks that typically require human intelligence, such as thinking and acting (Kewalramani, Kidman & Palaiologou, 2021). Fetzer (1990) defines AI as a product of human creativity, while Coppin (2004) describes it as the ability of machines to adapt to new situations, solve problems, and perform various functions that often resemble human intelligence. In this context, AI is a technological innovation and a paradigm that fundamentally transforms social and economic processes.

In recent years, the applications of AI in fields such as healthcare, art, engineering, and education have showcased the multifaceted impacts of this technology (Panu, 2015; Yim, 2024; Yue, Jong & Dai, 2022). AI-supported smart devices and digital solutions are not only improving user experiences but also optimizing business processes and becoming an indispensable part of daily life (Zhai et al., 2021). In this context, AI stands out as an integral part of the Fourth Industrial Revolution and a technology with the potential to revolutionize education.

The use of AI in education contributes to the adoption of innovative approaches in teaching processes and enriches learning experiences (Huang, Saleh & Liu, 2021). AI enhances equity in education by providing personalized learning experiences, increasing teacher efficiency, and supporting lifelong learning (Ouabou & Idrissi, 2024). By improving the performance or effectiveness of educational environments, AI offers significant opportunities to develop students’ creativity, collaboration, and inquiry skills. Moreover, it encourages children to understand technology and become future AI designers and ethical leaders (Pedro et al., 2019; Kewalramani, Kidman & Palaiologou, 2021). In this direction, understanding the opportunities that AI

offers in education is crucial for transforming individual learning processes and supporting social progress. In particular, integrating AI into school curricula is thought to pave the way for future generations to engage with this technology in a more conscious and effective way.

The integration of AI into education is not just a technological tool but a transformation that changes students’ thinking patterns and deepens learning processes (Yang, 2022). These developments are causing students to encounter AI more frequently and to form their opinions about the concept from an early age. Therefore, examining the perceptions, attitudes, and thoughts of elementary school students regarding AI applications is of great importance in understanding how this age group comprehends and approaches this technology. The number of published studies on this topic has increased with the growing use of AI technology in education (Chen et al., 2020). However, it is noteworthy that most of these studies are review-based. The lack of research examining student opinions on the subject is seen as a gap in developing the necessary strategies to raise informed and responsible digital citizens.

Children’s early exposure to the digital world can shape their expectations and attitudes toward technology. However, complex and abstract concepts, such as AI, can lead to uncertainties in how children perceive this technology. Investigating elementary school students’ views on AI applications is important for understanding how they perceive the technology, their feelings and thoughts about it, and determining the impact of AI on them. The positive, negative, or neutral evaluations of AI by students in this age group may shape their attitudes toward future technology and their relationships with the digital world. In this context, analyzing students’ perceptions of AI applications, their thoughts on the use of these applications in daily life, and their positive or negative views about AI will contribute to the development of strategies for integrating technology into education. Additionally, such research is considered an important step in helping students develop awareness of technology from an early age while also raising awareness among educators and aiding in the preparation of educational content. In this regard, the primary aim of this study is to explore in-depth the thoughts of elementary school students about AI applications.

METHOD

Research Method

This research was designed using a basic qualitative research design, one of the qualitative research methods.



Basic qualitative research is a type of study that aims to understand the meaning of a phenomenon or situation deeply and is based on qualitative data collection and analysis methods. These types of studies focus on understanding individuals' experiences, perceptions, and life stories. Qualitative research is typically used to explore and generate meaning rather than test hypotheses (Merriam, 2009; Maxwell, 2013). Basic qualitative research aims to understand a phenomenon or situation from the participants' perspective.

Study Group

The study group was determined using the convenient sampling method, one of the purposeful sampling techniques. Convenient sampling is defined as a method that includes individuals who are easily accessible to the researcher, typically those in the immediate environment (Yıldırım & Şimşek, 2021). According to this, the study group consisted of 20 students (10 girls/10 boys) attending the 4th-grade level at public schools affiliated with the Ministry of National Education in the 2024-2025 academic year.

Data Collection Tool and Data Collection

Before developing the data collection tool, draft questions were created to identify students' opinions on AI applications, and semi-structured interview questions were prepared. The drafted data collection tool was directed to faculty members working in the departments of Measurement and Evaluation, Classroom Teaching, and Computer and Instructional Technologies Education to obtain expert opinions. In the next phase, based on the feedback from the experts, the semi-structured interview form was finalized and directed to the participants. The semi-structured interview form included the following questions: "Have you heard of the concept of artificial intelligence before? Where or from where have you heard it? Can you explain what artificial intelligence is? Have you ever used AI applications? If you have, for what purpose did you use them? Do you think using artificial intelligence is a good thing? Are there any bad aspects of using artificial intelligence? If so, what could they be? Do you think artificial intelligence will affect our future? If so, how? Does this situation scare you?" In a quiet classroom environment, students were asked to answer the questions in the semi-structured interview form.

Data Analysis

The participants' responses collected via the semi-structured interview form were coded S1, S2, S20 and transcribed. The collected data were analyzed using

the content analysis. As a result of the content analysis, themes, codes, and categories were created.

Validity and Reliability

The credibility of this research (internal validity) was supported by a review of the literature and the confirmation of participant statements. Transferability (external validity) was ensured by detailed reporting of the process and including direct quotes from the findings. Consistency (internal reliability) was ensured by checking the relationships between themes, codes, and categories, and results ranging from 86-94% were obtained by applying Miles and Huberman's (2015) reliability formula. Confirmability (external reliability) was secured by storing data and codes, making them accessible to readers.

FINDINGS

This study, which aims to examine elementary school students' opinions on AI applications, identified four themes, as outlined below:

1. Perception of Artificial Intelligence
2. Experience with Artificial Intelligence
3. Impact of Artificial Intelligence
4. Artificial Intelligence in the Future

Perception of Artificial Intelligence

Based on the responses given by the participants to the questions, "Have you heard of the concept of artificial intelligence before? Where or from where have you heard it? Can you explain what artificial intelligence is?," the theme of "Perception of Artificial Intelligence" was formed. The categories and codes created within the framework of this theme are presented in Table 1 below.

When Table 1 is examined, it is evident that all participants have heard of the concept of "artificial intelligence." The participants' responses indicated varying levels of awareness about the concept of AI. The fact that all participants mentioned having heard of AI shows that it is a widely recognized topic in today's society. However, the way this concept is perceived varies according to personal experiences and sources of information.

Most participants indicated they learned about AI through mass media such as computers, phones, and television, while others mentioned hearing about it from their social circles, families, and educational institutions. For example, the participant coded S2 learned about AI from "Teknofest" events, S6 learned about it from



Table 1: Perception of Artificial Intelligence Theme Based on Participant Opinions

Theme: Perception of Artificial Intelligence		
Categories	Codes	Participants
Perception	Yes	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S20
	Mass media	S1, S5, S6, S7, S8, S9, S10, S11, S15, S16, S17, S18, S20
Source	Social environment	S6, S13, S15, S17
	Family	S3, S4, S16, S19
	Educational institution	S2, S12
	Advanced intelligence	S1, S2, S9, S12
Definition	A tool	S3, S4,
	An information-providing device	S7, S14, S16
	Robot	S1, S15, S18
	Assistant	S6, S17
	I can't explain	S5, S8, S10, S11, S19, S20

television and friends, and another S2-coded participant learned about it from school and AI courses.

The participants were asked to explain what they understood by the concept of AI. In this context, the response from the participant coded S1, "A very advanced robot or something with tools," suggests that they perceive AI more as a physical entity or robot. Similarly, the participant coded S14 defined it as "something that answers our questions," while the participant coded S15 described it as "something that helps people by making their work easier. A robot voiced by a device found in technological tools." S14's response indicates that they view AI as an interactive technology, while S15's statement describes it as a technological tool that assists with labor. These responses demonstrate that AI is generally considered a functional assistant and is often associated with tangible entities such as robots or voice assistants. Finally, the response from the participant coded S18, "An application like Google. It tells you anything you ask. It's like it talks to you." shows that they perceive AI as an informational and interactive application.

Artificial Intelligence Experience

The theme of "Artificial Intelligence Experience" was created through the analysis of participants' responses to the questions "Have you ever used artificial intelligence applications?" and "If you have used it, for what purpose did you use it?". The categories and codes developed within this theme are presented in Table 2.

Table 2. Artificial Intelligence Experience Theme Based on Participant Opinions

Theme: Artificial Intelligence Experience		
Categories	Codes	Participants
Codes	Yes	S1, S2, S3, S4, S6, S7, S8, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19, S20
	No	S5, S9
	Education	S3, S14, S15, S17, S18, S19
Purpose	Entertainment	S2, S10, S12
	Personal Development	S6, S8, S11, S16, S17, S20
	Daily Life	S1

When Table 2 is examined, it is observed that a large majority of the participants stated that they actively use AI applications, indicating that AI has become an integral part of everyday life in today's world. Participants reported using AI applications for various purposes, such as education, entertainment and personal development. For example, the participant coded S1 mentioned using AI applications for home cleaning, S3 reported using them for studying and reviewing topics, while participants S8, S11, and S17 stated they use AI applications for asking questions. Additionally, participants S11 and S14 mentioned using AI for assistance with homework. Although it is evident that most participants use AI applications during the interviews, it was also observed that some participants confused AI applications with other internet-based technologies.

Artificial Intelligence Impact

Participants were asked the questions, "Do you think using AI is a good thing?," "Are there any negative aspects of using AI?," and "If so, what could they be?" Based on the analysis of their responses, the theme of "Artificial Intelligence Impact" was created. The categories and codes derived from this theme are presented in Table 3.

When Table 3 is examined, it is seen that half of the participants expressed AI as a positive thing. For example, the participant coded S7 stated, "Yes, because



Table 3. Artificial Intelligence Impact Theme Based on Participant Opinions

Theme: Artificial Intelligence Impact		
Categories	Codes	Participants
Is it a good thing?	Yes	S4, S5, S6, S7, S9, S10, S12, S17, S18, S20
	No	S13
	Both good and bad	S1, S2, S3, S8, S11, S14, S15, S16
Its negative side?	Exists	S1, S2, S3, S6, S10, S11, S13, S14, S15, S16, S17, S18, S20
	Does not exist	S4, S5, S7, S8, S9
Why is it bad?	Health	S2, S3
	Content	S14, S16, S17
	Misuse	S10, S11, S16, S18
	Addiction	S15, S20

it provides us with useful information," and the participant coded S12 said, "I think it's good because it entertains and also develops us," thus explaining their views on artificial intelligence. However, it is observed that only the participant coded S12 did not describe AI as a positive thing, stating, "I think if it's used too much, it wouldn't be good. It's a bad thing." It was also determined that some participants described AI as both good and bad. For example, the participant coded S2 explained, "In my opinion, it's somewhat good, but if used 24/7, it can negatively affect our health," thus expressing both the positive and negative sides of artificial intelligence.

In the "Artificial Intelligence Impact" theme, participants were asked whether there were any negative aspects of artificial intelligence. Most of the participants stated that AI does have some negative aspects, while some claimed there were no negative aspects at all. Those who believed AI has negative aspects were asked to explain why. According to the responses, the negative aspects of AI were linked to concerns such as health issues, inappropriate content, misuse, and addiction. For example, participants S2 and S3 stated, "It can damage our eyes." Participant S14 mentioned, "Sometimes it shows bad videos," S16 said, "It can provide incorrect information and can download harmful apps," and S17 pointed out, "It deceives people, and there are bad, offensive contents." Participant S15 emphasized, "It should be used in a way that does not cause addiction," indicating that caution should be taken in AI usage due to the potential for addiction.

Future of Artificial Intelligence

Participants were also asked, "Do you think artificial intelligence will affect our future?," "If so, how?," and "Does this scare you?" Based on the analysis of

the responses, the "Future of Artificial Intelligence" theme was identified. The categories and codes derived from this theme are presented in Table 4 below.

Table 4. Future of Artificial Intelligence Theme Based on Participant Opinions

Theme: Future of Artificial Intelligence		
Categories	Codes	Participants
Impact	Yes	S1, S2, S3, S4 S5, S6, S7, S8, S9, S10, S11, S12, S15, S16, S17, S19, S20
	No	S18
How it affects	Positive	S7, S10, S12
	Negative	S1, S2, S3, S4, S9, S11, S15, S16, S17, S20
Concern	Yes	S1, S2, S3, S4, S10, S11, S15, S16, S17
	No	S5, S6, S7, S8, S9, S12, S14, S20

When Table 4 is examined, it is seen that the vast majority of participants believe AI will impact the future. Only one participant stated that AI will have no effect. This suggests that the future impact of AI is generally accepted, although there are a few individuals with different opinions. Three participants believe AI will have beneficial outcomes in the future, indicating the presence of individuals who think AI will offer advantages as technology advances. Half of the participants expressed concerns that AI could lead to negative consequences. The higher number of negative views indicates that concerns about AI are widespread.



While some participants expressed anxiety about artificial intelligence, others mentioned that they did not feel any fear regarding it. According to the responses, it appears that AI could have various effects on human life in the future. First, some participants believe AI could pose risks in terms of physical security. There are views suggesting that AI could lead to technological dependence and changes in human behavior, both individually and socially. The statement by participant S2, "We would become very lazy. We would always be involved with AI," suggests that people's interest in AI could turn into an addiction over time, negatively affecting their productivity. Similarly, S15 and S16 stated that focusing solely on AI could weaken people's connection to real life and make them dependent on technology. This situation could lead to a decline in social relationships and a weakening of connections with the real world.

Additionally, the impact of AI on the workforce and economic systems emerges as another significant concern. S10 expressed a worry about job loss and the replacement of human labor by technological systems, stating that robots could do all the work. S11's statement, "Everything in the world will be in the hands of technological devices," and S20's comment, "Everything will be technological," suggest that with the spread of AI and digital systems, traditional systems could be entirely replaced by technology. This could result in a decrease in human control, a shift toward a life fully dependent on technological systems, and significant changes in societal structures.

CONCLUSION AND DISCUSSION

This study aimed to explore the perspectives of fourth-grade elementary school students regarding applications of AI. The findings obtained in this context are presented below.

All participating fourth-grade students reported prior familiarity with the concept of AI. Most participants reported learning about AI primarily through mass media—such as television and the internet while others encountered it via their social circles, families, or schools. This finding suggests that mass media and social environments significantly shape children's perceptions of technology. The fact that students usually obtain information about AI from sources like television, the internet, and family highlights the need for educational institutions to take a more active role in this regard.

The study findings reveal that some participants had difficulty defining artificial intelligence, while others described it as an advanced mind, a robot, an information-

providing tool, or an assistive technology. A study conducted with elementary school students mentioned that students could apply AI in different contexts and relate it to machines such as robots, computers, phones, and autonomous vehicles (Walan, 2024).

The findings suggest that participants have a basic level of understanding of the concept of artificial intelligence; however, their understanding of its broader and more profound dimensions is limited. Overall, this indicates that the majority of participants have limited knowledge of AI. Considering that elementary school-aged students are in the process of understanding abstract concepts, it is believed that the findings support this developmental process. The participants tend to perceive AI primarily as a technology that interacts with users provides information or facilitates business processes. However, they exhibit a lack of understanding regarding the broader potential and complexity of artificial intelligence. This suggests that AI is often seen as a tool limited to specific functions and that there is a need to increase education and awareness in this area.

As noted by Yang (2022), the "AI for Kids" curriculum developed by a research team in Hong Kong emphasizes the role of AI-powered technologies in daily life and encourages children to learn about AI through a hands-on, project-based approach. Similarly, Lee and Kim (2022) designed a classroom program aimed at enhancing elementary school students' AI literacy and self-expression skills. In their research, a model was proposed that aligns with the needs of the AI era, recommending an educational approach for primary school students in grades 3, 4, and 5. This model helps students express themselves and address career issues by integrating culture and art with AI programs.

The core feature of this program is to allow 3rd, 4th, and 5th-grade students to express themselves by integrating culture and art with AI technologies. It also aims to enable students to express their thoughts on careers and future concerns through AI-supported applications. This study presents an interdisciplinary approach by considering AI literacy not just as a technical skill but as an educational tool supporting artistic and individual expression.

It was found that most participants reported using AI applications. They stated that they used these applications for education, entertainment, and personal development purposes. These usage patterns show that AI is widely used in practical areas, such as supporting information gathering, learning processes, and facilitating daily tasks. In a study examining the views of 2nd and 3rd-grade students on using AI applications in

graphic arts classes, most students reported using them regularly. They indicated that the use of AI in the design process inspired them, although they mentioned that they could not use AI applications in other subjects and areas (Yağcı, 2024).

In the study by Su and Yang (2022), it was stated that AI could have a positive impact on the learning of young children. However, based on the conducted interviews, it was observed that some participants confused AI applications with other internet-based technologies. This suggests that the participants were unable to fully distinguish between AI and internet technologies and that there is a need for more awareness and information regarding the applications of AI. Such confusion indicates the necessity of further education and awareness-raising efforts to fully leverage the potential of AI. However, there are studies that suggest AI is used as a tool that accelerates development and significantly reduces workloads (Yağcı, 2024). Some participants described AI in general as "good," while others acknowledged both positive and negative aspects of AI. Those who viewed AI positively tend to see it as a functional and supportive tool in daily life. On the other hand, participants who viewed AI negatively highlighted risks such as health issues, content security, misuse, and addiction. In a study examining the views of graphic arts students on using AI applications in class, the liked and disliked features of AI applications were explored. Most students positively evaluated the opportunity for practical work provided by AI while also mentioning that it could stifle creativity and lead to laziness as negative aspects (Yağcı, 2024).

These findings show that participants view AI as a multifaceted technology and are aware of the potential negative effects of its overuse. Overall, participants' opinions on AI encompass both positive and negative perspectives. While the benefits of AI, such as information provision, entertainment, and personal development support, are highlighted, concerns about overuse, health problems, and harmful content are also mentioned as sources of anxiety. These evaluations indicate that participants recognize the potential of AI but emphasize the importance of careful use and a mindful approach. Indeed, in a study conducted by Walan (2024), it was found that about 16% of 60 students were uncertain about the positive aspects of AI. However, other participants positively assessed AI's ability to assist with text writing, its accessibility, its benefits in dangerous situations, and its potential to facilitate learning.

The vast majority of participants believed that AI would significantly impact the future. This finding suggests that the effects of AI on technology and society are

generally acknowledged by the participants. However, one participant's lack of concern about AI's future impact suggests that some individuals may approach the issue with indifference or optimism. Participants who believe that AI will yield beneficial results in the future accept that this technology may offer various advantages in the coming years. However, the fact that half of the participants express concern about the potential negative effects of AI indicates a general anxiety about the risks associated with the widespread adoption of this technology. Notably, concerns were widely expressed about AI potentially having negative impacts on individuals' lifestyles and social relationships. Additionally, some participants voiced concerns that robots could replace human workers. This perception reveals deep concerns about job loss and the replacement of human labor by technological systems. Similar risks were also addressed in a study by Walan (2024), where participants mentioned possible threats such as AI misuse, the potential to make people lazy, and the likelihood of errors. These evaluations underscore that while AI offers opportunities, it also presents various risks that need to be carefully managed.

RECOMMENDATIONS

The observation that most participants define AI narrowly and lack broader understanding suggests challenges in grasping abstract concepts. Therefore, developing instructional methods that present abstract technological concepts through tangible examples and real-life connections would benefit primary school students:

- It is recommended that primary school 4th-grade students be provided with a more practical and comprehensive understanding of artificial intelligence, including what it is, how it works, and examples of existing applications. This should include real-life applications and examples of AI use.
- While most participants use AI applications for educational, entertainment, and personal development, some expressed concerns about overuse and misuse.
- Guidance and training on how to use AI applications efficiently, healthily, and in a balanced way should be provided to students.
- It has been observed that participants are concerned about the negative effects of AI, such as health issues, misuse, addiction, and harmful content. To address these concerns, awareness



campaigns should be conducted regarding how to minimize the negative effects of AI technology and its proper usage.

- Students should be guided in using AI responsibly and productively, while awareness efforts should target both learners and their families regarding potential risks. Introducing "AI Literacy" courses into primary and middle school curricula similar to existing "Media Literacy" programs is recommended. I
- Many participants hold both optimistic and concerned views about the future impact of artificial intelligence, while some emphasize the benefits of AI more. It is recommended that the concept of AI be integrated more into various subjects within the primary school curriculum, along with information on the future development of AI and potential career opportunities.

Additionally, it is suggested that various experimental studies be conducted to understand the effects and use of AI applications better. Such studies could yield concrete insights into the impact of AI on education, personal development, and broader aspects of life.

Ethics Committee Approval: The study received ethical approval from the Niğde Ömer Halisdemir University Ethics Committee with decision number 2024/20-46 dated 03.12.2024.

Plagiarism/Ethics: This article has been reviewed by at least two referees and has been confirmed to comply with research and publication ethics, containing no plagiarism.

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