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## Primary School Students' Views on Artificial Intelligence

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### Abstract

The aim of this study is to examine primary school students' views on artificial intelligence. Phenomenology design, one of the qualitative research methods, was used in the study. The study was conducted with 25 fourth grade students. The participants of the study were determined using the criterion sampling method, one of the purposeful sampling methods. The data were collected using a structured interview form and content analysis technique was applied to analyze the data. The results of the study showed that primary school students generally associate AI with technology, science, education, art and daily life. Students define artificial intelligence as human-designed robots and tools that provide information and help in every field. Stating that artificial intelligence has both positive and negative effects, the students emphasized knowledge acquisition and increasing creativity among the positive effects, while they expressed health problems, ethical and privacy concerns among the negative effects. They also stated that the use of AI in the classroom supports learning and development but can create reliability and ethical issues. It is recommended to conduct studies evaluating the long-term effects of artificial intelligence and to better understand the perceptions of artificial intelligence of students in different age groups.

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### Introduction

Artificial intelligence is a field of science and engineering that aims to mimic and extend human intelligence. Artificial intelligence has proven its usefulness in a wide range of fields such as education, health, transportation, law, engineering and has become a driving force for reforms in these fields. Because AI knowledge and skills offer possibilities that can help us better understand and manage our future work and life. These knowledge and skills can provide a strategic advantage to solve complex problems, increase efficiency and productivity, and keep abreast of developments in different fields that we may encounter in school life, business and our daily lives. It is therefore critical to equip societies with basic AI knowledge and application capabilities (Zhao, 2022).

Current and future generations are increasingly likely to face an AI-powered future (Chai et al., 2021). In this context, the importance of younger students having knowledge of AI has been emphasized (Knox, 2020). Although scientific interest in the field of artificial intelligence in education has been increasing in recent years, it has been observed that very little research has been conducted on artificial intelligence in the context of primary school students (Martínez-Comesaña et al., 2023; Walan, 2024; Zawacki-Richter et al., 2019). It is thought that each study in this field will be an important step in contributing to the accumulation of knowledge in the relevant

literature, informing the public about current technologies and evaluating the potential benefits and risks of these technologies.

Artificial intelligence, which is gaining importance day by day, is artificial systems that aim to imitate human cognitive functions, perception and decision-making processes in the best way (Alanoglu & Karabatak, 2020). Artificial intelligence is a branch of science that continues its development while studying human intelligence and brain functioning (Cetin & Aktas, 2021). Artificial intelligence, introduced by the British computer scientist Alan Mathison Turing, has achieved tremendous success in its journey of more than 70 years, starting in the 1950s (Savas, 2021). Today, artificial intelligence is used in various tasks such as visual and voice recognition, decision making, processing and translation between natural languages, interacting, detecting some medical potential diseases, and making judgments by analyzing the dataset (Hwang et al., 2020).

At the same time, AI allows people to think more deeply and creatively, helping them to better understand the unique capabilities of human beings, which can improve society's quality of life. In the near future, artificial intelligence is expected to penetrate almost every aspect of life. On the other hand, it is important to consider the opportunities offered by artificial intelligence as well as the risks it brings with it. Artificial intelligence technology, which offers many opportunities to humanity such as individualized learning, prevention of resource-time wastage, fast access to information, support for individuals with special needs, smart management and planning, also poses potential risks such as privacy and security, harmful content, location detection (Sacan et al., 2022). In Frey and Osborne's (2017) study, 47% of American workers said they would be at risk of losing their jobs in the coming years due to computerization, including artificial intelligence and robotics. Similarly, it can be said that the economic, security and privacy risks of artificial intelligence cause people to develop negative attitudes towards artificial intelligence.

In recent years, artificial intelligence has started to be used for various purposes in the field of education as in other fields. For example, smart robots can answer student questions, reduce the burden on teachers in terms of lesson planning and content preparation, and support disadvantaged students who need constant repetition (Nalbant, 2021). As can be seen from these examples, the use of artificial intelligence technology has gone beyond computer science. Therefore, developing policies related to artificial intelligence in the field of education is critical to increase the effectiveness of education systems in the rapidly changing and digitalizing world of our age and to ensure that future generations are competitively equipped. Appropriate policy frameworks need to be established for the effective use of these technologies in education. It is important that policy regulators recognize the potential of AI technologies in education and provide regulations, standards and resources that support them. Within the framework of the "National Strategic Plan for Artificial Intelligence Research and Development" published in 2016 in the USA, it was stated that the necessary policy and financial support will be provided for artificial intelligence in education (Seng & Choo, 2008). India launched the "National Strategy for Artificial Intelligence" in 2018, which lists the implementation of AI technology as one of five key areas (Yufeia et al., 2020). In China, the government attaches great importance to the integration and development of AI and education, paying large sums of money and strongly promoting knowledge-based education (Yan, 2019). The "2021-2025 National Artificial Intelligence Strategy" report published by the Presidency of the Republic of

Turkey analyzed Turkey's current situation in the field of artificial intelligence and comprehensively identified strategic goals and priorities (Turkey National Artificial Intelligence Strategy 2021-2025, 2021). In line with this report, similar initiatives related to artificial intelligence in education in Turkey should be implemented by both the state and the private sector. In this way, innovative and sustainable solutions can be developed that will have a positive impact on the Turkish education system and industry.

The use of artificial intelligence for primary school students is a new and important development in the field of education. The integration of this technology can offer significant opportunities to improve and individualize students' learning processes. Existing AI curricula are generally designed for middle school and higher grades, and there is a lack of appropriate content for elementary school-aged students, and therefore it is important to develop age-appropriate AI literacy curricula (Yang, 2022). The main issues addressed in the process of developing curricula for young children aged 3-8 are stated in the following statements with three basic questions: “why, what, how?” (Bredenkamp, 2020; cited in Yang, 2022):

1. Why is AI education important for young children?
2. What topics are appropriate for AI education in the early years, and can a subset of basic AI ideas and concepts be learned by children?
3. How should young children learn about AI and what pedagogical approaches are appropriate?

The artificial intelligence education curriculum to be prepared within the framework of these basic issues will help primary school students develop their digital literacy by building their basic understanding of artificial intelligence technology from an early age and contribute to their cognitive and emotional development by enabling them to succeed in the digital world of the future. However, ethical and confidentiality issues related to the use of this technology should also be taken into account and educational measures to protect students' safety and privacy should be considered (Alam, 2023). Students' having a positive perspective in AI-based education is critical for the effective use of this technology (Ankiewicz, 2019). First of all, a positive attitude increases students' sensitivity to technological innovations. Advanced tools such as AI can optimize the educational process, but understanding and evaluating these benefits may be out of reach for reluctant or biased learners. In contrast, a positive approach allows students to effectively adopt and use AI technologies. Students with a positive attitude can delve deeper into these tools, use them more efficiently and even discover new areas of application. Finally, taking students' views into account encourages their active participation in the educational process. Student feedback can help to better design AI-supported educational tools and better adapt to student needs. Therefore, addressing student views on artificial intelligence is necessary for the effective use of this technology in education (Walan, 2024).

When the literature is examined, it is seen that Turkey-based and international studies on artificial intelligence in primary school education are quite limited. In the studies based in Turkey, mixed method (Soydemir Bor & Alkis Kucukaydin, 2021; Celik, 2020) and qualitative method (Sacan et al., 2022) were used as research methods. In a study conducted by Sacan et al. (2022), which was similar to the current study and conducted according to the qualitative research method, children aged 6-10 years old compared the concept of artificial intelligence to the concepts of “robot (f: 40), brain (f: 30) and human (f: 17)” in the main theme of “living”, and to the concepts of “information processes (f: 20), machine (f: 6) and miracle (f: 5)” in the main theme of “inanimate”, respectively.

When the studies reached at the international level are examined, it is seen that there are survey studies (Chai, 2021; Lin et al., 2021; Ma et al., 2021) and experimental studies (Ghareeb Ahmed Ali, 2020) conducted with quantitative methods. In addition to these studies, there are literature review studies using qualitative research methods (Levchenko & Merenkova, 2021; Ma et al., 2021; Martínez-Comesaña vd., 2023; Zhao, 2022) and studies aiming to put forward theory (Yang, 2022; Yim, 2023).

When the studies on the use of artificial intelligence at the primary school level are examined, it is noteworthy that the studies dealing with student views are quite limited (Walan, 2024). It is thought that every study to be conducted for this purpose will be an important step in terms of contributing to the accumulation of knowledge in the relevant literature and integrating artificial intelligence technologies into primary school education in a healthy way. Based on this gap in the literature, the main problem of this study was determined as “What are the views of primary school students on the use of artificial intelligence?”. Based on this problem, the following research questions were sought to be answered:

1. How do primary school students perceive artificial intelligence?
2. How do primary school students define artificial intelligence?
3. In which areas can artificial intelligence be used according to the views of primary school students?
4. What are the views of primary school students on the positive and negative effects of artificial intelligence on human life?
5. What are the views of primary school students on how artificial intelligence can help students while studying?

## **Method**

### **Research Model**

This research was designed according to the phenomenology design, which is one of the qualitative research methods. Phenomenology is a research method in which the cause and inherent reality of a known phenomenon are examined in depth and methodologically (Yildirim & Simsek, 2021). Since this study was designed to examine the views of primary school students towards artificial intelligence in depth, phenomenology design was preferred.

### **Study Group**

This research was conducted with 25 primary school students studying in the fourth grade of primary schools in Turhal district of Tokat province. In the literature, it is stated that the sample size can generally vary between 5 and 25 (Neuman, 2014). Criterion sampling method, one of the purposive sampling methods, was used as the sample selection method. The criterion sampling method is a sample selection method that meets the criteria predetermined by the researcher and enables in-depth investigation of rich information situations for the purpose of the study (Buyukozturk et al., 2020). Since this study aims to examine the views of primary school students towards artificial intelligence, the participants were selected based on the criterion that they had previously received training on artificial intelligence technology and had experienced artificial intelligence applications. The gender distribution of the study group determined in line with these criteria is shown in Table 1.

Table 1. Gender Distribution of Participants

| <b>Gender</b> | <b>N</b> | <b>%</b> |
|---------------|----------|----------|
| Female        | 12       | 48       |
| Male          | 13       | 52       |
| Total         | 25       | 100      |

As seen in Table 1, a total of 25 elementary school students, 12 female (48%) and 13 male (52%), participated in the study. Since the identity information of the students participating in the study was kept confidential in accordance with the ethical rules, the participants were coded as S1, S2, S3... to facilitate access to the data during the research process and to ensure reliability in the data analysis phase.

### **Data Collection Tools**

A 6-item structured interview form developed by the researchers to determine the thoughts and perceptions about artificial intelligence, including questions about the meaning of artificial intelligence, its usage areas, its positive and negative effects, its role in lessons, and the help it provides in course work, was used as a data collection tool in the study. Before preparing the structured interview form, the researchers conducted a literature review on the subject area. In this context, some studies in the literature related to the research topic were examined (Chai, 2021; Celik, 2020; Ghareeb Ahmed Ali, 2020; Lin et al., 2021; Ma et al., 2021; Sacan et al., 2022; Soydemir Bor and Alkış Küçükaydın, 2021; Yang, 2022; Yim, 2023). After the structured interview questions prepared for the study were prepared, they were presented to two experts in the field of classroom education. In addition, it was submitted to the evaluation of a Turkish teacher working in a secondary school affiliated to the Ministry of National Education in order to ensure spelling-punctuation control and clarity. A pilot study was conducted by interviewing two primary school students on the interview form.

### **Data Collection Process**

A structured interview form prepared by the researchers was used to collect data from the participants. Interviews were conducted face-to-face in schools at the convenience of the participants. Participants were informed that all measures were taken to ensure that the names of the participants were kept confidential and that the data obtained would only be used for scientific purposes. Participants and their parents were informed about the study and signed a parental consent form and a voluntary participation form. The interviews lasted approximately 60 minutes. Considering that students might be hesitant to express their true thoughts in the presence of the teacher, care was taken to ensure that the teacher was not present in the classroom during the interview.

### **Data Analysis**

The data obtained from the participants through the interview form were transferred to the computer by the researchers and uploaded to the NVivo 10 program, which provides qualitative data analysis. In this study, content analysis technique was used to analyze the data. Content analysis is a research method used to understand the

meaning, structures and characteristics of the content in a text or data set and enables a researcher to systematically examine the data set, classify it according to predetermined coding and themes, and make sense of it (Buyukozturk et al., 2020). The data were examined by the researchers at different times and the common or similar ones were coded accordingly and collected under the same themes. The different codes were re-evaluated by three researchers and included in the appropriate themes after reaching a common opinion. Tables and graphs were created according to the results of the analysis.

### Validity and Reliability

The validity of qualitative studies depends on the researcher explaining the data obtained by the researcher in detail, stating how the results were obtained, and directly quoting the views of the participants (Yildirim & Simsek, 2021). For this reason, the participants were interviewed about the research process and purpose before data collection, the research process was explained in detail, and direct participant opinions were included in the findings section. Reliability in qualitative research is closely related to achieving consistent results in the analysis and coding performed by different researchers (Creswell, 2021). In this context, the research data were analyzed by the researchers at different times and codes and themes were determined by achieving a comparative consensus.

## Results

### Primary School Students' Perceptions of Artificial Intelligence

Within the scope of the first sub-problem of the study, primary school students were asked the questions “What words come to your mind when you think of artificial intelligence / What words does artificial intelligence evoke to you?”. The themes and codes obtained from the analysis of the students' responses are presented in Table 2.

Table 2. Words Associated with Artificial Intelligence

| Theme                  | Code        | Participants                                     | f  |
|------------------------|-------------|--|----|
| Technology and Devices | Robot       | S2, S3, S6, S7, S9, S10, S11, S16, S17, S20, S21 | 11 |
|                        | Phone       | S1, S10, S11, S16, S17, S25                      | 6  |
|                        | Tablet      | S1, S16, S17, S21, S25                           | 5  |
|                        | Computer    | S2, S10, S17, S21                                | 4  |
|                        | Smart Board | S1, S2, S17                                      | 3  |
|                        | ChatGPT     | S16, S17   | 2  |
|                        | Car         | S8, S16  | 2  |
|                        | Software    | S2   | 1  |
|                        | Internet    | S10  | 1  |
|                        | Drone       | S16  | 1  |
|                        | Hearing Aid | S11  | 1  |
|                        | Camera      | S25  | 1  |
|                        | Television  | S17  | 1  |
|                        | Printer     | S1   | 1  |

| <b>Theme</b>             | <b>Code</b>             | <b>Participants</b>             | <b>f</b> |
|--------------------------|-------------------------|---------------------------------|----------|
|                          | Capcut                  | S16                             | 1        |
|                          | Elevenlabs              | S16                             | 1        |
|                          | Total                   |                                 | 42       |
| Science and Intelligence | Mind                    | S2, S4, S5, S6, S7, S10, S15    | 7        |
|                          | Intelligence            | S6, S7, S10, S14, S15, S18, S20 | 7        |
|                          | Science                 | S6, S10, S11, S12, S17, S25     | 6        |
|                          | Brain                   | S2, S4, S9, S25                 | 4        |
|                          | Knowledge               | S3, S5, S10                     | 3        |
|                          | Acquiring Knowledge     | S3, S5, S10                     | 3        |
|                          | Technology              | S10, S17, S25                   | 3        |
|                          | Scientist               | S19, S25                        | 2        |
|                          | Nikola Tesla            | S25                             | 1        |
|                          | Total                   |                                 | 36       |
| Education and Learning   | Practice                | S10, S11, S12                   | 3        |
|                          | Education               | S8, S12                         | 2        |
|                          | Asking Question         | S10, S21                        | 2        |
|                          | Studying                | S1                              | 1        |
|                          | Listening to the Lesson | S1                              | 1        |
|                          | Total                   |                                 | 9        |
| Arts and Entertainment   | Game                    | S3, S7, S17                     | 3        |
|                          | Writing Poetry          | S10, S13, S15                   | 3        |
|                          | Music                   | S1, S16                         | 2        |
|                          | Drawing Picture         | S1, S23                         | 2        |
|                          | Enjoyment               | S3                              | 1        |
|                          | Friendship              | S3                              | 1        |
|                          | Singing                 | S1                              | 1        |
|                          | Writing Book            | S10                             | 1        |
|                          | Chatting                | S3                              | 1        |
|                          | Total                   |                                 | 15       |
| Other                    | Human                   | S2, S4, S5, S6, S9, S21         | 6        |
|                          | Humanitarian            | S2, S5, S24                     | 3        |
|                          | Mathematics             | S8, S24                         | 2        |
|                          | Fast Typing             | S24                             | 1        |
|                          | Superman                | S6                              | 1        |
|                          | Company                 | S2                              | 1        |
|                          | Mental Games            | S8                              | 1        |
|                          | Letter                  | S24                             | 1        |
|                          | Total                   |                                 | 16       |



As seen in Table 2, primary school students associate artificial intelligence with different words. These words were categorized under the themes of “technology and devices (f=42)”, “science and intelligence (f=36)”, “education and learning (f=9)”, “arts and entertainment (f=15)” and “other (f=16)”. When the words that students most frequently associate with artificial intelligence are analyzed, important findings emerge under various themes. For example, in the technology and devices theme, words such as “robot (f=11), phone (f=6), tablet (f=5), computer (f=4), smart board (f=3)” stand out. This shows that AI is often associated with technology and devices. Similarly, in the theme of science and intelligence, words such as “mind (f=7), intelligence (f=7), science (f=6), brain (f=4), knowledge (f=3), acquiring knowledge (f=3), technology (f=3)” draw attention. In this context, AI is often associated with intelligence and scientific processes. In the education and learning theme, the word “practice (f=3)” comes to the fore. This may indicate that students' awareness of how artificial intelligence can be used in education has increased. In the arts and entertainment theme, the prominence of words such as “game (f=3), poetry writing (f=3)” indicates that artificial intelligence may also have an impact in the fields of arts and entertainment. Finally, the presence of words such as “human (f=6), humanitarian (f=3)” under other themes reflects the students' thoughts on the relationship of artificial intelligence with human and society. These findings show that the concept of artificial intelligence is perceived differently among students and evaluated in various contexts.

### Primary School Students' Ways of Defining Artificial Intelligence

Within the scope of the second sub-problem of the research, primary school students were asked the question “What do you think artificial intelligence means?”. The themes and codes obtained from the analysis of the students' responses are presented in Table 3.

Table 3. Artificial Intelligence Identification Approaches

| Theme                                 | Code                            | Participants  | f  |
|---------------------------------------|---------------------------------|---|----|
| Definition of Artificial Intelligence | Human Design Robot              | S2, S3, S5, S10, S12, S18, S22                          | 7  |
|                                       | The Tool that Makes Work Easier | S6, S7, S21, S24  | 4  |
|                                       | Human-Like Robot                | S5, S15, S23  | 3  |
|                                       | Man-Made Intelligence           | S4, S14, S20  | 3  |
|                                       | Total                           |   | 17 |
| Functions of Artificial Intelligence  | Informative Tool                | S2, S3, S5, S8  | 4  |
|                                       | Help in Every Field             | S1, S7, S10, S21  | 4  |
|                                       | Helping Intelligence            | S4, S6, S16   | 3  |
|                                       | Talking App                     | S9  | 1  |
|                                       | Total                           |   | 12 |
| Attributes of Artificial Intelligence | People Skills                   | S1, S5, S13, S18, S22                                   | 5  |
|                                       | High Knowledge                  | S4, S8, S14, S19, S20                                   | 5  |
|                                       | Smart App                       | S9, S15, S22  | 3  |
|                                       | Total                           |   | 13 |
| Impacts of Artificial                 | Time Savers                     | S1, S6, S8, S11, S12, S13, S15, S16, S18, S21, S24, S25 | 12 |
|                                       |                                 |   |    |

| Theme        | Code                                | Participants                         | f  |
|--------------|-------------------------------------|--------------------------------------|----|
| Intelligence | Technologies that Boost Imagination | S5, S8, S10, S14, S19, S20, S22, S25 | 8  |
|              | Technologies Supporting Development | S4, S9, S10, S11, S23, S24           | 6  |
|              | Total                               |                                      | 26 |

As seen in Table 3, primary school students define artificial intelligence in different ways. These definitions were classified under the themes of “definition of artificial intelligence (f=17)”, “functions of artificial intelligence (f=12)”, “attributes of artificial intelligence (f=13)” and “impacts of artificial intelligence (f=26)”. When the students' definitions of artificial intelligence are analyzed, important findings emerge under various themes. For example, in the definition of artificial intelligence theme, students frequently defined artificial intelligence as “human-designed robot (f=7) and a tool that makes work easier (f=4)”. In the theme of the functions of artificial intelligence, definitions such as “informative tool (f=4) and helper in every field (f=4)” come to the fore. In the theme of the attributes of artificial intelligence, “human skills (f=5) and high knowledge (f=5)” were defined. Finally, in the theme of the impacts of artificial intelligence, definitions such as “time savers (f=12), technologies that boost imagination (f=8) and technologies supporting development (f=7)” were made. Students often describe AI as man-made tools and information providers, but also associate this technology with positive effects such as saving time and supporting development. This shows that they have developed a basic understanding of the functions and potential benefits of AI. Some student views on these themes and codes are given below:

*A robot similar to the human brain, designed by someone made by human hands, designed to help people (S2).*

*It is the intelligence formed by people, it does not give a specific answer but it compares. It is the intelligence that enables us to acquire knowledge and increases our imagination (S5).*

*What we do is an intelligence that works by talking to us and drawing pictures and repeating them. It knows everything we do with this intelligence, it is a very smart intelligence. It does not want us to say bad words (S7).*

*I think artificial intelligence enables people to develop, facilitate education, save time, improve our lives and make our lives easier (S11).*

*It is a person-made and intelligent artificial intelligence, it answers all our questions (S21).*

### Areas Where Artificial Intelligence Can Be Used According to Primary School

Within the scope of the third sub-problem of the research, primary school students were asked the question “In which areas and how can artificial intelligence be used?”. The themes and codes obtained from the analysis of the students' responses are presented in Table 4.

Table 4. Artificial Intelligence Use Cases

| Theme                  | Code                     | Participants                       | f |
|------------------------|--------------------------|------------------------------------|---|
| Education and Learning | Answering Questions      | S2, S6, S7, S9, S15, S18, S19, S22 | 8 |
|                        | Information and Research | S3, S5, S7, S10, S17, S18          | 6 |
|                        | Lecturing and Assistance | S3, S5, S6, S12, S14               | 5 |

| Theme                          | Code                                    | Participants                  | f  |
|--------------------------------|---|-------------------------------|----|
|                                | Examination                             | S5, S13                       | 2  |
|                                | Total                                   |                               | 21 |
| Creativity and Art             | Painting                                | S1, S3, S5, S9, S10, S16, S24 | 7  |
|                                | Writing Stories and Poems               | S1, S3, S10, S13, S16, S24    | 6  |
|                                | Total                                   |                               | 13 |
| Daily Work and Life            | Cleaning                                | S2, S4                        | 2  |
|                                | Cooking                                 | S4, S19                       | 2  |
|                                | Doing Business and Making Things Easier | S2, S16                       | 2  |
|                                | Travel                                  | S21                           | 1  |
|                                | Total                                   |                               | 7  |
| Fun and Game                   | Entertainment                           | S3, S7, S17, S25              | 4  |
|                                | Game Play                               | S3, S7                        | 2  |
|                                | Total                                   |                               | 6  |
| Social and Communication       | Chat                                    | S3, S7, S16, S23              | 4  |
|                                | Messaging                               | S23                           | 1  |
|                                | Total                                   |                               | 5  |
| Technology and Applications    | Cell Phones and Devices                 | S11, S20                      | 2  |
|                                | Apps and Filters                        | S11                           | 1  |
|                                | Total                                   |                               | 3  |
| General Use                    | Use in Every Field                      | S4, S14, S18, S20, S22        | 5  |
|                                |   |                               |    |
| Problem Solving and Assistance | Incomprehensible Questions and Problems | S4, S6, S19                   | 3  |

As seen in Table 4, primary school students stated that artificial intelligence can be used in different fields. These views of the students were classified under the themes of “education and learning (f=21)”, “creativity and art (f=13)”, “daily work and life (f=7)”, “fun and games (f=6)”, “social and communication (f=5)”, “technology and applications (f=3)”, “general use (f=5)” and “problem solving and assistance (f=3)”. When the students' thoughts on the usage areas of artificial intelligence are analyzed, important findings are observed in line with various themes. Under the theme of education and learning, the most common views were that AI could be used in “answering questions (f=8), information and research (f=6) and lecturing and assistance (f=5)”. Under the theme of creativity and art, there are opinions that artificial intelligence can be used frequently in the fields of “painting (f=7), writing stories and poems (f=6)”. Under the other themes, there are opinions that artificial intelligence can be used most frequently in the fields of “entertainment (f=4), chat (f=4) and incomprehensible questions and problems (f=4)”. These findings show that AI is seen as a potential tool in both educational and creative processes and can be useful in different areas of daily life. Some student views on these themes and codes are given below:

*For example, let's say you wrote a novel. If you want to draw a picture for it, the artificial intelligence*

will tell you immediately, but if you give it a little hint, it will draw you a picture about your novel. You wrote a text and the artificial intelligence immediately voices it, but sometimes artificial intelligence can say it wrong, so let's be careful (S1).

Information, entertainment, fun, games, conversation, learning. For example, it can be like a teacher in front of you. It is used in poetry, story, painting, etc. Children can use it for entertainment purposes (S3). When we don't understand something in class, he helps us and gives us ideas. It helps us in subjects we don't understand. In other words, we can look a little bit at the subjects we do not understand (S6).

Artificial intelligence can be used in the field of drawing. We ask it for something and it designs the picture. We ask AI to write a story and then we write what we want to happen in that story, etc. (S10).

For example, if we want to go to cities like Istanbul, we write to him and he makes it easier for us to go there (S21).

It is used at home, we can paint, we can talk, it is used outside, we can text with it (23).

### Primary School Students' Views on the Positive and Negative Effects of Artificial Intelligence on Human Life

Within the scope of the fourth sub-problem of the research, primary school students were asked the questions “What are the positive effects of artificial intelligence on human life?” and “What are the negative effects of artificial intelligence on human life?”. The themes and codes obtained from the analysis of the students' responses are presented in Table 5.

Table 5. Positive and Negative Effects of Artificial Intelligence on Human Life

| Theme                         | Code                                 | Participants                   | f  |
|-------------------------------|--------------------------------------|--------------------------------|----|
| Knowledge Acquisition         | Helping in Lessons                   | S2, S3, S10, S18, S21          | 5  |
|                               | Fast Information Acquisition         | S2, S3, S7, S11, S17           | 5  |
|                               | Asking Questions and Getting Answers | S2, S10, S13, S20              | 4  |
|                               | Becoming a Teacher                   | S3, S14                        | 2  |
|                               | Foreign Language Translation         | S2                             | 1  |
|                               | Total                                |                                | 17 |
| Creativity and Art Activities | Poetry and Story Writing             | S1, S6, S13, S14, S20          | 5  |
|                               | Drawing Picture                      | S1, S9, S14, S24               | 4  |
|                               | Voiceover                            | S1, S17                        | 2  |
|                               | Boosting Imagination                 | S5                             | 1  |
| Total                         |                                      | 12                             |    |
| Daily Works                   | Making Things Easier                 | S2, S4, S6, S11, S14, S16, S25 | 7  |
|                               | Entertainment and Games              | S7, S12                        | 2  |
|                               | Saving Time                          | S11                            | 1  |
|                               | Cooking and Cleaning                 | S4                             | 1  |

| Theme  | Code                                | Participants             | f  |
|--|-------------------------------------|--------------------------|----|
|  | Total                               |                          | 11 |
| Personal<br>Development<br>and Support           | Making Happy and Becoming Friends   | S7                       | 1  |
|  | Talent Development                  | S5                       | 1  |
|  | Increasing Attention                | S5                       | 1  |
|  | Total                               |                          | 3  |
| Technological<br>Assistance and<br>Communication | Voice and Message Conversion        | S4, S20                  | 2  |
|  | Information Search                  | S19                      | 1  |
|  | Technological Support               | S17                      | 1  |
|  | Information Collection              | S7                       | 1  |
|  | Total                               |                          | 5  |
| Health Problems                                  | Damage to Eye Health                | S2, S3, S7, S11, S16     | 5  |
|  | Mental Health and Addiction         | S1, S3, S6, S16          | 4  |
|  | Physical Pain                       | S3                       | 1  |
|  | Total                               |                          | 10 |
| Security and<br>Privacy                          | Theft of Private Information        | S2, S4, S7, S9, S18, S20 | 6  |
|  | Malicious Use                       | S4, S7, S20              | 3  |
|  | Total                               |                          | 9  |
| Academic and<br>Personal<br>Development          | Laziness and Overuse                | S2, S6, S10, S16         | 4  |
|  | Loss of Talent and Skills           | S10, S14                 | 2  |
|  | Attention Deficit                   | S3                       | 1  |
|  | Total                               |                          | 7  |
| Information and<br>System                        | Giving False Information            | S2, S7, S8, S17, S20     | 5  |
|  | Technical Problems                  | S7, S17, S20             | 3  |
|  | Total                               |                          | 8  |
| Social Problems                                  | Decreased Communication with People | S1, S16                  | 2  |
|  | Withdrawal from Social Life         | S1                       | 1  |
|  | Total                               |                          | 3  |
| No problem                                       | No Negative Impact                  | S12, S13, S15            | 3  |

As seen in Table 5, primary school students expressed the positive and negative features of artificial intelligence in different ways. Students' views on the positive effects of artificial intelligence are under the themes of “knowledge acquisition (f=17)”, “creativity and art activities (f=12)”, “daily works (f=11)”, “personal development and support (f=3)” and “technological assistance and communication (f=5)”, The views on the negative effects of the negative effects of the system were categorized under the themes of “health problems (f=10)”, “privacy and security (f=9)”, “academic and personal development (f=7)”, “information and system (f=8)” and “social problems (f=3)”. When the students' thoughts about the positive and negative effects of artificial intelligence on human life are analyzed, it is seen that important findings have emerged in line with various

themes. According to student opinions, it is noteworthy that the most common positive effects of artificial intelligence on human life are “making things easier (f=7), helping in lessons (f=5) and fast information acquisition (f=5)”. The most common negative effects of artificial intelligence on human life are “theft of private information (f=6), damage to eye health (f=5) and giving false information (f=5)”. In addition, there are also student opinions that artificial intelligence does not have a negative impact on human life (f=3). According to these findings, while students positively evaluate the effects of AI on knowledge acquisition and creativity, they also draw attention to potential risks such as privacy and health issues. Some student views on these themes and codes are given below:

*It has positive effects on being successful in his/her field, increasing his/her skills, increasing his/her imagination, and increasing human attention (S5).*

*It saves time, makes our lives easier, facilitates education, and develops people (S11).*

*Artificial intelligence facilitates people's needs. For example, it can be a teacher for students, it draws pictures for students, writes poems and stories, it makes our work much easier (S14).*

*Giving the wrong answer to what we want, people getting used to easier things, getting lazy when they use too much, impairing eye health, stealing our information for malicious purposes (S2).*

*If we use artificial intelligence too much, we become lazy and always want to use artificial intelligence (S6).*

*Artificial intelligence also has negative effects on people's lives. For example, it messes with people's brains and damages the eyes. Sometimes and always it prevents people from thinking (S14).*

*No, I think not. Because the applications are different from each other and each application is beautiful. Therefore, I have never seen any negative effects of artificial intelligence. I think it will help us in our lessons and they are applications that develop our imagination (S12).*

### Primary School Students' Views on the Effects of Using Artificial Intelligence in Lessons

Within the scope of the fifth sub-problem of the research, primary school students were asked the question “Do you think artificial intelligence can help you while studying? Why?”. The themes and codes obtained from the analysis of the students' responses are presented in Table 6.

Table 6. Student Opinions on the Effects of Using Artificial Intelligence in Lessons

| Theme            | Code                         | Participants  | f  |
|------------------|------------------------------|---|----|
| Positive Impacts | Learning and Development     | S3, S8, S11, S12, S13, S16, S17, S18, S19, S20, S21, S22, S23, S24, S25 | 15 |
|                  | Reliable Source              | S3, S12, S13, S22, S23, S24, S25  | 7  |
|                  | Audiovisual Support          | S5, S11, S12  | 3  |
|                  | Academic Success             | S8, S16, S22  | 3  |
|                  | Facilitating Tools           | S8, S12   | 2  |
|                  | Fast and Effective Solutions | S2  | 1  |
|                  | Total                        |   | 31 |
| Negative         | Reliability                  | S1, S3, S7, S9, S10, S15  | 6  |

| Theme   | Code             | Participants     | f  |
|---------|------------------|------------------|----|
| Impacts | Ethical Problems | S1, S6, S15, S19 | 4  |
|         | Dependency       | S10              | 1  |
| Total   |                  |                  | 11 |

As indicated in Table 6, primary school students expressed the effects of using artificial intelligence in lessons in various ways. These opinions of the students were classified under the themes of “positive effects (f=31)” and “negative effects (f=11)”. As can be seen, primary school students stated that the positive effects of using artificial intelligence in lessons were significantly higher than the negative effects. According to student opinions, it is seen that the most common positive effects of the use of artificial intelligence in lessons are concentrated on issues such as “learning and development (f=15), reliable source (f=7), audiovisual support (f=3) and academic success (f=3)”. On the other hand, it was determined that the most common negative effects of using artificial intelligence in lessons were concentrated on “reliability (f=6), ethical problems (f=4) and addiction (f=1)”. This suggests that the potential risks as well as the benefits of AI in education need to be considered. Some student views on these themes and codes are given below:

*No, artificial intelligence is not useful for me when I'm studying and doing lessons. Because I think it feels like cheating for me. Although it is not very helpful, it can be (S1).*

*Yes. Because it can give us accurate information, the risk of having difficulty in lessons is low. Artificial intelligence can sometimes give wrong information, so if we give examples carefully and carefully, we can be sure that it will not give wrong information. It is useful in the lesson because we can look at what we do not know from there (S3).*

*Yes, because I can watch videos explaining the lesson and get help, I can write questions from Google to improve myself and answer them myself at home (S11).*

*I think because he helps me. She tells me when there are questions I don't understand, but I would be cheating (S19).*

## Discussion, Conclusion and Recommendations

In this study, it was aimed to comprehensively reveal primary school students' perceptions of artificial intelligence, how they define this technology, their thoughts on the areas in which artificial intelligence can be used, their views on the positive and negative effects of artificial intelligence on human life, and their ideas about how artificial intelligence can help students in their study processes. The research aims to examine in depth the students' level of awareness of artificial intelligence technology and how they position and define this technology in their daily lives. It also analyzes primary school students' imaginations and predictions about where and how they can use artificial intelligence. It is also an important component of the research to evaluate the level of awareness of students about the contributions and potential harms of artificial intelligence to human life and the critical thinking they develop on this issue. In addition, determining students' ideas and expectations about what role artificial intelligence can play in educational processes provides valuable clues about future educational technologies and methods. In this context, it is among the objectives of the research to address how students experience artificial intelligence technologies, how they benefit from these technologies and the challenges they face.

In the study, it was determined that primary school students associated artificial intelligence with various words. Students generally associated AI with technology and devices, science and intelligence concepts, education and learning processes, art and entertainment. For example, under the theme of technology and devices, robots, phones and computers are prominent, while the concepts of reason, science and knowledge stand out in the theme of science and intelligence. Under the theme of education and learning, practices were prominent, while under the theme of arts and entertainment, activities such as games and poetry writing were emphasized. In addition, various thoughts on the relationship of artificial intelligence with human beings and society were also expressed. Research has revealed that primary school students generally describe artificial intelligence with concepts such as “robot, brain, human, computer” (Saçan et al., 2022; Walan, 2024). These findings are consistent with the results of this study. Primary school students define artificial intelligence in various ways. Students see AI as human-designed robots and tools that make work easier. They also stated that AI functions as a tool that provides information and helps in every field. Human skills and high knowledge are emphasized among the qualities of AI. Regarding the effects of artificial intelligence, it was stated that it saves time, increases imagination and supports development. In a study, the main reasons why children likened artificial intelligence to concepts such as “robot, human and brain” were that artificial intelligence resembles human, makes life easier, has the ability to analyze and has robotic features (Sacan et al., 2022; Walan, 2024). These findings provide important clues about the qualities and functions of AI and are consistent with the results of the current research.

Students stated that artificial intelligence can be used in various fields. In the field of education and learning, the functions of artificial intelligence such as answering questions, obtaining information and lecturing come to the fore. In the area of creativity and art, uses such as painting and writing stories were mentioned. It was also stated that AI can be used in daily life activities such as entertainment, chat and problem solving. Students stated that artificial intelligence has both positive and negative effects on human life. Positive impacts include knowledge acquisition, creativity and artistic activities, ease of daily tasks and personal development. Negative impacts include health problems, privacy and security concerns, negative impacts on academic and personal development, and information security issues. In addition, primary school students stated that the use of artificial intelligence in lessons generally had positive effects. Students stated that artificial intelligence contributed to their learning and development processes, was a reliable source, and provided visual and auditory support. However, some students also noted that AI can create credibility and ethical issues in lessons and can be addictive. Similar to the results of this study, research shows that the use of artificial intelligence in education facilitates access to information, improves problem-solving skills, and helps students develop personal learning by providing support for challenging information and questions (Haung et al., 2021; Nalbant, 2021; Popenici & Kerr, 2017; Walan, 2024). Unlike the results of this study, it is stated in the literature that artificial intelligence has positive effects on issues such as student motivation and individualized education (Dincer & Doganay, 2016; Rudolph et al., 2023). On the other hand, the results of this study are in line with the opinions in the literature that the use of artificial intelligence in education has negative effects on issues such as security and privacy (Asik et al., 2023; Osetskyi et al., 2020; Walan, 2024). Regarding the results obtained in the study, suggestions for practitioners and researchers are presented below:

1. The research results provide clues on how AI can be used effectively in the classroom. Teachers and school administrators should be encouraged to receive training to more effectively integrate AI tools into



lessons.

2. The research highlights the negative impacts of the use of AI on health and safety. Therefore, teachers and school administrators should take the necessary measures to ensure the healthy and safe use of AI tools and provide students with information on these issues.
3. The results of the research revealed that AI has positive effects on students' knowledge acquisition, creativity and its use in daily tasks. However, longitudinal studies assessing long-term effects are needed. These studies can provide a more comprehensive understanding by tracking the effects of AI on students' academic achievement and social skills.
4. The research shows how AI-supported education programs contribute to students' learning processes. However, more comprehensive studies should be conducted on the effectiveness and impact of these programs. These studies can evaluate the effects of AI-supported educational materials on students' learning and development in more detail.
5. The results of the research determined how primary school students perceive artificial intelligence. However, it can be suggested that there may be differences between the perceptions of artificial intelligence of students in different age groups. Therefore, future studies should focus on better understanding the effects of artificial intelligence in different developmental periods by including students in different age groups.

## References

- Alam, A. (2023). Developing a curriculum for ethical and responsible AI: A university course on safety, fairness, privacy, and ethics to prepare next generation of AI professionals. In *Intelligent communication technologies and virtual mobile networks* (pp. 879–894). Springer. <https://doi.org/10.1007/978-981-99-1767-9>
- Alanoglu, M., & Karabatak, S. (2020). *Eğitimde yapay zekâ [AI in Education]*. In Eğitim Araştırmaları [Educational Research], (F. Guclu Yılmaz & M. Naillioğlu Kaymak, Eds.), pp.175-185.
- Ankiewicz, P. (2019). Alignment of the traditional approach to perceptions and attitudes with Mitcham's philosophical framework of technology. *International Journal of Technology and Design Education*, 29, 329-340. <https://doi.org/10.1007/s10798-018-9443-6>
- Asık, F., Yildiz, A., Kilinc, S., Aytakin, N., Adali, R., & Kurnaz, K. (2023). The Impact of Artificial Intelligence on Education. *International Journal of Social and Humanities Sciences Research (JSHSR)*, 10(98), 2100-2107. <https://doi.org/10.5281/zenodo.8307107>
- Buyukozturk, S., Kilic-Cakmak, E., Akgun, S., Karadeniz, S., & Demirel, F. (2020). *Bilimsel araştırma yöntemleri [Scientific Research Method]* (29th Edition). Pegem Akademy.
- Chai, C. S., Lin, P. Y., Jong, M. S. Y., Dai, Y., Chiu, T. K., & Qin, J. (2021). Perceptions of and behavioral intentions towards learning artificial intelligence in primary school students. *Educational Technology & Society*, 24(3), 89-101. <https://www.jstor.org/stable/27032858>
- Creswell, J. W. (2021). *Nitel araştırma yöntemleri [Qualitative research methods]* (Translation from 3rd Edition). (M. Bütün & S.B. Demir, Trans. Eds.). İstanbul: Siyasal Bookstore.
- Celik, C. (2020). *Modelling Reasons for Reading Problems Experienced by Third Graders Through Artificial*

- Intelligence Method*. (Publication No: 640591), [Doctoral Thesis], Uludag University, Bursa.
- Cetin, M., & Aktas, A. (2021). Artificial Intelligence and Future Scenarios in Education. *OPUS International Journal of Society Researches*, 18 (Special Issue of Educational Sciences), 4225-4268. <https://doi.org/10.26466/opus.911444>
- Dincer, S., & Doganay, A. (2016). Computer-assisted teaching evaluation scale adaptation study. *Ondokuz Mayıs University Journal of Education Faculty*, 35(1), 45-62. <https://doi.org/10.7822/omuefd.35.1.4>
- Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254–280. <https://doi.org/10.1016/j.techfore.2016.08.019>
- Ghareeb Ahmed Ali, S. (2020). Using an artificial intelligence application for developing primary school pupils'. *Oral Language Skills*, 75(75), 67–110. <https://doi.org/10.21608/edusohag.2020.97643>
- Huang, J., Saleh, S., & Liu, Y. (2021). A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies*, 10(3). <https://doi.org/10.36941/ajis-2021-0077>
- Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial Intelligence in Education. *Computers and Education: Artificial Intelligence*, 1, 100001. <https://doi.org/10.1016/j.caeai.2020.100001>
- Knox, J. (2020). Artificial intelligence and education in China. *Learning, Media and Technology*, 45(3), 298-311. <https://doi.org/10.1080/17439884.2020.1754236>
- Levchenko, I. V., & Merenkova, P. A. (2021). Formation of content modules for teaching artificial intelligence in the basic school. *RUDN Journal of Informatization in Education*, 18(3), 227-237. <https://doi.org/10.22363/2312-8631-2021-18-3-227-237>
- Lin, P. Y., Chai, C. S., Jong, M. S. Y., Dai, Y., Guo, Y., & Qin, J. (2021). Modeling the structural relationship among primary students' motivation to learn artificial intelligence. *Computers and Education: Artificial Intelligence*, 2, 100006. <https://doi.org/10.1016/j.caeai.2020.100006>
- Ma, Z., Xin, C., & Zheng, H. (2021). Construction of a teaching system based on big data and artificial intelligence to promote the physical health of primary school students. *Mathematical Problems in Engineering*, 2021, 1-10. <https://doi.org/10.1155/2021/9777862>
- Martínez-Comesaña, M., Rigueira-Díaz, X., Larrañaga-Janeiro, A., Martínez-Torres, J., Ocarranza-Prado, I., & Kreibel, D. (2023). Impacto de la inteligencia artificial en los métodos de evaluación en la educación primaria y secundaria: revisión sistemática de la literatura. *Revista de psicodidáctica*. <https://doi.org/10.1016/j.psicod.2023.06.001>
- Nalbant, K. G. (2021). The importance of artificial intelligence in education: a short review. *Journal of Review in science and engineering*, 2021, 1-15. <https://www.htpub.org/jrse/>
- Neuman, L. W. (2014). *Social research methods: qualitative and quantitative approaches* (Seventh Ed.). Essex: Pearson Education Limited. [https://letrunghieutvu.yolasite.com/resources/w-lawrence-neuman-social-research-methods\\_-\\_qualitative-and-quantitative-approaches-pearson-education-limited-2013.pdf](https://letrunghieutvu.yolasite.com/resources/w-lawrence-neuman-social-research-methods_-_qualitative-and-quantitative-approaches-pearson-education-limited-2013.pdf) (Date of Access: 26.07.2024)
- Osetskyi, V., Vitrenko, A., Tatomyr, I., Bilan, S. and Hirnyk, Y. (2020). Artificial intelligence application in education: Financial implications and prospects. *Financial and Credit Activity: Problems of Theory and Practice*, 2(33), 574-584. <https://www.fkd.net.ua/index.php/fkd/article/view/3019/3010>


- Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and practice in technology enhanced learning*, 12(1), 22. <https://doi.org/10.1186/s41039-017-0062-8>
- Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? *Journal of applied learning and teaching*, 6(1), 342-363. <https://doi.org/10.37074/jalt.2023.6.1.9>
- Sacan, S., Yarali, K. T., & Kavruk, S. Z. (2022). Investigation of Metaphorical Perceptions of Children on The Concept of "Artificial Intelligence". *Mehmet Akif Ersoy University Journal of Faculty of Education*, (64), 274-296. <https://doi.org/10.21764/maeuefd.1074024>
- Savas, S. (2021). Artificial intelligence and innovative applications in education: The case of Turkey. *Journal of Information Systems and Management Research*, 3(1), 14-26. <https://dergipark.org.tr/en/download/article-file/1483035>
- Seng, K. T., & Choo, L. S. (2008). Digital skills and education: Singapore's ICT master planning for the school sector. *Toward a Better Future*, 167. <http://hdl.handle.net/10986/6432>
- Soydemir Bor, S. & Alkis Kucukaydin, M. (2021). The effect of Socioscientific Issues Teaching on Primary School Students on Problem Solving and Creative Writing Skills in the Theme of Artificial Intelligence. *Western Anatolian Journal of Educational Sciences*, 12(2), 432-446. <https://doi.org/10.51460/baebd.904806>
- Turkey National Artificial Intelligence Strategy 2021-2025 (2021). <https://cbddo.gov.tr/UYZS> (Date of Access: 26.07.2024)
- Walan, S. (2024). Primary school students' perceptions of artificial intelligence—for good or bad. *International Journal of Technology and Design Education*, 1-16. <https://doi.org/10.1007/s10798-024-09898-2>
- Yan, H. (2019). Innovative Research on Talent Cultivation in Colleges and Universities under the Background of Artificial Intelligence. *Educational Research*, 2(5).
- Yang, W. (2022). Artificial Intelligence education for young children: Why, what, and how in curriculum design and implementation. *Computers and Education: Artificial Intelligence*, 3, 100061. <https://doi.org/10.1016/j.caeai.2022.100061>
- Yildirim, A. & Simsek, H. (2021). *Sosyal bilimlerde nitel araştırma yöntemleri [Qualitative research methods in social science]* (12th edition). Ankara: Seckin Publishing.
- Yim, I. H. Y. (2023). Design of artificial intelligence (AI) education for primary schools: Arts-based approach. In A. Kaban, & A. Stachowicz-Stanusch (Eds.), *Empowering Education: Exploring the Potential of Artificial Intelligence* (pp.65-90). ISTES Organization. <https://book.istes.org/index.php/ib/article/view/5/24>
- Yufeia, L., Salehb, S., Jiahuic, H., & Syed, S. M. (2020). Review of the application of artificial intelligence in education. *Integration (Amsterdam)*, 12(8), 1-15. <https://doi.org/10.53333/IJICC2013/12850>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>
- Zhao, X. (2022). Education Challenges and Coping Mechanisms for Artificial Intelligence in Primary and Secondary Schools. *Science Insights*, 41(5), 675-679. <https://doi.org/10.15354/si.22.re083>

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