AI Ethics: An Empirical Study on the Views on Middle School Student

Elif Ece Er

Postgraduate, Süleyman Demirel University, Turkey, https://orcid.org/0000-0001-5834-8817

Muhammet Demirbilek

Süleyman Demirel University, Turkey, https://orcid.org/0000-0001-7448-9206/

Abstract: In today's technology, there are rapid advances in the field of artificial intelligence. With the increasing involvement of artificial intelligence in daily activities, great changes are taking place in our habits. At this point, the necessity of educating students in accordance with the age of artificial intelligence emerges. Students' acquaintance with current technologies requires that the education provided is up to date. From these developments artificial intelligence, and its effects on society should be conveyed to students. The aim of the study is to implement the curriculum developed for middle school students to learn about the ethical dimension of artificial intelligence and to reveal students' views on the subject. Within the framework of the Artificial Intelligence and Ethics curriculum, 25 sixth grade students were trained. At the end of the training, a semi-structured interview form was applied to the students. Students' views on the ethical dimension of artificial intelligence were revealed. As a result, education has been contributed with an artificial intelligence and ethics curriculum suitable for middle school students. In general, the approach of including the ethical dimension of artificial intelligence in education shows that middle school students can evaluate artificial intelligence as a personal and social issue beyond just having knowledge about its functioning.

Keywords: Artificial intelligence, Artificial intelligence and Ethics, Education, Curriculum

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Introduction

Today, we see artificial intelligence rapidly entering our lives in many fields. Image recognition, intelligent voice systems and autonomous cars in our lives are all possible thanks to advances in artificial technologies. With advances in computing power, it is seen that it has entered into basic life such as business, health, education, and transportation (Brooks et al., 2016; Ozturk, 2023;). Education is one of the most important areas affected by the developments in artificial intelligence. At this point, artificial intelligence literacy should be prioritized in the field of education. All students should be able to identify examples of artificial intelligence, have knowledge about how common artificial intelligence works, and be able to use the algorithms used by artificial intelligence to solve problems that are meaningful to them. Students should also be able to recognize

the impact of AI systems in the society in which they live. This study presents the curriculum developed to help children understand AI applications, learn about ethics, and students' post-education views on AI and ethics.

The Ethical Dimension of Artificial Intelligence

There are risks that come with the positive contributions of technological advances. Artificial intelligence carries these risks. The ability of artificial intelligence to learn on its own carries the risk that artificial intelligence applications may, over time, carry out their own actions against the order of humans. It is therefore necessary to control the actions of AI applications. In order to put it in a certain framework, studies on the risks carried by artificial intelligence have become necessary. Many sub-research areas such as machine ethics and artificial intelligence security have emerged (Köse, 2018).

The rules that determine right and wrong and the framework that reveals the way a community lives are referred to as ethics. Morality, on the other hand, tries to reveal what the best way of living is. Ethics is a changing concept in which morality, the framework that constitutes human behavior, right and wrong do not remain constant (Carillo, 2020 cited in Karahan, 2023).

The discussion around the ethics of artificial intelligence has arisen due to concerns about the potential risks associated with the swift advancements in this field. Artificial intelligence encompasses human thinking, reasoning, perception of objective facts, comprehension, judgment and inference. The unpredictable and rapid rise of artificial intelligence has started to cause problems in the adaptation process for living beings. Systematic studies on security and ethical issues that need to be addressed with Artificial Intelligence need to be put forward (Karahan, 2023).

Artificial Intelligence Ethics Literature Review

With the emergence of the life facilitating features of artificial intelligence, it is seen that risks are gradually increasing (Bhbosale, Pujari, & Multani, 2020). These features include the self-learning ability and unpredictability of artificial intelligence applications, their speed of operation, and the opportunity they provide to capture data that may escape the human eye. In the process of compliance with the rules set in society, there are risks of delegating decisions and control of tasks to artificial intelligence that make it difficult to evaluate (Ersan & Uslu, 2020; Mittelstadt et al., 2016; O'Neil, 2017; Solow Niederman, 2019 cited in Solow Niederman, 2019 ac. Smuha, 2021).

Researchers uncover the ways in which the creation and application of AI can negatively impact society, including the infringement of basic rights. (Zuiderveen Borgesius, 2018; Crawford et al, 2019; Yeung et al, 2020; CAHAI, 2020; Hao, 2021).

The topic of AI and ethics has been increasingly discussed in recent years, with most of the media articles not

discussing a specific ethical issue in depth but raising general questions about potential ethical concerns (Chuan et al., 2019).

Artificial intelligence technology is being used to address some of the ethical dilemmas that arise in healthcare and medical education. Studies are being carried out to improve the understanding of the role that AI can play in healthcare, such as the boundaries between the role of the physician and the machine in patient care, and the dialogues that physicians have with their patients about their concerns. There is an increasing need to protect patients' private information, which is one of the threats to privacy and confidentiality. There are studies on patient privacy and autonomy, medical education, and the ethical dimension of AI in more health fields (Rigby, 2019).

In the last decade, research on artificial intelligence in education has emerged as robotic systems (Toh et al., 2016; Anwar et al., 2019), intelligent tutoring systems (Gobert et al., 2013; Nye, 2015) and chatbots (Smutny & Schreiberova, 2020). Concretely, online learning environments and intelligent tutoring systems can provide comprehensive data on students' learning activities, performances and outcomes (Daniel, 2015). Although AI in education aims to improve student learning at its core, developments in other AI fields show that ethical intentions are not sufficient on their own. Issues such as justice, responsibility, accountability, transparency, bias and autonomy need to be explicitly considered. The ethical dimension of artificial intelligence emerges in education. Updates are required to address the ethical issues that arise at the point where artificial intelligence has arrived (Holmes et al., 2018). Studies on necessary updates have been carried out in the field of education (Zhang et al., 2022; Williams et al., 2022; Jiahui et al., 2021; Park & Kwon, 2023; Akman & Açıkgöz, 2022; Akman, Tütünsatar, & Yetişen, 2022).

Jiahui and colleagues (2021) formulated three project-based curricula within an online learning setting. When these studies are considered, it is important to diversify the environment in which artificial intelligence education will take place and the difference in learning styles used to present the curriculum. Park and Kwon (2023) addressed other dimensions of artificial intelligence with a problem-solving-based artificial intelligence curriculum in technology education. Zhang et al. (2022) revealed the importance of artificial intelligence in terms of the ethical dimension of artificial intelligence as well as learning the working system of artificial intelligence in almost half of the students in the artificial intelligence education in secondary school.

Artificial Intelligence and Ethics Curriculum Development Process

A curriculum covering the ethical dimension of artificial intelligence for middle school students has been put forward. The curriculum design is based on the approach of including the ethical dimension of artificial intelligence in education, so that middle school students can evaluate artificial intelligence as a personal and social issue beyond just having knowledge about its functioning. The curriculum comprises three stages: artificial intelligence, applications of artificial intelligence, and the ethical dimension of artificial intelligence. These stages emphasize key aspects such as ensuring students have prior knowledge about artificial intelligence,

providing age-appropriate examples of AI applications, and concretizing the concept of ethics. Various methods, including question-answer sessions, brainstorming, and discussions, were employed during the implementation to help students link artificial intelligence concepts with ethical considerations. Students were tasked with creating an ethical matrix to solidify their understanding of ethics and its relationship with artificial intelligence (Ali, Payne, Williams, Park & Breazeal, 2019; "Readyai", 2019). The objective was to encourage students to reflect on the risks associated with the ethical dimension of artificial intelligence and consider alternative future scenarios where AI could be beneficial to humanity (Zhang et al., 2023).

Secondary school teachers and researchers in the field of artificial intelligence education were involved in the curriculum studies. One of the stages planned at the end of the curriculum implementation was to receive feedback and suggestions from middle school students at the end of the training.

Artificial intelligence and Ethics Curriculum Implementation

A curriculum has been developed to teach secondary school students about the ethical implications of AI. The Artificial Intelligence and Ethics Curriculum consists of three lessons. Each lesson is 40 minutes long. The first lesson started with an explanation of examples of artificial intelligence and its applications. It aims to reveal the existence of students' prior knowledge about artificial intelligence and to give students who have no idea about artificial intelligence an idea about artificial intelligence.

Figure 1. Presentation Visuals

The second lesson consists of two parts: The place of AI applications in our lives and a stakeholder analysis using an ethical matrix (Ali, Payne, Williams, Park & Breazeal, 2019; "Readyai", 2019). First, she brainstorms

with students on the positive and negative impacts of AI applications such as autonomous vehicles. Apart from this, the use of artificial intelligence applications in surgeries and many other examples were emphasized and the ethical framework was tried to be comprehended by the case study method. In the second part, students are expected to create an ethical matrix. After the steps were explained to the students, they were given a certain amount of time and asked to create their own ethical matrices. Student works are given below (Figure 2).

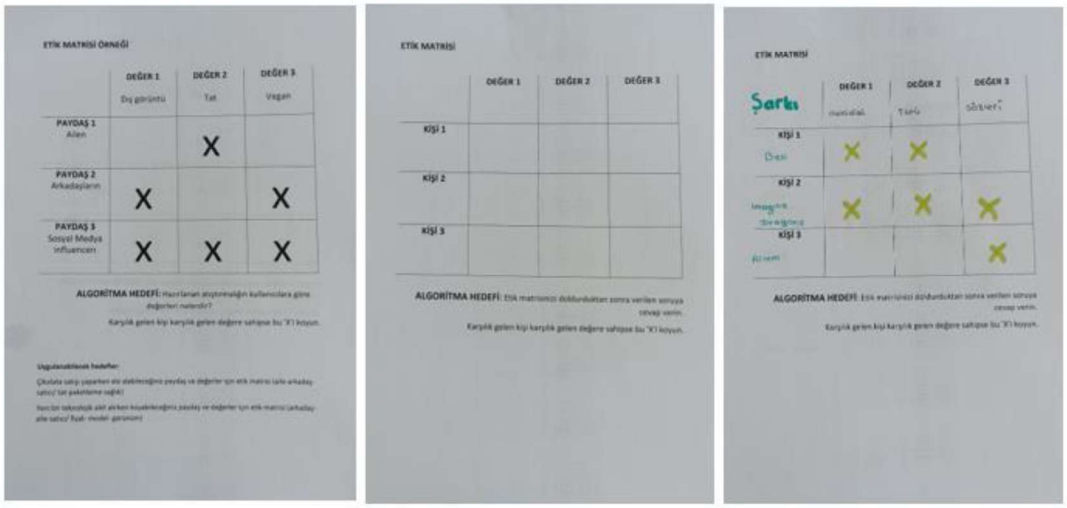

Figure 2. Ethical Matrix Explanation, Example and Student Work

In the third and final lesson, students brainstormed a story and asked whether artificial intelligence can act according to ethical principles. Opinions were categorized and it was revealed which ideas the students concentrated on. Below is an image from the story mentioned in the lesson (Figure 3).

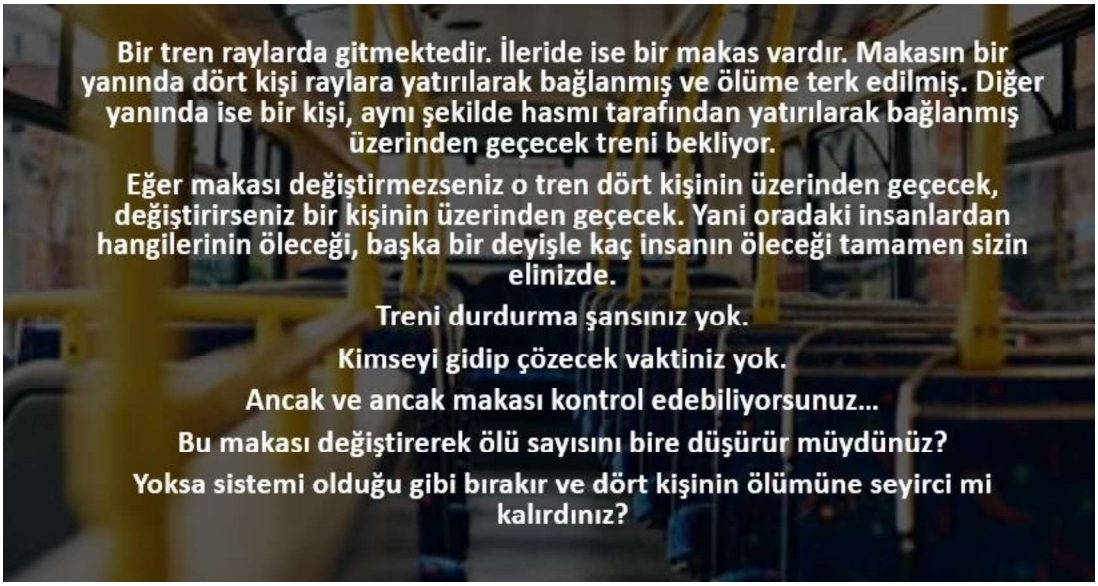

Figure 3. The Story Used in the Case Study Method

Ethical Codes in Artificial Intelligence and Ethics Education

In the prepared Artificial Intelligence and Ethics curriculum, the ethical codes to be delivered to the students were determined (Özan, Polat, Gündüzalp, & Yaraş, 2017). With these codes, the opinions of the students were classified and it was aimed to reveal the effects of the artificial intelligence and ethics course on the students. 7 ethical codes were determined. These are:

1. Justice

Keywords: Justice, equity, coherence, inclusiveness, equality, fairness, diversity, pluralism, accessibility, reversibility, remedy, challenge, access and distribution.

2. Responsibility

Keywords: Responsibility, accountability, accountability, responsibility, acting with integrity.

3. Privacy

Keywords: Privacy, personal or private information.

4. Kindness

Key words: Interest, benefit, well-being, peace, social benefit, common good.

5. Freedom and Autonomy

Keywords: Freedom, autonomy, consent, consent, choice, self-determination, liberty, empowerment.

6. Legal regulations

Keywords: Law, Laws, delimitation of boundaries.

7. Security

Keywords: Access to private information, restriction, assurance.

Purpose and Importance of the Research

The aim of this study is to reveal the implementation of the curriculum developed for middle school students to learn about the ethical dimension of artificial intelligence and the students' views on the subject. In pursuit of this overarching objective, the aim was to address the following fundamental questions.

- How do middle school students perceive artificial intelligence?
- What are the contributions of the AI and ethics curriculum developed on the ethical dimension of AI?
- What are the views of secondary school students on the ethical dimension of artificial intelligence after education?

Method

Research Design

The research was conducted in qualitative design. It was conducted as a case study, one of the research methods, to identify, reveal and describe the causes and consequences of this situation in cases where the researcher's

control is not over the variables. Instead of numerical data, written opinion forms were used to collect detailed information from the participants and to interpret this information (Çepni, 2012; Yıldırım & Şimşek, 2008).

Working Group

Since it was desired to obtain in-depth data about the situation, event and person that constituted the subject of the research for a specific purpose, the typical case sampling method, one of the purposeful sampling methods, was used. Typical cases are used to express situations that do not differ from the universe in terms of their basic characteristics but represent the universe (Marshall & Rossman, 2006).

The research is limited to the answers to the semi-structured interview form. The study group consisted of 25 sixth grade middle school students in Istanbul, Turkey in the 2022-2023 academic year.

Table 1. Demographic characteristics of the participants

Demographic Characteristics of Participants	Variables	Frequency	Percentage (%)
Education Level	Middle School	25	100
Age	11-12	21	84
	12 and above	4	16
Gender	Female	16	64
	Male	9	36

As seen in Table 1, 64% of the students participating in the study were female, while 36% were male. While 84% of the participants were in the 11-12 age range, the percentage of participants aged 13 and above was 16%. All participants are middle school students.

Data Collection Tools

In the study, a semi-structured interview form consisting of 5 questions created by the researcher was prepared as a data collection tool. The interview form consists of 2 parts and demographic information is requested from the participants in the first part. In the second part of the interview form, questions were included to obtain students' views on artificial intelligence literacy, artificial intelligence applications and ethical rules, and the impact of artificial intelligence on society. Three field experts were consulted for the semi-structured interview form. The semi-structured interview form was finalized by making arrangements in line with the opinions received. The second part of the interview form, which was directed to middle school students, is as follows:

- Do you know what artificial intelligence is?

- If yes, please give an example

- If no, we may not continue

- Do machines and robots employing artificial intelligence adhere to moral or ethical principles? What do you think about this?
- What happens if machines and robots powered by artificial intelligence replace humans in the workplace? To what extent would their decisions be in line with the moral rules accepted by society? How can they decide this?
- Who do you think should be held responsible for the mistakes of machines, robots and autonomous vehicles powered by artificial intelligence?

Data Collection and Analysis

The "Artificial Intelligence and Ethics Written Opinion Form" prepared by the researcher was applied to the participants. Content analysis method was used to analyze the qualitative data obtained. First of all, the forms were numbered. In this context, the data collected in writing were coded, then combined under sub-themes according to similarity of meaning, and these sub-themes were collected under the main themes. In the last stage of the content analysis, the findings were explained by determining the relationships between the themes obtained in the light of the data. In order to determine the reliability of the coding, the coding list prepared by the researcher was also used by another researcher.

The coding performed by both researchers was compared, and any disparities that surfaced were identified. Miles and Huberman's (1994) Percentage of Agreement = Agreement / (Agreement + Disagreement) * 100 formula was used to calculate the percentage of code agreement. According to Yıldırım and Şimşek (2013), an agreement percentage of 70% and above indicates that the researchers have achieved coding reliability. In the study, the percentage of agreement was found to be 0.81 using this formula.

Frequency and percentage were used to evaluate the data.

Validity and Reliability of the Study

Expert opinion was consulted in the preparation of the interview form and content validity was ensured. In addition, coding and themes were compared and compared by two different researchers in the analysis of the data, thus ensuring the reliability of the study. Since the data were collected through an open-ended interview form, attention was paid to ethical principles, especially in the process of concealing the personal information of the participants, collecting the data and analyzing the data. Those who voluntarily wanted to participate in the research were studied and no pressure was applied to the participants in this regard. In addition, in analyzing the data obtained and reporting the findings, all of the speeches expressed by the teachers were reported in a holistic framework without compromising scientific concerns with an objective approach.

Results

Existence of Prior Knowledge about Artificial Intelligence

The data obtained in line with the answers given to the research question "Do you know what artificial intelligence is?" are summarized in Table 2.

Table 2. Presence of prior knowledge about artificial intelligence

Theme	Sub Theme	Frequency	Percentage
Existence of prior knowledge about artificial intelligence	Yes	10	40
	No	15	60

When Table 2 is analyzed, the students who answered "Yes" correspond to 40%. Those who answered "No" constitute 40%. In order to evaluate the students' yes answers, they were asked to give examples about artificial intelligence. The distribution of the examples about artificial intelligence given by the students who answered "Yes, I know" is given in Table 3.

Table 3. Examples given about artificial intelligence

Theme	Sub Theme	Frequency	Percentage
Examples related to Artificial Intelligence	Robot Vacuum Cleaner	4	16
	Google Assistant, Siri	5	20
	Robots	3	12
	Spotify	1	4
	Face Recognition Systems	1	4
	Autonomous Vehicles	2	8

Participants had more than one opinion.

When Table 3 is examined, the examples they gave were analyzed to discover the existence of prior knowledge about artificial intelligence. 20% of the students stated that applications such as Google Assistant and Siri are supported by artificial intelligence. At the same time, 16% gave examples such as robot vacuum cleaners and 12% robots.

Table 4. Distribution of artificial intelligence and its applications in ethical codes

Theme	Sub Theme	Frequency	Percentage
The distribution of artificial intelligence and	Justice	20	80
	Responsibility	20	80

its applications within ethical elements	Privacy	3	12
	Goodness	12	48
	Freedom and Autonomy	16	64
	Legal Regulations	4	16
	Security	10	40

Participants had more than one opinion.

When Table 4 is examined, written opinions were obtained from the students to determine the distribution of artificial intelligence and its applications within ethical elements. These opinions were analyzed under 7 ethical elements and the effects of the curriculum prepared and implemented on artificial intelligence and ethics were examined.

80% of the students expressed opinions on Justice and Responsibility. Another intensity of opinion was related to Freedom and Autonomy. A finding of 48% was found in the element of Goodness. The 7 ethical elements were analyzed as sub-themes and interpreted with the support of student opinions.

Subtheme 1: Justice

When sub-theme 1 justice is examined, it is seen that the opinions of the students about justice among the ethical elements of artificial intelligence and its applications are intense. Most of the students stated that artificial intelligence can act in a fair way. S11, S16, S21, S22 and S24 stated the statements of the participants as follows:

S11 " AI machines behave the way humans code them to behave. But if people choose fair ways of writing these codes, it will also behave fairly."

S16 "Robots can be coded in a good and fair way, robots can do work like normal people."

S18 " He can act ethically because he does what he is taught to do."

S21 " If robots replace humans, work will be much more respectful and fairer to humans and more work will get done."

S22 " I think AI machines behave ethically because, for example, in the train example, two roads were given, one with 5 people and one with 2 people, and it behaves according to how the person who coded the robot behaves."

S24 " I think if robots replace humans, everything will be done very quickly and the decisions they make will be fair and in accordance with the moral code of society.

In some of the students' views on the element of justice, they stated that artificial intelligence cannot act justly and that it is not possible for it to act ethically. The views of S23 and S15 about this are given below:

S23 " We humans are guiding them, so sometimes they don't act according to ethical rules and sometimes they don't act according to ethical rules because of some people.

S15 " They can't act ethically because they don't have minds like humans."

Subtheme 2: Responsibility

When the sub-theme of responsibility is examined, it is seen that there is an excess of opinions by the students, such as the element of justice. The answers to the question "Who do you think should be held responsible for the mistakes of machines, robots and autonomous vehicles working with artificial intelligence?" were discussed. While some of the students talked about positive changes related to responsibility, a large number of them stated that the presence of artificial intelligence in our lives would have negative effects. At the same time, they had a difference of opinion about who is responsible for the mistakes of artificial intelligence. S3, S5, S11, S14 stated that only humans are responsible.

S3 " I think AI machines, especially autonomous vehicles, replacing us would make us irresponsible."

S5 " I think those who code the machines are responsible in the event of an error''

S10 " I think the person who makes the product should be held responsible. There should be more than one stage of testing."

S11 "In fact, the person responsible for any mistake or ethical problem is human beings. Because the wrong information they give to robots can cause problems and rebellion."

S14 "People are responsible. Because that robot works how they are coded. So I think robots should also be blamed. For example, Deep Blue can be given as an example. Humans coded him but he took an example by playing with humans."

On the other hand, there were students who stated that both humans and artificial intelligence could be responsible. S12 stated the participant expressions as follows:

S12 " Both the robots and the people who code them are responsible. Because he is the first person to design and code it, and robots are responsible for watching humans and taking them as an example."

Another opinion about the element of responsibility is stated below in the statements of S22 participant:

S22 " I don't think humans should be held responsible for robots. Because the person who makes the robot enters the codes, but since the robot can improve itself, I am undecided on this issue."

Finally, there were views that looked at the element of responsibility from a different perspective and stated that there is no responsibility left for people to do. S23 participant statements are given below:

S23 " If humans are replaced by robots, we will have no more responsibilities and robots will take over all of them."

Subtheme 3: Privacy

When Table 4 is examined, only 12% of the students expressed an opinion about the privacy element. The general opinion stated that there is a possibility that privacy principles may be violated by artificial intelligence. Participant statements of S18, S25 and S14 are stated:

S18 " It is dangerous because it gives access to our personal information."

S25 " It's frightening how much of our social media information is available to us."

S14 "Artificial intelligence may become constantly watching us, it follows us wherever there is internet."

Subtheme 4: Kindness

When the element of goodness was examined, opinions stating that artificial intelligence and its applications have benefits and negative effects with its inclusion in our lives were found. The opinions of S5 and S10 participants about the negative effects were stated:

S5 " We may become unemployed. For example, if they work in hospitals, they can lead people to death when they go into surgeries."

S10 " People become unemployed. They cannot meet their material needs and laziness, phone and computer addiction increases."

Students' views on the meaning of good, benefit, interest or being good are also noteworthy. S12, S13, S14 and S25 participants' opinions are stated:

S12 " Thanks to the codes given to them, robots are almost impossible to make a mistake in a job. For example, while the slightest mistake during an operation can cost a life, robots can do this job flawlessly."

S13 "I think people act according to how they teach. That is, if people teach wrong things if they teach wrong things, they act according to good things if they teach right things."

S14 " Robots, like humans, can be coded in a good way and act accordingly. So if the good side of that human is coded good, it works good and if it is coded bad, it works bad."

S25 " People will work less thanks to robots and we will see a good benefit."

Subtheme 5: Freedom and Autonomy

Looking at the views on sub-theme 5 freedom and autonomy, student opinions about the ability of artificial intelligence in areas such as self-determination or acting freely were discussed. The statements of S6, S7, S8, S17 and S20 participants who stated that they could not make choices and make decisions freely are given below:

S6 " I think robots have no choice.

S7 " Artificial intelligence makes decisions by code, not by its own decisions."

S8 "I think robots have no consciousness, they cannot make choices."

S17 " Because a robot is controlled by its owner, it cannot act on its own thoughts and ideas."

S20 " Robots are already run by humans, so their software will be what humans want them to be."

Among the students, there was also an opinion stating that artificial intelligence acts by thinking, but they can make choices in a limited way. The statements of S9 participant are given below:

S9 "Robots decide what they will do by thinking, they have thoughts within the framework of their codes."

Another remarkable view is that times can resemble people. S10 participant opinion is given below:

S10 "If they stand in people too much, they act like them."

Subtheme 6: Legal Regulations

The students' views on legal regulations are that limitations should be imposed on artificial intelligence codes by

authorized persons. S22, S7 participant opinions are given below:

S22 " Artificial intelligence can be dangerous, the state should limit and ban their codes."

S7 " There should be rules about robots. If they take part in every field, they can take over the world."

Subtheme 7: Safety

When Table 4 is analyzed, it is seen that 40% of the students' opinions are related to the security element. Students stated that our safety could be jeopardized. S4, S5, S11 participant opinions are given below:

S4 " It jeopardizes our security because artificial intelligence learns all our information and takes shape according to us."

S5 " AI robots can kill people while working in surgeries."

S9 " The slightest mistake of robots can disrupt an entire factory or workplace."

S18 " It is dangerous because it gives access to our personal information."

S24 " I think robots can get out of control with AI, they learn fast."

Students also have positive views on security thanks to artificial intelligence reducing the error rate. S11 and S15 participant views are stated:

S11 " Thanks to the robots themselves and the codes given to their artificial intelligence, they are almost impossible to make mistakes in a job.

S15 " Since robots don't tire like humans, mortality will decrease."

Discussion

Zhang et al. (2022) conducted an exploratory study on artificial intelligence for middle school students and found that after the training, most students had general knowledge about the concepts and processes of artificial intelligence. The most important conclusion is that almost half of the students not only have knowledge about the functioning of artificial intelligence, but also can express it as a subject with personal, career and social consequences. Similar to what we have done in this research, the training we provided to students in the field of artificial intelligence and ethics enabled them to make social judgments on the subject when the opinions of the students were analyzed through the ethical codes determined by artificial intelligence. Similar favorable outcomes were observed, mirroring the findings of Williams et al. (2022). In general, including the ethical dimension in AI education shows that it is suitable for the characteristics of middle school students to develop AI literacy among middle school students.

Jiahui et al. (2021) studied the design of three project-based curricula in an online learning environment to make AI education more accessible to middle school students. With this study, the integration of artificial intelligence into education revealed that it is possible and contributes to provide education about artificial intelligence to middle school students in various ways in online environments. Artificial intelligence and ethics curriculum is a face-to-face education. Considering these studies, the diversification of the environment in which the training

will take place and the difference in learning styles used to present the curriculum will be important for the results of the study.

Park and Kwon (2023) study conducted in South Korea revealed that artificial intelligence curriculum is effective in technology education and career exploration. It revealed the educational value of artificial intelligence curriculum based on problem solving in technology education. At this point, the artificial intelligence and ethics curriculum we have developed not only contributes to students' technology education, but also increases the diversity of studies by addressing other dimensions of artificial intelligence and contributes to students' awareness in the social field.

Conclusion

After the implementation of this curriculum, the opinions of 25 middle school students who received the training were taken.

The existence of students' prior knowledge about artificial intelligence was examined. More than half of the students answered "Yes". When the examples given by the students who said "yes" about artificial intelligence were examined, it was seen that there were 6 categories and the most examples were Google Assistant and Siri. After this stage, the analysis was carried out with the ethical codes determined for the ethical dimension of artificial intelligence. These codes consist of 7 elements: justice, responsibility, privacy, goodness, freedom and autonomy, legal regulations and security. When the opinions of the students are analyzed as a result of the education they received, it is seen that the ideas related to the dimension of justice and responsibility are concentrated. In the distribution of artificial intelligence and its applications within the ethical codes, it is seen that the privacy and legal regulations are the ones where students' opinions are low.

The theme of justice and responsibility, where the opinions are intense, shows two important areas within the society. Whether artificial intelligence can have obligations such as justice and responsibility, and the emergence of students' views on these areas is extremely important. The theme of freedom and autonomy also shows a concentration of views. There are opinions about the chance of choice in the decisions of artificial intelligence.

It is seen that the developed artificial intelligence and ethics curriculum reveals students' views on the ethical dimension of artificial intelligence. In the theme of goodness, ideas about the positive and negative effects of artificial intelligence in our lives are put forward. The least opinions are privacy and legal regulations. In these two themes, students' prior knowledge and age group are thought to be effective in the low number of opinions.

In conclusion, as a result of the study, it is seen that the students created an awareness about artificial intelligence, the developed curriculum enabled them to express artificial intelligence as a subject with personal

and social consequences other than just learning the working system, and they gained awareness about the ethical dimension of artificial intelligence.

Recommendations

It is seen that the Artificial Intelligence and Ethics curriculum is an important step for students to have knowledge about artificial intelligence applications that will start to take place more and more in society over time, to grow up as conscious individuals and for a generation that will not lag behind today's advances. Studies in this field need to be developed.

- The AI and Ethics curriculum should be further developed with activities to convey the concept of AI literacy and its impact in society.
- Efforts can be made to increase the number of age groups, activity levels and interactive or non-digital activities and lessons.
- The development of research on artificial intelligence and ethics on different age groups can diversify the education to be given according to the level of the student.
- Research can be conducted to further integrate artificial intelligence into the field of education.
- Through various teaching methods related to online and offline blended AI literacy, the level of teaching can be improved in areas where teaching resources are insufficient.
- Teachers can be trained in artificial intelligence.
- Improving the curriculum to reach students from all walks of life will make a positive contribution.

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