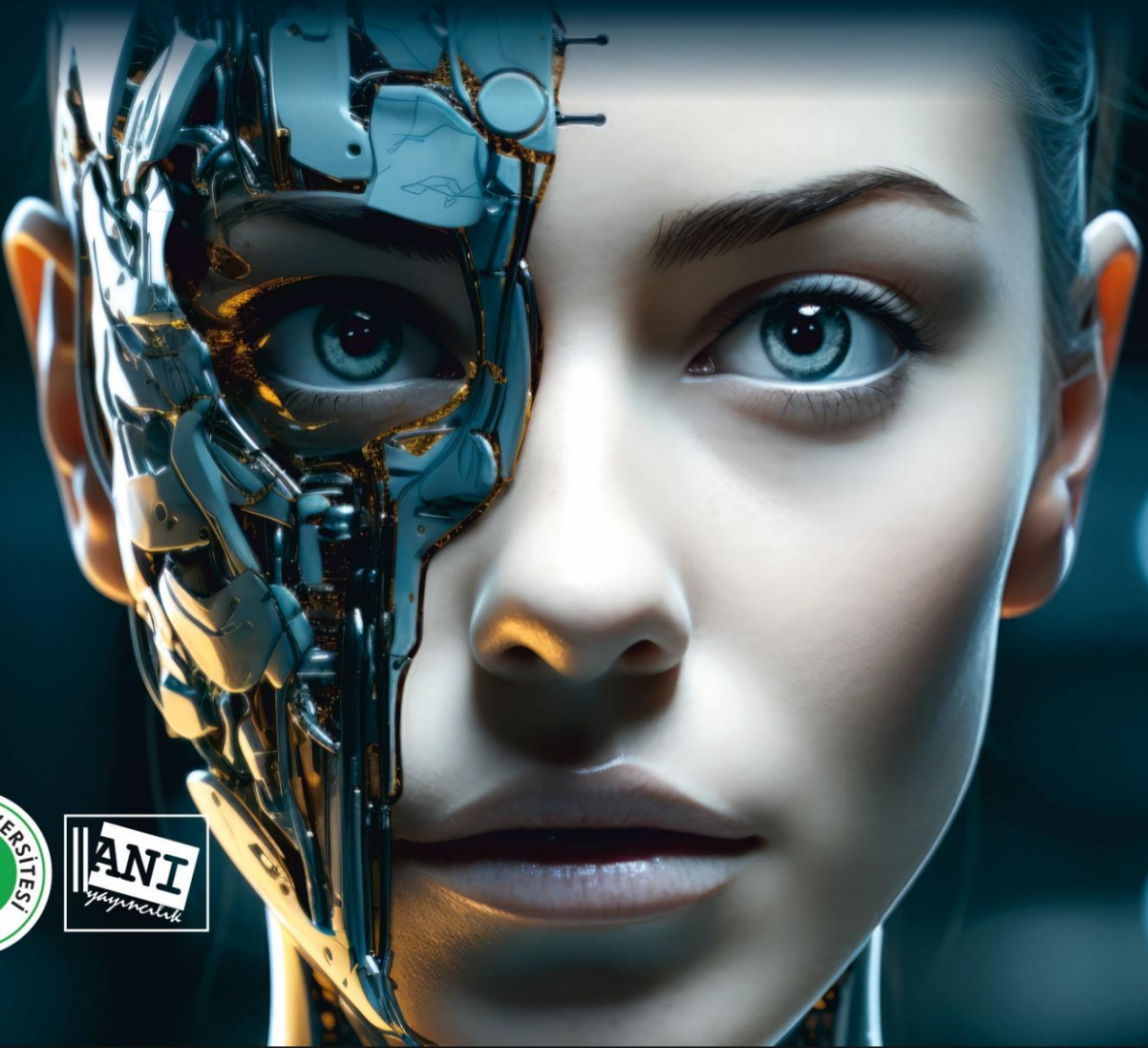# INTERNATIONAL EJER CONGRESS

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XI INTERNATIONAL EURASIAN

EDUCATIONAL RESEARCH CONGRESS

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Main Theme

"Designing the Future: Changing Paradigms and Transhumanism with Artificial Intelligence in Education"

Sub-Themes

- Academic freedom, autonomy, and social responsibility in education
- Artificial intelligence and educational applications
- Augmented reality applications
- Barriers to learning
- Blended learning
- Computer-assisted measurement and evaluation
- Core skill sets for students and teachers
- Design of school buildings in the future
- Designing and delivering a digital strategy
- Digital competence
- Digital parenting
- Distance Education
- Earthquake Education
- Post Earthquake Trauma Training
- Earthquake and Effective Psychosocial Intervention Methods
- Earthquake and Trauma
- The Impact of Earthquakes on School Staff
- Education and society
- Education for healthy living and healthy communities
- Education for a sustainable life
- Education in the digital age: Primary, secondary, high school, higher education, and application examples
- Educational leadership in the digital age
- Effects of regional differences on education
- Equity, Diversity, and Inclusion Related to Marginalized Groups
- Emergency Management at Schools
- Evidence-Based School Counseling Services for Refugees and Marginalized Groups
- Globalisation and Education
- Higher education
- Innovative learning designs for student success
- Instructional technologies in the digital age
- Integration of immigrants into education
- K-12 education (preschool, primary, and secondary education)
- Learning management systems
- Lifelong learning
- Machine learning
- Management information system
- Managing schools
- Measurement and evaluation of students' learning outcomes
- Metaverse
- Migration and education
- Multicultural Classroom Concerns of Educators and Parents
- New educational system after COVID-19
- New skills to live and work in new times
- New technologies in teaching and learning

- New trends in educational research
- New trends in learning and teaching methods
- New trends in research methods
- Pedagogy, educational programs, and teaching
- Politics, good governance, and leadership in the educational sector
- Program design and development
- Promoting equality, diversity, and inclusion
- Psychological counseling and guidance in education
- Quality assurance/standards and accreditation
- Research and innovations in education
- Research ethics
- Right to an education
- Sustainable Educational Goals Related to Refugees
- Teacher education in the digital age
- The Possibility of Fundamental Changes in the Curriculum
- The role of parents in education
- The skills we need to thrive in a post-COVID-19 world
- Vocational education
- Ways to overcome the digital divide

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Author Information

This book has been compiled with contributions from 61 authors representing 35 different universities in Turkiye, the United States, and Iran, as well as Turkiye's Ministry of National Education. Among the contributors, there are 51 authors from 31 universities 6 authors from education institutions in Turkey, 3 authors from 2 universities in the United States, and 1 author from a university in Iran.

CONTENTS

What is Artificial Intelligence?: Analyzing the Drawings of Preschool Children

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Abstract

Artificial intelligence, also known as machine intelligence, is defined as the intelligence demonstrated by machines or computers. Artificial intelligence tools are increasingly being used in early childhood education to support learning and development for young children. Therefore, it is considered important to understand how children perceive artificial intelligence. This research aims to reveal the perceptions of preschool children regarding the concept of 'artificial intelligence' through drawings. This research, designed in a qualitative manner using a survey model, is a case study due to its focus on a single class in an independent kindergarten located in the city center. The case study approach describes a situation or reveals themes within a limited timeframe. The study group consists of 17 children (6 girls, 11 boys) aged 60-72 months, attending the same class at an independent kindergarten affiliated with the Turkish Ministry of National Education in Rize, Merkez district, during the 2023-2024 academic year. The sampling method used is typical case sampling, which is limited to selecting a class that can relatively reflect the general population in the city center. Data in the research were obtained through the draw-and-tell technique. The collected drawings from the children were analyzed using the 'content analysis' method. The results of the study revealed that blue was the most used color in the children's AI drawings, all drawings used the entire paper, most drawings had normal-sized figures, and all drawings were planned and completed. It was found that the most commonly used symbol in the children's drawings in response to the question 'What is artificial intelligence?' was a human-like robot, the most frequently depicted scenes were outdoor environments such as parks and gardens, and the drawn human figures represented the researcher, the children themselves, and their teachers.

Introduction

Educational technology forms an essential aspect of modern education, providing students with unique learning experiences and enhancing their learning. Technological resources (especially computers) have been integrated into education for decades. However, the integration of educational technology into early childhood education is a newer trend compared to other levels of education. This fact especially necessitates the development, implementation, and examination of resources and methodologies aimed at young children (Prentzas, 2013). Artificial intelligence (AI) accompanies a growing generation in a rapidly changing digital world with many AI-powered applications used in various fields such as health, automobiles, education, social media, entertainment, and robotics, with the proliferation of virtual assistants like Siri and Google Assistant (Druga et al., 2019; Su & Yang, 2022). AI is defined as the science and engineering of problem-solving through technological innovations like machine learning and neural networks (Wang, 2020). This represents the convergence of science, technology, engineering, and mathematics (STEM) emphasized in the current technology-focused society (Yang, 2022).

Artificial intelligence, referred to as machine intelligence, is the intelligence demonstrated by machines or computers (Solanki et al., 2021). AI is used to mimic complex functions associated with the human mind, such as perception, learning, and prediction (Russell & Norvig, 2002). In education, artificial intelligence is a topic of increasing interest among educators and researchers because AI makes a significant contribution to education by personalizing learning experiences. For example, AI plays an effective role in facilitating teaching, learning, and assessment, ranging from robotic teaching to the invention of an automated system for scoring answer sheets (Su & Yang, 2022).

Artificial intelligence tools are increasingly being used in early childhood education to support the learning and development of young children (Lin et al., 2020; Nan, 2020; Vartiainen & Tedre, 2023; Vartiainen et al., 2020). For instance, two recent studies were conducted on teaching children machine learning using AI robots (Lin et al., 2020; Vartiainen et al., 2020). However, no studies have been found that aim to determine the views of preschool children regarding artificial intelligence.

Children are unique individuals with complex and rich thoughts and emotions, and their drawings provide insights into their cognitive, affective, and social development (Bowker, 2007). Drawing is one of the most effective ways for children to express themselves, offering a stronger and more straightforward means of expression and communication than some of the words and expressions they have previously learned (Artut, 2007). The drawings a child makes are considered a mirror of their inner world (Doğru et al., 2006)

and a direct field of self-evaluation (Robinson et al., 2015). The drawings of children are a full reflection of their personality and emotions, containing elements from the past or present (Afşaroğlu Eren, 2017). Expressing through drawing also serves to integrate parts of an identity that may be temporarily lost or confused during trauma (Malchiodi, 2013).

Drawing is a symbolic game for children (Cox, 2013). What a child expresses in this game are images related to their emotional and mental life (Buyurgan & Buyurgan, 2007). Drawing is not merely about expressing what children see; it provides direct access to their emotional memories. It is considered a symbolic way for children to express their feelings, thoughts, and sensitivities through reflections from their subconscious (Cox, 2013). The drawings made by children are regarded as indicators of their development, mental maturity, the environments they grow up in, their problems, personal preferences, emotions, and thoughts. All children draw, but the subjects reflected in their drawings and drawing characteristics vary due to environmental and cultural differences and conditions (Ekinci, 2008).

When examining the literature related to determining children's views on artificial intelligence, Saçan et al.'s (2022) study is encountered. The study examined the perceptions of children aged 6-10 regarding artificial intelligence. As a result of the study, it was found that children produced 12 metaphors related to artificial intelligence. Secim et al. (2021), on the other hand, determined children's views on educational robots using drawings of robots by children. At the end of the research, it was found that before education, children said that robots were made by factories and machines, while after education, engineers and scientists provided their answers. Xu and Warschauer (2020) investigated the perceptions of children aged 3-6 about the animate/inanimate membership and characteristics of conversational agents and the reasons for these perceptions. The research concluded that children associated artificial intelligence with both animate and inanimate characteristics. Lee et al. (2019) examined the perceived personalities of conversational agents (such as Amazon Echo, Google Home, etc.) through drawings by participants aged 4-51. Of the 31 participants in the study, conversational agent devices were depicted as human, speaker, system, and space.

Upon reviewing the literature, no study was found that examined children's views on artificial intelligence through drawings. In the rapidly advancing technological development of the 21st century, determining children's perceptions of the concept of artificial intelligence is important to support them in terms of technology literacy. Based on this, the aim of the research is to reveal the perceptions of preschool children towards the concept of 'artificial intelligence' through drawings.

Method

Research Design

This research, designed in a qualitative pattern within the survey model, follows a qualitative approach. Qualitative research is defined as a study where qualitative data collection methods such as observation, interview, and document analysis are used, aiming to reveal perceptions and events in a realistic and holistic manner in their natural environment (Yıldırım & Şimşek, 2013). A case study was chosen because the research was conducted in a single class at an independent kindergarten located in the city center. The approach where a situation is described or themes are revealed within a limited time frame is known as a case study (Creswell, 2023).

Study Group

The study group of this research consists of 17 children (n = 17), 6 girls and 11 boys, aged 60-72 months, who are studying in the same class at an independent kindergarten affiliated with the Ministry of National Education in the Central district of Rize province during the 2023-2024 academic year. The study group was determined according to the typical case sampling method. A class of children aged 60-72 months, which would relatively represent the general population, was selected from independent kindergartens located in the city center.

Research Instrument and Procedure

The data in this research were obtained using the draw-and-tell technique. This technique is based on the view that children have the right to comment on situations that affect them. The technique, where children's opinions are obtained from a child-centered perspective, offers several benefits, including allowing children to draw as part of their daily lives, interact with people around them, and have easy access to drawing materials and time (Angell et al., 2015).

In the context of the research, ethical approval was obtained from the Artvin Çoruh University Scientific Research and Publication Ethics Committee with the decision dated 14.03.2024 and numbered E-18457941-050.99-129599. Official permission was granted to visit the preschool institution, permission was obtained from the school principal, and data were collected from the class of children aged 60-72 months. Before entering the classroom, the researcher introduced themselves to the preschool teacher and explained the research process. After free play time, the researcher entered the classroom with the teacher and introduced themselves to the children, stating, "Children, today I want you to draw a picture. I will distribute drawing paper to you."

Each child was given an A4-sized white drawing paper and colored pencils, with the instruction, "What do you think artificial intelligence is? Could you draw a picture of it for me?". There was no time limit. After the children finished their drawings, one-on-one interviews were conducted in a

guidance room equipped with child-appropriate tables and chairs. These interviews provided more detailed information about the children's feelings and thoughts as they described their drawings, revealing details that might not be apparent to an external observer (Wright, 2010). The researcher wrote down the children's comments in a notebook during these interviews. The children were asked questions such as, "What is this? Who is this? What is happening here?" while showing them their drawings. After each interview, the researcher returned to the classroom, thanked the children, and said goodbye. The data collection process was carried out on 25.03.2024.

Data Analysis

In this research, the drawings collected from the children were analyzed using the 'content analysis' method. In this type of analysis, the researcher examines the occurrence of specific words or concepts (concepts are abstract qualities formed by the combination of one or more words with implicit content) within a text or a group of texts. Additionally, information interpreted through descriptive analysis is further scrutinized with content analysis, and concepts and themes that may not be noticeable through descriptive analysis can be revealed as a result of content analysis (Şencan, 2005). The text being analyzed in content analysis can be a book, a drawing, a film, an interview, a dialogue, a theater play, a photograph, etc. In short, the main purpose of content analysis is to reach concepts and relationships that can explain the obtained data (Yıldırım & Şimşek, 2013).

Results

Within the scope of this research, the children's drawings of artificial intelligence were analyzed in terms of 'colors used,' 'drawing features and position on the paper,' 'symbols drawn,' 'environmental characteristics,' and 'human figures,' and the findings are presented in this section.

Table 1

Frequency Distribution of Colors Used In AI Drawings By The Study Group

Used Colors	n= 17 f
Blue	9
Black	7
Green	7
Yellow	7
Red	5
Orange	5
Brown	5
Gray	4
Purple	3
Pink	3
White	1

When looking at Table 1, it is determined that children use the color blue the most (9) in artificial intelligence images, followed by black (7), green (7), and yellow (7) with the same frequency; and the least used color is white (1).

Drawing 1, Boy
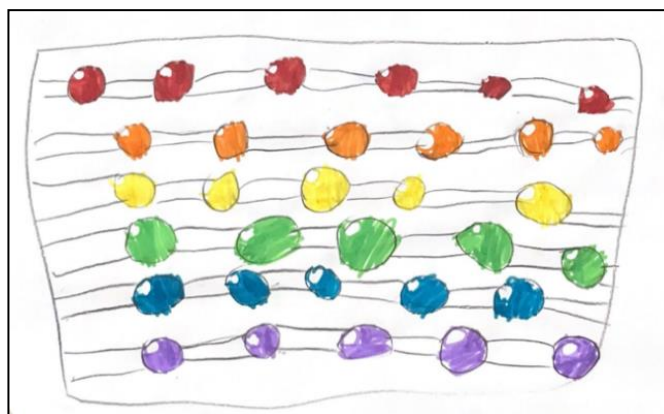
Drawing 16, Girl

Table 2

The Frequency Distribution of Paper Usage and Drawing Characteristics In The Artificial Intelligence Images of The Study Group

Drawing Characteristics and Location on Paper	n=17 f
The majority of the drawing is at the bottom of the paper	-
The majority of the drawing is at the top of the paper	-
The drawing is normal	17
The drawings are in very small size	-
The drawings are in very large size	3
The drawings are in normal size	14

There is a sense of ground	7
There is no sense of ground	10
Strong and bold lines are used	10
The picture is planned and completed	17

When Table 2 is examined, it is determined that the entire paper is used in all drawings. The same applies to the size of symbols and figures in the picture; in most of the pictures (14), the sizes of the drawn elements are normal. It is found that ground perception is absent in 10 of the pictures, 10 of them are drawn with strong and bold lines, and all of them are planned and completed drawings.
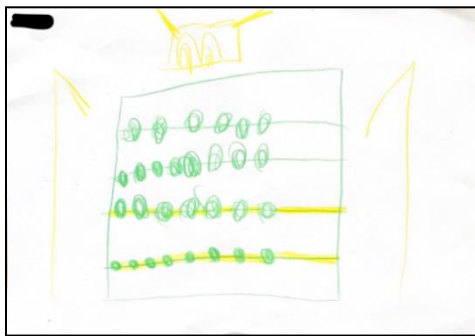
Drawing 4, Boy

Drawing 8, Girl

Table 3

The Frequency Distribution of Symbols Drawn in The Artificial Intelligence Images of The Study Group

The Drawn Symbols	n=17 f
Robot human	7
Abacus	4
Robot princess	3
Numbers	3
Heart	3
Money	2
Hat	1
Year (2024)	1
Natural phenomena	1
Star	1
Snowflake	1
Flower	1
Puzzle	1
Computer	1
Cell phone	1
Engine	1
House	1
Car	1

According to Table 3, children have drawn robot human the most in artificial intelligence images (7). Following that, they drew abacus (4), and then robot princess, numbers, and heart (3) respectively.
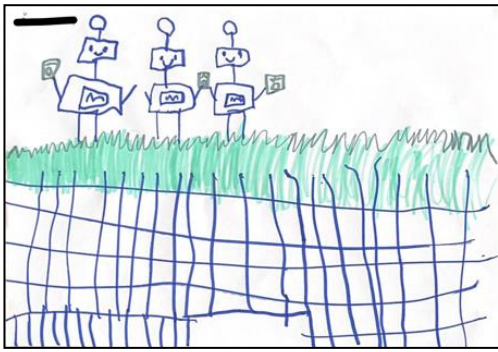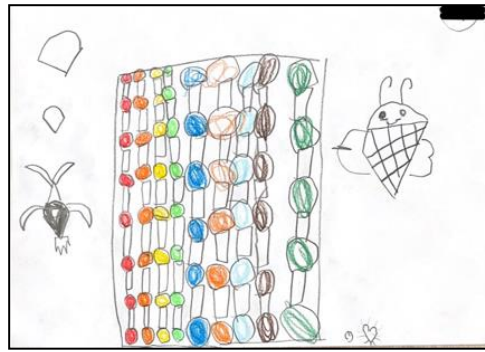
Drawing 11,   *Boy Drawing 6, Boy*

Table 4

The Frequency Distribution of Spatial Features Drawn In The Artificial Intelligence Images Of The Study Group

Spatial Features	n=17 f
Outdoor	6
Home	5
School	3
Road	2
Unspecified	1

According to Table 4; in the artificial intelligence image, 6 of the children depicted outdoor scenes. When asked, the children gave answers such as in the garden, outside, or in the park.

Drawing 10, Girl   Drawing 2, Boy
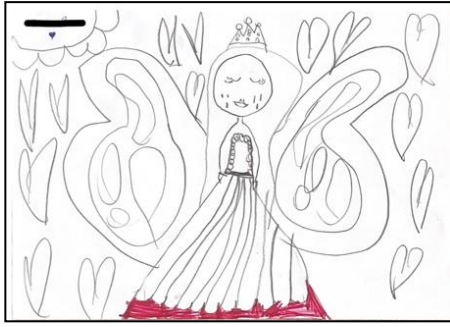
Table 5

The frequency distribution of the human figures drawn by the study group in the artificial intelligence images

Human Figures	n=17
	f
Researcher	4
Themselves	3
Teacher	3

According to Table 5; 4 children have drawn the researcher in the artificial intelligence image. 3 children have drawn themselves and their teacher each.

Drawing 13, Girl

Drawing 5, Girl

Discussion

This study, which examines the perceptions of preschool children towards the concept of artificial intelligence through pictures, revealed that children use the color blue the most in their drawings of artificial intelligence. In the study conducted by Ramazan and Öveç (2017), it was found that 72-month-old children used blue the most when depicting positive emotions such as happiness and joy, while they used black more frequently in drawings representing fear. Similarly, Çankırılı (2013) reported that black color in children's drawings generally represents pessimism. Yukay Yüksel et al. (2015), in their study with children aged 48-72 months, found that children used blue, yellow, and green colors the most in drawings representing the concept of goodness, while they used black color less frequently. Yavuzer (2016) stated that it is difficult to draw definite conclusions about the colors children use, as they can vary depending on the child's feelings at the moment. Additionally, Golomb (2003) mentioned that children make conscious color choices in their drawings after the age of 4. Burkitt et al. (2003) found that children use black color the most for portraying negative figures. In the current study, the reason for children use blue the most in their drawings of artificial intelligence might be because blue color generally evokes feelings of calmness, peace, and trust (Cyr et al., 2010). Furthermore, it is interpreted that children perceive artificial intelligence as a reliable and friendly entity and therefore reflect these feelings by using the color blue.

As a result of the study, it was determined that the entire paper was used in all drawings. The same applies to the size of symbols and figures in the pictures; in most drawings (14), the sizes of the drawn elements are normal. It was found that in 10 drawings, there was no perception of ground, 10 were drawn with strong and bold lines, and all of them were planned and completed drawings. Aminabadi et al. (2011) examined the fear of dentists in 54 children aged 4-11 through drawings; they indicated the children's anxiety based on the position of the drawings on the page. The positioning of children's drawings in the corners of the page reveals their levels of anxiety. In interpreting the expression of emotions in children's drawings, not only human figures and colors but also the structure of lines is important. For example, the use of dark colors and weak lines symbolizes sadness (Rosenblatt & Winner, 1988). In the current study, the fact that the drawings were of normal size and completed suggests that children do not have a negative perception of artificial intelligence.

When the symbols used by children in their drawings for the question "What do you think artificial intelligence is?" were examined, it was determined that they mostly drew human-like robots. According to the study by Saçan et al. (2022), which examined the metaphorical perceptions of children aged 6-10 towards artificial intelligence, it was found that children likened artificial intelligence to robots in the living category and toys in the inanimate category. Lee et al. (2019) examined the perceived personalities of conversational agents (such as Amazon Echo, Google Home, etc.) through drawings by participants aged 4-51. In the study, 31 participants depicted the conversational agent devices as human, speaker, system, and space. Artificial intelligence, referred to as machine intelligence, is defined as the intelligence exhibited by machines or computers (Solanki et al., 2021). The reason children draw robots as representations of artificial intelligence may be because they perceive robots to have intelligence similar to humans.

When the features of the locations depicted in children's drawings were examined, it was found that children mostly drew outdoor spaces such as parks and gardens. Halmatov et al. (2012) observed that 6-year-old children living in Istanbul drew wide spaces, detached houses with gardens, and playgrounds in their drawings. Nodelman (1988) stated that children who use various objects and figures in their drawings see such environments as a source of happiness. Keskin (2006) mentioned that the drawings of preschool children containing fewer details are a developmental phenomenon and that drawing is a language used by children. The reason for children drawing outdoor spaces in their drawings is interpreted as spending most of their time at school, in the schoolyard, and in the garden.

As a result of the study, it was determined that the human figures drawn in children's drawings were researchers, themselves, and their teachers. The drawings of human figures in children's drawings are elements that reflect not only their cognitive development but also their emotions (Slee & Skrzypiec, 2015). Cherney et al. (2006), who stated that approximately 81% of children draw their families in their drawings, suggest that children reflect their inner world and their experiences with their own families through their

drawings. Yavuzer (2016) mentions that children who do not draw themselves in their drawings may do so as a result of feeling insecure or inadequate. In the current study, the reason for obtaining this result may be that children prefer to draw people they feel close to at that moment.

Conclusion

In this research, which examines the perceptions of preschool children towards the concept of 'artificial intelligence' through drawings, it was found that children mostly used the color blue in their drawings of artificial intelligence. It was determined that the entire paper was used in all drawings, and the same applies to the size of symbols and figures in the pictures; in most drawings, the sizes of the drawn elements are normal. It was found that the most frequently drawn symbol in children's drawings of artificial intelligence is a robot. It can be said that children are aware that artificial intelligence is a concept related to machines. When the features of the locations depicted in children's drawings of artificial intelligence were examined, it was determined that children mostly depicted outdoor spaces such as parks and gardens. As a result of the study, it was revealed that the human figures drawn in children's drawings were researchers, themselves, and their teachers.

Recommendations

Based on the findings obtained from the research examining the perceptions of preschool children towards the concept of 'artificial intelligence' through drawings, several recommendations are offered for teachers and researchers. Firstly, this research was conducted with children from a single classroom; therefore, it is recommended to increase the number and diversity of the study group in future research. While this study examined children's drawings, subsequent research could involve one-on-one interviews with children to explore their views on artificial intelligence in detail. The results of this research reveal that children have a basic understanding of artificial intelligence. It is recommended that teachers make informative discussions with children about the concept of artificial intelligence based on these findings.

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