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# PERCEPTIONS OF PRESERVICE PRESCHOOL TEACHERS' REGARDING ARTIFICIAL INTELLIGENCE AND THE MEANINGS THEY ATTRIBUTE[1]

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## ABSTRACT

In the current era, the use of artificial intelligence is rapidly becoming widespread. However, there is limited research on how artificial intelligence can be utilized in preschool education both in our country and globally and how educators' perceive it. This study aims to investigate preservice teachers' perceptions of artificial intelligence and the meanings they attributed to it by preservice teachers who will be preschool educators in the near future. The study was designed as qualitative research. The participants of the study consisted of 107 preservice preschool teachers selected through convenience sampling. Data were collected using a semi-structured form that included prompts such as: "Artificial intelligence is like... because..." and "Artificial intelligence is... because..." They were asked to explain their views on AI in detail. As a result of data analysis, the preservice preschool teachers' perceptions regarding artificial intelligence were grouped into ten categories. The metaphorical perceptions of AI included: human-like, assistant teacher, convenience, future essentials, complexity, innovation and change, double-sided meaning, dangerous, play and experience, and philosophy. Most of the participants stated that AI has human-like features, while the others focused on its functionality. Regarding the meaning attributed to AI, five categories emerged: features, effects, philosophy, usage of AI, and other. It was determined that pre-service teachers attributed the highest number of meanings to the functional, technical, human-like, dynamic, and human interaction features of artificial intelligence and the lowest number to the necessary, unnecessary, mandatory, and important meanings in the other category. The findings suggest that preservice preschool teachers perceive AI as a necessity of the modern age with the potential to shape

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the future of education. They also emphasize that need for cautious use to its dual impacts-both positive and negative. Thus, it should be used cautiously. While the participants expressed willingness to integrate AI into preschool education, they approached it with a critical perspective.

**Keywords:** Artificial intelligence, preservice preschool teacher, metaphor, meaning, content analysis.

## INTRODUCTION

Artificial Intelligence (AI) is one of the cornerstone technologies of industry 4.0., the latest industrial revolution shaping nations worldwide. AI technology is rapidly advancing and increasing its importance for many sectors. It leads the way to a wide variety of changes in both the business world and people's lifestyles. In order to keep up with these changes, AI has been used in many fields, such as engineering, sociology, philosophy, medicine, and education (İşler & Kılıç, 2021). Recognizing its transformative potential, developed countries have revised their educational policies to integrate AI into all school levels, thereby equipping the younger generation with AI-related skills (Touretzky & Gardner-Mccune, 2022). By integrating AI technologies into the education programs of every school level, it is aimed at educating the generation ready to use AI (Association for the Advancement of Artificial Intelligence, 2020). In this context, countries are providing opportunities for their citizens to adapt to the changes in the society of the future and to develop skills related to AI.

The origins of AI can be traced back to 1950, when British mathematician Alan Turing posed the question, "Can machines think?" (Turing, 1950). McCarthy and colleagues (2006) later coined the term "artificial intelligence" in 1956. Since then, AI has evolved into software capable of mimicking human intelligence and reasoning, using techniques such as machine learning and deep learning to perform tasks like understanding language, recognizing objects and sounds, learning, and problem-solving (Wang, 2019). Its applications have significantly accelerated developments in labor markets, technology, and the economy, thereby emphasizing the importance of educating individuals to utilize AI effectively.

AI in education is divided into two categories: as an educational tool and as educational content creator (Holmes, Bialik, & Fadel, 2019). The General Directorate of Innovation and Educational Technologies (MoNE, 2024) recommends AI applications that teachers can use in their classrooms as educational tools. It also identifies the core elements for training teachers, students, and children in the use and development of AI in order to develop individuals' skills required in the future (Digital Transformation Office of the Presidency of the Republic of Turkey, 2021). Developing teachers' digital skills towards AI, raising individuals with the digital skills of the future, and

innovations in education using AI can be laid. Inservice and preservice teachers play a critical role equipping students with the necessary digital skills for the future. It is crucial for all teachers to use AI as an educational tool in the educational activities (Vartiainen, Tedre, & Valtonen, 2020). In addition, teachers' beliefs and attitudes are known to be one of the main factors in the planning, implementation, and evaluation of education (Bulut et al., 2023). Therefore, teachers who attach importance to the use of AI can frequently include it at every stage of their teaching activities. Potential users of AI, their perceptions of it, and the meanings they attribute to it can establish the point of view they will establish with this technology.

Since the announcement of educational policies on AI in the world, studies focusing on preschool children, teachers, and preservice teachers have been conducted. For example, research indicates that AI contributes to preschool children's understanding of AI and developing positive attitudes towards it (Druga, et al., 2019), to acquire AI literacy (Ng et al., 2021), to experience coding education, to interact with robots, and to have fun (Williams, 2018). In addition, humanoid robots are used in AI-based research in preschools. Zhorai (Lin et al., 2020), PopBots (Williams, Park, & Breazeal, 2019), and Plush Toys (Tseng et al., 2021) are some of them. They show that children who interact with humanoid robots make visualizations during the education process; their motivation, creativity, and focus time increase, thus these robots make contributions to the education (Lin et al., 2020; Tseng et al., 2021; Williams et al., 2019). In addition, suggestions for activities that preschool teachers can carry out for the use of AI were presented (Druga et al., 2019). AI literacy have been critical to develop children, which can be defined as "having the essential abilities that people need to live, learn, and work in our digital world through AI-driven technologies" (Ng et al., 2021, p. 2). AI literacy studies in which the concept of 'education with AI' have been carried out (Kandlhofer, Steinbauer, Hirschmugl-Gaisch, & Huber, 2016); AI is used in education via educational robots and augmented reality to evaluate children's development (Jin, 2019). Research shows that AI at the preschool level can be used in different ways and has different contributions to children.

In studies examining the AI use of inservice or preservice teachers, their perceptions of AI are focused (Aslıyüksek, Taş, Türkoğlu, & Sezer, 2023) and the effects of AI training program are examined (Vartiainen et al., 2020). Moreover, the perceptions of educational stakeholders (Demirtaş & Türksoy, 2023) and children (Saçan, Yaralı, & Kavruk, 2022) about AI were examined. However, limited attention has been given to the perceptions of preservice preschool teachers (PPTs) regarding AI. These perceptions are crucial, as PPTs will shape

future generations and guide how AI is incorporated into preschool education. At this point, it is possible to examine how they make sense of intelligence with metaphor and meaning analysis.

PPTs are introduced to and begin utilizing AI tools at the faculty, one of the technologies they are expected to use in their future classrooms (Sperling et al., 2024). Hence, their perceptions of AI are significantly shaped during the teacher education process (Lim, 2024). Understanding PPTs' perceptions of AI is crucial, as it influences their intentions and willingness to integrate AI tools into their future teaching practices. Moreover, identifying the perceptions can support their understanding and effective use of these tools, facilitate the creation of productive educational environments (Lim, 2024), and enhance their self-confidence (Bautista et al., 2024; Yıldız Durak, 2021). Importantly, PPTs' awareness of ethical considerations of AI-use in the classroom offers an opportunity to cultivate a sense of social responsibility (Ayanwale et al., 2024). AI tools also enable them to create personalized preschool learning settings (Maghsudi et al., 2021). Additionally, their attitudes towards AI provide them with the knowledge and experience necessary to select appropriate AI tools for their educational contexts and to effectively integrate these technologies into their teaching activities (Yang & Kim, 2016). Finally, PPTs' perceptions play a critical role in fostering awareness of the importance of considering students' interests and needs when selecting technologies, as well as anticipating potential limitations and security risks to implement appropriate precautions (Ayanwale et al., 2024).

One of the methods used to determine teachers' perceptions of AI is using metaphors. Metaphor, one of the verbal expression methods, is a way of thinking to find and express similarities between two different objects, situations, or concepts (Lakoff & Johnson, 2020). Metaphor is based on the similarities of abstract concepts expressed as "A is like B" with concrete entities and objects. They are used in research to determine teachers' attitudes, beliefs, and values (Cortazzi & Jin, 2020). Metaphors emerge from personal experience and perception, allowing individuals to create similarities or relationships between two things.

AI, commonly used in all areas of life, has started to make revolutionary changes in educational environments. Thus, it is important how teachers, as the primary users of it, make sense of AI. Educational use of AI in class may be related to the teachers' meanings attribute to AI. Because, according to Dijksterhuis and Van Knippenberg (1998), the meanings that individuals attribute to events, phenomena, or situations are directly related to their behaviors. The studies on the meaning that people attribute to AI are quite limited (Gerlich, 2023). Mahajan (2023) indicated that people understand AI as computers that

think like humans, have learning processes, and are a reflection of human intelligence. In other words, they see AI as machines with skills close to human intelligence. Correspondingly, it has been revealed that the meaning attributed to AI affects their use and learning of AI and users of AI-supported applications emphasize the ease of use and usefulness of AI (Kashive, Powale, & Kashive, 2020). It is known that people still have unanswered questions about AI (Gerlich, 2023). The studies reveal that although the research on the meaning of AI generally accepts that it is a system arising from the latest developments of technology in a large mass of society, some of the individuals are cautious or reactive towards AI.

As the interest in AI education has increased, research on how individuals make sense of and perceive AI has also increased. For example, Erdoğan and Bozkurt (2023) found that preservice physics teachers mostly used human, brain, universe, space, library, machine, and robot metaphors about AI to reflect their perceptions. Saçan et al. (2022) uncovered 12 metaphors about AI of children (6–10 ages) and their parents and grouped these metaphors into two categories: living and nonliving. Tartuk (2023) found that middle school students mostly used human, brain, robot, technology, and scientist metaphors for AI. Lim (2024) examined PPTs' metaphors of AI through the eyes of children and found five positive metaphorical concepts (play and experience, foundations of the future, innovation and change, convenience, and assistant teacher) and one negative metaphorical concept (double meaning). However, there were no studies directly examining PPTs' metaphorical perceptions of AI. However, when the metaphorical perception studies conducted in the literature are examined, it is seen that the participants may have difficulties in fully reflecting their views on the phenomenon or concept directly investigated (Cates, 1994; Williams, 2000); therefore, the meanings they attribute to AI along with metaphorical perceptions were examined in this study to make more detailed examinations. Therefore, the current study is important as it will contribute to the literature at this point. The aim of this study is to determine PPTs' metaphorical perceptions of AI and the meanings they attribute to AI. In line with this purpose, the research questions were determined as: What are the preservice preschool teachers' metaphorical perceptions of artificial intelligence? How do the preservice preschool teachers make sense of artificial intelligence?

## METHOD

### Research Design

The current study was designed as basic qualitative research to answer the research questions. Basic qualitative research is commonly used in educational research, which aims to explore the participants' perceptions related to how they

perceive and interpret an object, situation, and/or case (Merriam & Grenier, 2019). In the current study, it is aimed to determine the views of PPTs and their meaning to AI, who are frequently confronted with AI in their daily lives.

**Participants**

The participants of the study consisted of the students enrolled in Program of Preschool Teacher Education at the Faculty of Education, YOBU. Currently, there are approximately 240 PPTs in the department, overall. All students in the department were invited to the study through online messaging systems. Data were gathered from 107 PPTs, selected using the convenience sampling method based on voluntary participation. Of the participants, 24% were first-year students, 30.4% were second-year students, 23.2% were third-year students, and 22.4% were fourth-year students. 79.2% of the PPTs were female; 7.2% were 18 years old, 17.6% were 19 years old, 13.6% were 20 years old, 21.6% were 21 years old, 22.4% were 22 years old, 11.2% were 23 years old, and 6.4% were 24 years old or older.

**Data Collection Tools**

As a data collection tool, a structured form with open-ended questions was prepared in so that participants could share their views in detail. In this form, closed-ended questions regarding the participants' gender, age, grade level, and other demographic information were included. In addition, there were two basic open-ended questions where the participants could express their views on AI. These were 'Artificial intelligence is like... because...' and 'Artificial intelligence is... because...'. The first question aimed to determine their perceptions of AI metaphorically, and the second question aimed to determine the meanings they attributed to AI. To ensure construct validity, expert opinions were gathered from two different academicians with the expertise of early childhood education and educational technology integration, and relevant corrections were made, such as changing the phrase from 'AI is…' to 'AI is like….'. Then the form was finalized.

**Data Collection and Analysis**

Ethics committee approval dated 17.07.2024 and numbered 16/6 was obtained prior to data collection. The data collection form was distributed via online platforms. By getting permission from the instructor, the researchers entered the classrooms in the last ten minutes of the course and shared the form link created by Google Forms with the preservice teachers through the online messaging system. While the preservice teachers who volunteered to participate in the study filled out the form in the classroom, the researchers were present in the classroom environment and answered the PPTs' questions about the research and the form. Before the analysis phase, all the data were read by the researchers and reviewed

in terms of the appropriateness of the data for the analysis. During this phase, researchers checked the responses to see whether there was missing data. At the first phase, researchers decided that all the data could be analyzed.

For data analysis, content analysis was implemented. Before the analysis phase, while reading all the data, researchers captured the initial codes from the data to construct their main codes and themes. Separate codes, themes, and sub-themes were identified for each question in a spiral coding phase. A codebook was created to explain codes, specifying examples and related units. 10% of the data were coded separately by two different researchers in accordance with the codebook, and the inter-coder reliability coefficient was determined. If the consensus was above 80%, the data analysis phase was started. It was determined that the coders reached 94.54% consensus. According to Miles and Huberman (1994), a consensus of 90% and higher among coders is considered reliable for qualitative data analysis. The codebook was used to complete coding all data.

## FINDINGS

### The metaphorical perceptions of preservice teachers on AI

Findings related to PPTs' metaphorical perceptions of AI and the meanings they attribute to AI are presented in Figure 1. PPTs' metaphorical perceptions of AI were categorized as human-like, assistant teacher, convenience, future essentials, complexity, innovation and change, double-sided meaning, dangerous, play and experience, and philosophy.

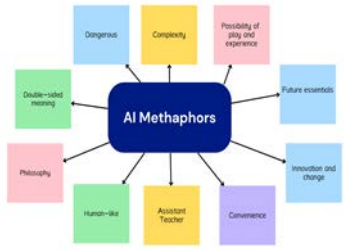


Figure 1. Summary of Metaphors

PPTs' metaphorical perceptions of AI were categorized into ten themes. The human-like category was the most frequently mentioned, with subcategories including; human (n=16), brain (n=15), human intelligence (n=10), human without emotions, and technology thinking like humans. In this category, the

participants used expressions that AI had human characteristics. For example, one participant stated, *'It imitates human intelligence, thinks like a human, and completes the tasks given by humans by imitating human intelligence*' (P54). Similarly, they expressed that artificial intelligence was a reflection of the brain, as *'Artificial intelligence is like the brain because it can solve human problems even though it is an inanimate being'* (P14). It was seen that preservice teachers perceive AI as human beings because it was cognitive features other than human emotional and physical features.

In the assistant teacher category, the participants emphasized the metaphor of auxiliary power (n=7). The sub-metaphors of assistant and counselee in this category were mentioned twice each, and the metaphor of master was mentioned once. The participants stated that it contributed to facilitating people's work as follows: *"Artificial intelligence facilitates our work by providing us with convenience in every field; it has become a part of our lives and is like a helpful element. Artificial intelligence has many contributions in the field of education. Such as preparing slides, videos, etc*.' (P79). Since AI could support people in every subject, it was likened to a counselee with the following expressions: *'It responds to everything we ask for'* (P29). Participants emphasized the features of AI to support and guide people.

In the convenience category, participants emphasized the subcategories of robot (n=7), ease, and comfort. For participants, AI was like a robot in terms of functionality. For example, '*Nowadays, the function of robots is to reach a result in the shortest and fastest way; we can liken artificial intelligence in this respect*' (P21). Convenience, in terms of facilitating human life, was expressed by one of the participants as follows: '*It allows us to access information practically*' (P72). Regarding the fact that it makes life easier, the participant explained as follows: '*We can easily do most of the things in our lives thanks to artificial intelligence, and it gives people a sense of ease and comfort.'* (P86) The participants focused on the features of AI that made things easier in human life and helped humans to perform many tasks.

When the metaphors were analyzed, it was seen that future essentials and complexity categories were more diverse than other categories. As future essentials, the metaphors of our dream world (n=3) and blessings were mentioned. One of the participants explained AI as a dream world like *'...it offers everything I imagine in front of me endlessly and can create forests with just a small spark*' (P46). While defining AI as a blessing, the ease of access was explained as *'... it allows us to reach everything easily*' (P104). In addition, there were subcategories of light, breathing, water, magic wand, and miraculous. Within the light, it was mentioned that AI could provide benefits with its effective use. For example, *'... if*

*you use it correctly, it turns your darkness into light'* (P107). AI had vital importance, the view was expressed as *'It is one of the necessities of today, and a world without artificial intelligence cannot progress'* (P80). Similarly, the participant who likened it to water stated that AI was a necessity with the expression, "*Because artificial intelligence is like one of our basic needs in the age we live in now.*" (P94). In this category, preservice teachers mentioned that AI was a necessity in human life, like water or breathing, and that it could contribute to the realization of dreams by taking people beyond the limits of their imagination.

In the complexity category, the bee metaphor was mentioned more than the metaphors of sky, bottomless well, sea, cloud, sun, candlelight, road, wheel, four-armed human, and car with unclear route. PPTs indicated similarity of AI working mechanism with bees' like being as fast and interconnected as bees: *'In a way, it processes information like a bee colony'* (P104). Again, they likened AI to the sky bu means of the edges and said, "*It is endless. It can be developed further, since there is no limit to its development...*' (P41). The similarity to the bottomless well was expressed as *'It is difficult to predict the end and the beginning'* (P34) and as sea: '*... the sea is big; the knowledge of artificial intelligence is as much as the drops of water in the sea'* (P1). As for the clouds, *'Because when we look at the sky, it seems as if the clouds protect their existence up to an infinite height; that is, they are endless. Artificial intelligence is developing so fast that it seems infinite in terms of how much more it can develop. Every time it develops more, it surprises even more'* (P24) emphasized its size, complexity, and surprisingly rapid development. In the sun metaphor, it was stated that it is continuity *'It will always be'* (P42). It was seen that preservice teachers metaphorized AI as an entity that was hardworking and productive, had access to infinite resources, could reach broad horizons, and could transform life with deep, powerful, and infinite potential. It was seen that preservice teachers metaphorized AI as being hardworking and productive, having access to infinite resources, being able to reach wide horizons, and as an entity that could transform life with deep, powerful, and infinite potential.

When the innovation and change category was analyzed, it was seen that the most common subcategories were book (n=2) and warehouse (n=2). The perception of AI as a book was explained as *'Because it provides easy access to information' (P71)* and as a repository, *as 'It stores information'* (P33). In addition to these, there were the categories of rainbow, encyclopedia, information ball/information pool, god, flash memory, and ore. The similarity of AI to the rainbow in terms of the diversity it offered was stated like, *'Because just as the rainbow is made up of different colors, artificial intelligence provides people with*

*many different facilities*.' (P40). AI was likened to an encyclopedia with the statement, *'When the necessary conditions are provided, it can access any information*' (P2), and to God with the statement, *'If it accesses the right data, there will be no information that it cannot find'* (P104). It was likened to an information pool with the explanation *'We can easily find the answers to our questions'* (P16), to a flash memory as *'It has the feature of storing all the information in it...'* (P37), and to an ore as *'When you enter the system, we discover something new'* (P25). Since AI had the ability to access and analyze huge amount of data, preservice teachers emphasized the features of accessing information, processing information, storing information, and versatile functionality.

In the double-sided meaning category, there were scalpel (n=2), pepper, snake, iron mountain, mushroom, and medicine metaphors. PPTs explained the connection of AI with a scalpel that they made: *'If it is used for best, all people will benefit form it; if it is used for evil by malicious people, it will harm'* (P81). PPTs indicated similarity with pepper: *'You cannot know whether it is bitter or sweet. You need to taste it and discover it.'* (P15) and its similarity to an iron mountain: *'It allows us to see the horizon by melting like an iron mountain. When it does not melt, it imprisons us'* (P30). The similarity with the snake was explained as *'Because if we approach it correctly and use it with good intention, it adds difference and innovates our lives, but if we do not use it correctly and make it the center of our lives, it will gradually poison us'* (P102). The similarity with mushrooms was established as *'We cannot do anything without it, but too much of it poisons us'* (P77). Regarding the similarity between medicine and AI, *'When we are sick, we apply to the pharmacy; it temporarily relieves our pain. We use it for a certain period of time for our illness to pass. It's the same logic in artificial intelligence. In fact, when we have academic difficulties, we can use artificial intelligence for homework and other things. Of course, it is debatable how harmful it is to humans in excess.'* (P15) drew attention. PPTs stated that, besides having both positive and negative effects, it was shaped under the influence of the ethical and moral values of the person(s) who develop/direct this technology and act in line with their expectations and directions. They stated that when it was used within self-restrained, morally, and ethically, it could be beneficial for universe, but when it was devoid of these, it could have dangerous and destructive effects.

There were four subcategories of 'dangerous' and 'possibility of play and experience' categories. Brain rot, excessive wealth, darkness, and bombs were included in the dangerous category. Brain rot indicating the harm of AI to human life was explained as: *'Because it offers us solutions in every field where we will*

*perform our brain functions without giving us the opportunity to think. This restricts us from using brain functions, over time'* (P105). A similarity of AI and excessive weather was made as: *'The richer we are, the more we tend to be lazy, so artificial intelligence is the factor that directs our lives that makes us lazy.'* (P28). A similarity was made with AI and darkness that it could replace human beings: *'Artificial intelligence will replace human power in the future; this will reduce the need for human beings. This situation will drag us humans into a compulsory obedience to artificial intelligence managers'* (P95). It was emphasized that being cautious was compulsory in its use. It was seen that the similarity with the bomb was established as *'It can save you with the right move and destroy you with the wrong move*' (P23). At this point, preservice teachers' metaphors contained their concerns that would AI weaken people's mental activities. Its uncontrolled use would endanger society and restrict human activities over time.

In the category of possibility of play and experience, there were subcategories of baby, curious child, and play. Emphasizing the continuity of the development of AI, it was likened to a baby by saying *'It develops continuously and rapidly'* (P7) and a curious baby with by *'Artificial intelligence questions everything that is curious and tries to find solutions'* (P78). In the game subcategory, a similarity was established with the explanation '*It offers a fun time'* (P84). PPTs mentioned that AI was in the process of continuous learning and development, that it renewed itself with high-level analysis while doing so, and that it strengthened itself with actions such as creativity, developing strategies, and making discoveries by providing a fun environment. In this case, preservice teachers emphasized that AI grew like a baby, was open to learning like a curious child, and had a flexible structure like a game.

Finally, in the philosophy category, pragmatic and bag metaphors were reported. When it was expressed as pragmatic, it was stated as *'It usually has an opinion on every subject'* (P36). For the bag category, *'It was not very necessary.'* (P26) was stated that the bag could provide benefits such as collecting the materials together. The preservice teachers emphasized the ability of AI to bring people to results in a functional and practical way. These metaphors showed that AI contained a system of thought as well as its digitally and that it was handled philosophically.

**The meanings that preservice teachers attribute to artificial intelligence**

When the meanings attributed to AI by preservice teachers were examined, they were grouped into five categories: characteristics, effects, philosophy, usage and others. Details about these categories were as follows, respectively. The meanings attributed by preservice teachers to AI were divided into five

subcategories in terms of their structural characteristics: functional, technical, human-like, dynamic, and human interaction.

Details are given in Table 1. Among these, the most emphasized subcategory was functional features. Among these features, they mentioned the facilitative (f=30), interesting (f=1), secure (f=1), manageable (f=1) and need-satwasfying (f=1) features of AI. According to the meanings they attributed to AI, preservice teachers emphasized the facilitating feature of AI because it could respond to any situation related to people's lives quickly and easily and guide them. When the technical subcategory was examined, technology (f=12) was emphasized the most, and powerful (f=1) and complex (f=1) were emphasized the least. On the other hand, the technical features were machine intelligence (f=9), fast (f=8), computer program (f=6), machine (f=6), and no emotions (f=2). They stated that since AI had a technological infrastructure, they addressed it from the digital aspect.

As human-like features, it was emphasized that AI thought like a human (f=12). On the other hand, one participant stated that it couldnot think like a human. Participants stated that AI was a device that replaced humans (f=10), imitated human intelligence (f=6) and acted like humans (f=5). In addition, there were also participants who stated that it fulfilled the task given to it (f=1) and was intelligent (f=1). Preservice teachers emphasized communicating, researching, and using logical processes as the human-like characteristics of AI.

In the case of being dynamic, the participants emphasized the novelty (f=8) and stated that it was constantly changing (f=3), uncertain (f=2), developing (f=2), and infinite (f=1). In the last sub-category of human interaction, PPTs stated that it was controlled by humans (f=3) and was a human product (f=1). They stated that AI improved itself by using the data obtained and was in the process of change.

**Table 1.** Characteristics of artificial intelligence according to PPTs

| **Category** | ***f*** |
|---|---|
| Functional characteristics | 79 |
| Technical characteristics | 45 |
| Human-like characteristics | 36 |
| Dynamic | 14 |
| Human interaction | 4 |

Regarding the effects of AI, the meanings attributed to AI by the participants were divided into two as positive and negative effects (see Table 2). Negative effects included its impact on society, mental impact, social-emotional impact, and impact on development. As a negative impact on society, preservice teachers mostly considered it in terms of double-sided use (f=21). At this point, the

participants stated that the person using AI could have both positive and negative consequences depending on the purpose of use. In addition, one participant had a skeptical approach to AI by stating that AI was not reliable. In addition, among the preservice teachers, there were preservice teachers who thought that AI was dangerous (f=20), could be misused (f=3), was harmful (f=3), and was frightening (f=2) and would destroy human beings (f=2). The participants, who stated that AI could be used for different purposes according to the characteristics of its users and that these could have different consequences, indicated that they approached AI cautiously and skeptically. Regarding its mental effects, they stated that AI caused laziness (f=7), prevented thinking (f=3), distracted from concreteness (f=1), and prevented creativity (f=1). As for its social-emotional impact, they stated that it was addictive (f=4), dysfunction (f=3), was misleading (f=2), prevented socialization (f=1), and distracted from reality (f=1). Finally, the participants who emphasized the negative effects on development mostly mentioned the negative effects on the development of the individual (f=4), the development of the child (f=2), the prevention of learning (f=1), and obesity (f=1).

According to the meanings they attributed to AI, preservice teachers perceived it as a dangerous technology due to its negative effects on the holistic development of society and human beings. The positive effects of AI were categorized under two subcategories: effects on society and human beings. They detailed its contributions to society as making life easier (f=33), being a decisive power (f=5), accumulation (f=1) and taking society to the top (f=1). They summarized its positive effects on human beings as saving time (f=7), developing people (f=5), supporting learning (f=3), providing opportunities (f=1), and being a source of inspiration (f=1). It was seen that preservice teachers emphasized that AI contributed to the development and progress of society and facilitates human life.

**Table 2.** Effects of artificial intelligence according to PPTs

| **Category** | **Subcategory** | ***f*** |
|---|---|---|
| Positive Effects | Society Impact | 52 |
| | Mental Impact | 12 |
| | Social-emotional Impact | 11 |
| | Impact on development | 8 |
| Negative Effets | Society Impact | 40 |
| | Human Impact | 17 |

PPTs evaluated the meaning of AI from a philosophical perspective and discussed AI within the scope of pragmatism (f=22), futurism (f=14), progressivism (f=4), rationalism (f=1), and skepticism (f=1) (see Table 3). The preservice teachers who philosophically evaluated AI focused on the fact that AI served people, designed the future, moved humanity and society forward, and provided the highest level of use of knowledge and logic. In addition, they approached AI cautiously and stated that it should be used by filtering logic.

**Table 3.** Philosophy of artificial intelligence according to PPTs

| **Category** | ***f*** |
|---|---|
| Utilitarianism | 22 |
| Futurism | 14 |
| Progressivism | 4 |
| Rationalism | 1 |
| Skepticism | 1 |

According to Table 4, the meanings they attributed to the use of AI differed as being in all areas of life (f=14), being source of information (f=5), being source of change (f=4), and requiring careful use (f=1). Although it was a part of life, preservice teachers considered AI as a technology open to criticism. Finally, in the "other" category, the participants diversified their opinions as AI was necessary (f=11), unnecessary (f=4), a necessity (f=3), and important (f=3). Preservice teachers attributed great importance to AI, but some participants stated that AI would not contribute to humans. While a significant portion of the participants saw AI as a necessary need, some participants were critical of AI considering the risks and negative effects.

**Table 4.** Preservice teachers' use of artificial intelligence and other categories

| **Category** | **Subcategory** | ***f*** |
|---|---|---|
| | All areas of life | 14 |
| Usage | Source of information | 5 |
| | Source of change | 4 |
| | Careful use | 1 |
| | Necessary | 11 |
| Other | Unnecessary | 4 |
| | Necessity | 3 |
| | Important | 3 |

## DISCUSSION

The use of AI in education is important in life: from preschool education to adult education. Global discussions and research on AI use at each grade level

have been intensively continuing (Denning & Tedre, 2021; Ouyang & Jiao, 2021). Teachers have tremendous responsibilities in the inclusion of AI technology in educational environments, especially in preschool (Yang, 2022). They should be able to use their digital competencies in educational environments, taking into account factors such as educational programs, content knowledge, teaching methods, and student characteristics (Lim, 2015). Therefore, this study focuses on the metaphorical perceptions of PPTs towards AI and the meanings they attribute to AI. In order to create the society of the future and for this society to be ready for the technologies of the future, it was found that PPTs have a positive perspective towards AI, although they had limited knowledge and experience regarding the use of AI in education. They included the metaphorical concepts of AI as the possibility of play and change, future essentials, innovation and change, convenience, assistive teacher, human-like, philosophy, double-sided meaning, dangerous, and complexity. In addition, when the meanings they attributed to AI were revealed ~~as~~ the features such as, effects, philosophy, and usage of AI stood out.

According to preservice teachers, AI is valued for its practical, easy-to-use, and innovative features, which enable it to facilitate human life and contribute to societal progress. When the features of AI are evaluated from this point of view, they can be expressed as significantly positive contributions. Since AI is a computer technology, it has been observed that it focuses on its functionality. It is seen that it is mainly beneficial to human beings, and its features, such as being innovative and versatile, are emphasized. A similar situation emerged in Kim's (2022) study, and in this study conducted with middle school students, it was determined that the functionality of AI as a machine technology was emphasized. Küçükkara, Ünal, and Sezer (2024) found that preschool teachers emphasized that AI was easy to use and saved time. Considering its functional features, Saçan et al. (2022), one of the similar studies, stated that children's metaphorical perceptions focused on the fact that AI facilitates life, was similar to human beings, and could be controlled by humans. When Tartuk (2023) examined the metaphorical perceptions of secondary school students in his research, he emphasized the technical and human dimensions of the perceptions and functionally mentioned that AI made life easier. Although preservice teachers have limited experience with AI, the fact that AI is facilitating, functional, and easily accessible and that they see it as a guide shows that they have a positive perspective towards AI and that they are already aware that these systems are not real.

Since AI is composed of human thought systems and has many human-like characteristics, preservice teachers clearly has stated that AI resembles human

beings both in their metaphoric perceptions and in the meanings they attributed to AI. Based on this, it is noteworthy that AI follows processes similar to human thinking processes, shows some human behaviors, and is a reflection of human intelligence. Balıkçı, Alpsülün, and Hayoğlu (2024) reached similar results in their studies with teachers and Tartuk (2023) with students, and it was determined that AI was most similar to humans as a living being. The fact that AI shows problem solving, learning, memory, reasoning, perception, and language skills may have caused preservice teachers to liken AI to humans the most.

One reason why AI is often perceived by PPTs as human-like and potentially dangerous can be the influence of cultural factors on such opinions. Amershi (2020) highlights that culture plays an active role in shaping perceptions and is a key factor in how individuals construct meaning. For example, in Turkish storytelling traditions—such as fairy tales, stories, and fables—mythical beings like fairies, jinns, and giants are frequently depicted with human-like characteristics (Duvarcı, 2005). This cultural context may influence the perception of AI, which exhibits behaviors like verbal and written communication, empathy, and problem solving, drawing parallels to these human-like traits. Additionally, the perception of AI as dangerous may stem from the interplay between technophobia—defined as anxiety-driven avoidance of technology—and technophilia, characterized by over-reliance on technology (Martines-Corcoles et al., 2017). The literature suggests that while individuals recognize the benefits of technology, they also remain cautious about its potential drawbacks (Mermer et al., 2021).

The point that AI could have positive and negative consequences depending on the intended use of the individuals was mentioned by the preservice teachers in the categories of dangerous and double-sided meaning. The preservice teachers expressed both in their metaphors and in the meanings they attributed that the process in which AI was not used within the framework of ethical and moral values was dangerous. It has been determined that the fears reported in the studies are due to reasons such as loss of privacy, malicious use, and AI-based surveillance (Selwyn, Cordoba, Andrejevic, & Campbell, 2020). Steps should be taken to create a 'Good AI Society' as fears about the unethical use of AI may strengthen the perception that this technology can be used by malicious individuals or groups for different purposes, posing major threats to justice and security in society (Cath, Wachter, Mittelstadt, Taddeo, & Floridi, 2018). In addition to the professional and personal development of individuals, digital literacy education should be given a significant place in order to ensure their development in cybersecurity awareness and ethical values. Cybersecurity awareness can be explained as '… relies on individuals knowing basic ways that

they can protect themselves, their data, and their devices' (Frydenberg & Lorenz, 2020, p. 34). According to Langub and Lokey-Vaga (2017), digital literacy education should include issues related to cybersecurity awareness and safety in addition to the positive aspects of digital technology in order to help future citizens build ethical values to use digital technologies in a desirable and effective way. Because the concerns of PPTs who play a role in shaping the society of the future may be reflected in the children they will raise. Teachers, preservice teachers, and children need to develop their digital literacy skills in terms of ethics and safety. Their perceptions about the danger of AI may have caused preservice teachers to approach AI cautiously. When the research in the literature is examined, it is stated that not only the users of AI but also the people who design and develop AI reflect their ethical values toward AI and may create results that will harm society and individuals (Kelley et al., 2021). In order to prevent the danger, AI users need to be developed in terms of ethical use; in order to reduce the danger effect, individuals need to be empowered at many points, especially cybersecurity.

For preservice teachers, AI is closely related to philosophical approaches such as pragmatism, progressivism, rationalism, skepticism, and futurism. Pragmatism can be defined as 'if a philosophical theory does not contribute directly to social progress, then it is not worth much' (SEP, 2024, p. 1). Pragmatism is based on the expectation that AI will provide broad benefits to society, especially its potential to increase efficiency in health, education, and business (Binns, 2018). Progressivism is based on the idea that technological innovations will advance the development of humanity, and AI is seen as the key to this progress (Brynjolfsson & McAfee, 2017). From a rationalism perspective, it is argued that AI can objectify decision-making processes and minimize human error (Bostrom & Yudkowsky, 2018). However, skepticism warns that AI may pose ethical problems and unforeseen risks (Zuboff, 2019). Futurism, on the other hand, sees AI as a force that can radically change the future of humanity and believes that AI will transform both society and the perception of humanity (Uğur & Kurubacak, 2019). In this direction, although AI is a mechanism that makes people's work easier, develops people, and prepares people for the future, it can be predicted that individuals see AI as a danger and therefore will be cautious when using AI for a long time.

## IMPLICATIONS AND LIMITATIONS

In the light of the research findings and discussion, the following suggestions can be made. Firstly, curriculum can be prepared and implemented so that preservice teachers can realize the potential of AI and have the competence to use it in their own classrooms in the future. By emphasizing topics such as ethical use,

cybersecurity awareness, and AI literacy in the content of these curricula, preservice teachers' concerns about AI can be reduced and effective use of AI can be ensured. In the education of children who will form the society of the future, preschool teachers can organize activities using AI-supported technologies, evaluate children individually and as a group, and easily prepare and effectively implement daily, monthly, and annual plans. Thus, they can enrich the educational environment and lighten their workload with the support of AI. In addition to these, children will be able to gain AI literacy skills. Another suggestion is for the further researcher: that analysis of the metaphorical perceptions of the in-service preschool teachers on AI can be conducted to enlarge the understanding of AI use in the current classroom environments. Moreover, PPTs' experiences on how to use AI in their daily lives and their educational activities can be explored in further research.

This study has some limitations. First of all, PPTs' perceptions regarding and understandings of AI were investigated. However, it is not possible to explore the intention behind these perceptions, and the reasons behind these tendencies cannot be analyzed. Secondly, participants in this study are not equally distributed in terms of their gender. Thirdly, this study is limited by the self-reported data from the participants of the study.

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# OKUL ÖNCESİ ÖĞRETMEN ADAYLARININ YAPAY ZEKÂYA İLİŞKİN ALGILARI VE YÜKLEDİKLERİ ANLAMLAR

## ÖZET

Günümüzde yappay zekânın kullanımı gün geçtikçe yaygınlaşmaktadır Bu doğrultuda ülkemizde ve dünyada yapay zekânın okul öncesi eğitşmde nasıl kullanıldığı ve öğretmenlerin okul öncesi eğitimde yapay zekâyı nasıl algıladıkları ile iglili araştırmalar oldukça kısıtlıdır. Bu çalışma yakın zamanda okul öncesi eğitimcisi olacak öğretmen adaylarinin yapay zekâ yönelik algılarını ve yapay zekâya yükledikleri incelemeyi amaçlamaktadır. Bu araştırma nitel desende tasarlanmıştır. Araştırmanın katılımcıları kolay ulaşılabilir örnekleme yoluyla 107 okul öncesi öğretmen adayından oluşmaktadır. Veri toplamak için geliştirilen yarı yapılandırılmış formda şu ifadelere yer verilmiştir: "Yapay zekâ... gibidir, çünkü..." ve "Yapay zekâ... gibidir, çünkü..." Katılımcılardan yapay zekâ hakkındaki görüşlerini ayrıntılı olarak açıklamaları istenmiştir. Verilerin analizi sonucunda, okul öncesi öğretmen adaylarının yapaya zekâya ilişkin metaforik algıları on kategoride toplanmıştır. YZ'ye yönelik metaforik algılar insana benzer, yardımcı öğretmen, kolaylık, geleceğin vazgeçilmezleri (temelleri), karmaşıklık, yenilik ve değişim, çift taraflı anlam, tehlikeli, oyun ve deneyim ve felsefe olarak belirlenmiştir. Katılımcıların büyük çoğunluğu yapay zekânın insana ait özellikler taşıdığına; çok azı yapay zekânın işlevselliği ilişkin algılara sahip olduğu sonucuna ulaşılmıştır. YZ'nin anlamı ile ilgili olarak beş kategori bulunmaktadır: özellikler, etkiler, felsefe, YZ kullanımı ve diğerleri. Öğretmen adaylarının en çok yapay zekânın fonsiyonel, teknik, insana benzeyen, dinamiklik ve insan etkileşimi özelliklerine; en az ise diğer kategorisinde yer alan gerekli, gereksiz, zorunlu ve önemli anlamlar yükledikleri belirlenmiştir. Araştırma bulgularına göre, geleceği şekillendirme potansiyeline sahip olan öğretmen adayları için YZ çağın bir gerekliliğidir. Öğretmen adayları, YZ'nin hem olumlu hem de olumsuz etkileri olabileceğini, bu nedenle dikkatli kullanılması gerektiğini vurgulamışlardır. Geleceğin öğretmenlerinin yapay zekâyı okul öncesi düzeyde eğitim sürecine dâhil etmeye istekli oldukları, ancak bu süreçte eleştirel bir bakış açısıyla ilerleyecekleri açıktır.

**Anahtar kelimeler:** Yapay zekâ, okul öncesi öğretmen adayı, metafor, anlam, içerik analizi.