

Determination of Teachers' Perceptions of Artificial Intelligence Concept: A Metaphor Analysis

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Abstract: This research sought to explore educators' views on Artificial Intelligence (AI), a topic that has become increasingly important with the advent of recent digital transformations. Given its potential impact on education, AI can offer valuable insights for curriculum planning and teaching strategies. The study used metaphor analysis to understand educators' perspectives on AI. An online questionnaire was employed to collect data from teachers working in schools affiliated with the Ministry of National Education in Şanlıurfa in the 2023-2024 academic year. Teachers were asked to complete the sentences about their perceptions of artificial intelligence, especially using expressions such as "Artificial intelligence is like ..." and "...because ...". According to the findings of the metaphor analysis, teachers conceptualized AI as a job facilitator, associating it with robots and machines representing cognitive intelligence. However, concerns also emerged about the potential risks of AI and its impact on creativity. The findings emphasized the complex perceptions of AI in education, showcasing the balance between its positive contributions and the ethical responsibilities it entails. While the study offers valuable insights for understanding the complexity of AI in the educational context, it also highlights the various metaphors teachers use to describe this technology. In this context, prominent metaphors used by teachers to describe artificial intelligence include human, robot, brain, assistant, and machine.

Keywords: Metaphor Analysis, Artificial Intelligence, Teacher Perception, Educational Technology

1. Introduction

In today's world, where each scientific advancement accelerates the next invention, new technologies are becoming indispensable at every stage of our lives. Alongside the advancing technology, significant developments are also occurring in our education system. As noted by Wildman and Niles (1987), the success of change and development efforts in educational institutions depends on the management's understanding within those institutions. This understanding has imposed new responsibilities on school administrators and teachers who play a crucial role in integrating technology into education (Akbaba, 2002; Anderson & Dexter, 2005; Flanagan & Jacobsen, 2003).

Artificial Intelligence (AI) is one of the most important technologies of our time. Today, we encounter AI and its applications not only in industry but also in almost every field from agriculture to health, from voice assistants to online chat and communication. Consequently, AI is gaining significance in the field of education with each passing day. According to the 2018 Horizon report, AI and adaptive learning technologies stand out as important developments in the field of educational technology (Becker et al., 2018). Similarly, the 2024 Horizon Report sees AI as a catalyst for significant advances in higher education, noting that it can enhance learning experiences, but also posing challenges that require careful management and ethical consideration (Pelletier vd., 2024).

In its simplest definition, intelligence is the ability to interpret external stimuli, transform them into information, and use them. The fact that computers show human-like behaviors such as reasoning, problem-solving, inference, and generalization, that is, the use of high-level cognitive skills, can be

defined as AI (Arslan, 2020). Today, when AI studies related to education are examined, not only knowledge-based but also data and logic-based AI applications take place in every field. Among these areas, applications that contribute directly to school management and indirectly to teaching such as personalized education systems, exploratory education, student essay analysis, automatic test creation systems, exam management, course schedules, and staff schedules are the first ones that come to mind (Holmes et al., 2019).

The success of AI education is closely related to teachers' knowledge and perceptions of AI, and it is also important to understand how prepared teachers are (Ayanwale et al., 2022). There are various ways to express mental perceptions. One of these is "metaphors" (Kösterelioğlu, 2014).

Güneş and Fırat (2016) highlighted that metaphor analysis can be used when traditional data collection tools such as interviews and observations cannot be used. According to the mental metaphor theory, metaphor can be defined as evaluating a phenomenon or event according to another phenomenon or event (Lakoff & Johnson, 1980).

According to Saban (2009), metaphor is formed by stating that a phenomenon X is like a phenomenon Y and this is what makes metaphor powerful as a mental model. Morgan (1980) characterized the use of metaphor as a way of thinking and a way of seeing our perception of the world, and in this respect, metaphors enable the individual to perceive a certain phenomenon as another phenomenon by directing the individual's mind from a certain way of comprehension to another way of comprehension.

Arslan and Bayrakçı (2006) described metaphor as a powerful mental mapping and modeling mechanism for individuals to understand and structure their world. Recently, studies on artificial intelligence and metaphor have gained importance in national and international education.

This study aimed to explore teachers' complex mental perceptions of artificial intelligence through metaphor analysis. As key stakeholders in the educational environment, teachers' perspectives on this transformative technology have significant implications for its effective and ethical implementation in the classroom. By identifying the various metaphors teachers use to conceptualize AI, this study provides insight into the multifaceted ways in which they make sense of this emerging technology and its potential impact on teaching and learning. By using the metaphor method to explore the complex interplay between teachers' beliefs, concerns, and aspirations regarding integrating AI into education, we aim to contribute to the literature with an in-depth examination of these metaphors.

1.1 Literature review

Metaphor studies have been used in various studies to address the perceptions of school administrators, teachers, pre-service teachers, and students in education (Kalaycı, 2018; Koç Akran & Karakaş, 2023; Sabahat et al., 2023). While Kalaycı's (2018) study explored the perceptions of primary school students toward 'science' and 'science' courses, Sabahat et al.'s (2023) study aimed to understand the perceptions of students, teachers, and school administrators toward the changing concept of school during the COVID-19 pandemic through metaphor analysis method. Similarly, Koç Akran and Karataş (2023) studied the perceptions of pre-service teachers towards Generation Z by using metaphor analysis in their study.

There is a limited number of metaphorical analysis studies directly related to the concept of Artificial Intelligence (AI), but metaphorical analyses of concepts such as the internet, technology, and computers, which are related to this concept, which is an output of digital transformation, are very common (Akçin, 2023; Ekici, 2016; Kaleli Yılmaz & Güven, 2015; Lindh & Nolin, 2017). The studies conducted by Akçin (2023) on robotic coding; Ekici (2016) on the concept of computers; Kaleli Yılmaz and Güven (2015) on distance education; and Lind and Nolin (2017) on the development of cloud technology through

participants' metaphorical conceptualizations point to the diversity of the ways individuals conceptualize and make sense of the internet, robotic coding, cloud technology, and distance education through metaphors.

There are various metaphor analysis studies on AI at different levels and in different forms (Aydın et al., 2022; Demir & Güraksin, 2022; Saçan et al., 2022). Aydın et al. (2022) prepared computer-assisted animations for teaching the concept of AI based on the opinions of information technologies teachers and evaluated how these animations affected fifth-grade students' perceptions of AI. Demir and Güraksin (2022) examined middle school student's perceptions of the concept of AI with the metaphorical analysis method. Saçan et al. (2022) applied metaphorical analysis to the idea of AI for children between the ages of 6-10 and their parents. In this study, unlike student perceptions of the concept of AI, which was put on the agenda by the Ministry of National Education (MoNE) in parallel with the public opinion created by the introduction of ChatGPT by OpenAI company in 2022 (Ministry of National Education, 2023), teacher perceptions were addressed through metaphors.

The study concluded that a significant portion of children learned about artificial intelligence from media tools, therefore children should be introduced to the concept of artificial intelligence appropriately and correctly from an early age, and parents should also be made aware of artificial intelligence.

1.2 Purpose of the research

The study aimed to examine the perspectives of educators on the concept of AI, which has gained importance with digital transformations in recent years, through the metaphor analysis method. For this purpose, answers to the following questions were sought:

- What are the metaphors generated by teachers about the concept of AI?
- Under which conceptual categories are the metaphors produced by teachers grouped?

2. Method

A phenomenological research method was used to examine teachers' perceptions of the concept of AI. Phenomenology is a qualitative research method that examines the experiences of individuals and how these experiences are perceived (Moustakas, 1994). In this context, the metaphor analysis method was adopted to understand the participants' perceptions. Metaphor analysis is a method used to identify and analyze metaphors in a text and allows for a deeper understanding of the conceptual structures and cognitive patterns underlying the text (Güneş & Fırat, 2016). In the context of a phenomenological study, metaphor analysis provides a deeper understanding from the perspective of those who experience the phenomenon by focusing on how metaphors capture the essence of the experiences under study. This method is based on the premise that metaphors are not only a figure of speech, but also a fundamental mental mechanism that affects the way individuals perceive and interpret the world (Lakoff & Johnson, 1980).

2.1 Participants

The participants were teachers working in Şanlıurfa in the 2023-2024 academic year. To reach the teachers working in the study, convenience sampling, one of the purposeful sampling methods, was used. In this sampling type, researchers choose this sampling type because they can easily reach a certain community (Yıldırım & Şimşek, 2016). 295 teachers participated in the study and 9 teachers did not complete the form because they did not approve the consent form. 22 teachers' views on AI were not included in the evaluation since they did not describe the metaphor. When the metaphor is not

defined, the metaphor may be misinterpreted. Demographic information of 264 teachers who were evaluated for the study is given in Table 1.

Table 1*Demographic Information of Teachers*

		f	%
Gender	Female	123	46,6
	Male	141	53,4
Education	Associate Degree	1	0,4
	Undergraduate	219	83,0
	Master's degree	41	15,5
	PhD	3	1,1
Experience	1-5 Years	69	26,1
	6-10 Years	67	25,4
	11-15 Years	52	19,7
	16-20 Years	29	11,0
	21-25 Years	31	11,7
	26 Years and Above	16	6,1
Grade	Preschool	11	4,2
	Primary School	70	26,5
	Secondary School	118	44,7
	High School	57	21,6
	Other	8	3,0

According to Table 1, 46.6% of the teachers participating in the study were female and 53.4% were male. In this context, many of the teachers participating in the study were male. An analysis of the level of education showed that the majority of the teachers (83.0%) had a bachelor's degree. In terms of seniority, most of the teachers (26.1%) had 1-5 years of experience and (25.4%) had 6-10 years of experience, this shows that more than half of the teachers have less than 10 years of experience. In addition, the majority of the teachers participating in the study worked at the secondary school level (44.7%). The distribution of the teachers participating in the study according to their branches is given in Table 2.

Table 2*Distribution of the Teachers Participating in the Study According to their Branches*

Branch	f	%	Branch	f	%
Primary School Teacher	56	21.2	Visual Arts Teacher	5	1.9
Science Teacher	25	9.5	Imam Hatip High School Vocational Teacher	4	1.5
Elementary Mathematics Teacher	21	8.0	Music Teacher	4	1.5
Turkish-Language Teacher	19	7.2	Biology Teacher	4	1.5
Religious Culture and Moral Knowledge Teacher	17	6.4	Arabic Teacher	3	1.1
English Teacher	15	5.7	Chemistry Teacher	3	1.1
Guidance Teacher	14	5.3	Technology and Design Teacher	2	0.8
Social Studies Teacher	11	4.2	French Teacher	2	0.8
Preschool Teacher	10	3.8	Geography Teacher	2	0.8
Physical Education Teacher	8	3.0	Child Development Teacher	2	0.8
Special Education Teacher	8	3.0	Physics Teacher	1	0.4
Turkish Language and Literature Teacher	8	3.0	Electricity Teacher	1	0.4
Other	6	2.3	Philosophy Teacher	1	0.4
History Teacher	6	2.3	Secondary Mathematics Teacher	1	0.4
Information Technology Teacher	5	1.9			
			Total	264	100.0

Table 2 presents the distribution of the teachers participating in the study according to their branches. According to the analysis, the majority of the teachers participating in the study (21.2%) were identified as primary school teachers, and they were followed by science teachers with 9.5%. The lowest participation rate belongs to Physics, Electricity, Philosophy, and Secondary Mathematics teachers with 0.4%. Although the participation of teachers from different branches in the study enables different perceptions of AI, the difference in the number of participations based on the branch is one of the limitations of the study.

2.2 Data collection and data analysis

Studies in the literature were examined in the development of the data collection tool (Bozkurt, 2020; Hacifazlıoğlu et al., 2011; Saban, 2009). In line with the reviewed studies, a semi-structured interview form was developed. The semi-structured interview form consists of two parts. The first part includes the section where data on teachers' demographic information (gender, education level, seniority, school level, and branch) will be collected, and the second part is the section where data on teachers' metaphorical perceptions are collected. To reveal the metaphorical perceptions of the teachers, each participant was asked to complete the construct 'Artificial Intelligence is like.....because.....' related to the concept of Artificial Intelligence. Participants were also asked to define a metaphor. The concept of 'like' in this structure aimed to establish a connection between the subject and the source of the metaphor. In addition, the concept of 'because' was used to reveal the justification attributed to the metaphor (Saban, 2008, 2009). This form was integrated into an online environment and data were collected from teachers through the online environment.

Data were collected through an online environment. The content analysis method was used to analyze the qualitative data collected for metaphorical perception (Yıldırım & Şimşek, 2016). Metaphors were created through content analysis and these metaphors were grouped under categories. Frequencies and percentages were used to show the frequency of use of metaphors. Data analysis was carried out in four stages (Saban, 2004):

1. Analyzing and evaluating the collected data: At this stage, the data collected through the online environment were exported in Microsoft Excel format and the data were put in an order after numbering.
2. Sorting stage and creation of metaphors: At this stage, metaphors that were irrelevant or invalid were eliminated from the data transferred to MAXQDA software. 22 teachers' opinions about AI were not included in the evaluation because they did not describe the metaphor. When the metaphor is not defined, the metaphor may be misinterpreted. Metaphors were produced by coding from the opinions included in the evaluation.
3. Creating categories from the metaphors: At this stage, the metaphors created on the MAXQDA application were grouped under categories. This involves a systematic process of reviewing each metaphor and identifying recurring concepts. Metaphors with similar ideas are then grouped under relevant categories.
4. Validity and reliability procedures: At this stage, coding was performed by a second expert and Cohen's Kappa value was calculated through MAXQDA software. Kappa value was found to be 0.89. This value being in the range of 0.81-1.00 is considered a "very good agreement" (Kılıç, 2015). To contribute to the validity and reliability of the research, the opinions of the participants were given using abbreviations such as T-1, T-2 without specifying the names of the participants.

Ethical Approval: Ethics committee approval dated 19.10.2023 and numbered 2023/156 was obtained from Harran University Social and Human Sciences Ethics Committee for this research.

3. Findings

In this part of the study, the findings of the data collected from the teachers regarding the concept of AI are discussed in the context of the research questions respectively.

3.1 What are the metaphors produced by teachers about the concept of AI?

In this section, the metaphors produced by the teachers about the concept of AI are included. The data includes the metaphors used by the teachers to define AI during the research process. Table 3 presents the metaphors produced by teachers to express the concept of AI.

Table 3

Teachers' Metaphors about the Concept of AI

No	Metaphor Name	f	No	Metaphor Name	f	No	Metaphor Name	f
1	Human	26	36	Miracle	2	71	Tightrope Walking	1
2	Robot	25	37	Ocean	2	72	Swiss Army Knife	1
3	Brain	13	38	Player	2	73	Heart	1
4	Assistant	10	39	Compass	2	74	Commander	1
5	Machine	10	40	Dream	2	75	Sheep	1
6	Space	9	41	Soil	2	76	Remote Control	1
7	Computer	8	42	Artificial Flower	2	77	Bird	1
8	Baby	7	43	Star	2	78	Small Home Appliances	1
9	Intelligence	6	44	Time	2	79	Lemon	1
10	Future	5	45	Octopus	1	80	Logic	1
11	Teacher	5	46	Gold	1	81	Scapel	1
12	Technology	5	47	Key	1	82	Nur	1
13	Light	4	48	Encyclopedia	1	83	Nuclear Energy	1
14	Weapon	4	49	Antidepressant	1	84	Spider	1
15	Car	3	50	Search Engine	1	85	Daisy	1
16	Mirror	3	51	Horse	1	86	Potato	1
17	Wise	3	52	The Unknown Path	1	87	Spring	1
18	Digital Universe	3	53	Plant	1	88	Renaissance	1
19	Parent	3	54	Chameleon	1	89	Clock	1
20	Hand Foot	3	55	Puzzle	1	90	Milky Way Galaxy	1
21	Imagination	3	56	Cloud	1	91	Cigarette	1
22	Medicine	3	57	The Invisible Part of the Iceberg	1	92	Magic Wand	1
23	Tree	2	58	Counselor	1	93	Simulation	1
24	Aladdin's Genie	2	59	Mill	1	94	Glossary	1
25	Fire	2	60	State	1	95	Chief	1
26	Moon	2	61	Bottomless Well	1	96	Savings	1
27	Avalanche	2	62	DNA	1	97	Horizon Line	1
28	Night	2	63	Education Coaching	1	98	Virus	1
29	Shadow	2	64	Idea	1	99	Demigod	1
30	Solar System	2	65	Movie	1	100	Investment	1
31	Copy of Life	2	66	Night and Day	1	101	Cooking	1
32	Animal	2	67	Sky	1	102	Method	1
33	Invention	2	68	Ghost	1	103	Time Machine	1
34	Oracle	2	69	Cell Nucleus	1			
35	Closed Box	2	70	Wrench	1			
					103	Total	264	

According to Table 3, a total of 103 metaphors were produced by teachers. These metaphors were coded 264 times in total. Among the metaphors analyzed, the most coded metaphors were human (26) and robot (25) metaphors, respectively.

3.2 Under which conceptual categories are the metaphors generated by teachers grouped?

In the context of this research question, the metaphors produced by teachers about the concept of AI were categorized. This involves a systematic process of reviewing each metaphor and identifying recurring concepts. Metaphors with similar ideas are then grouped under relevant categories. These categories are given in Table 4.

Table 4

Distribution of the Metaphors Produced by Teachers about the Concept of AI According to Categories

Categories	Metaphors	f
Technology and Machines	Robot (25), Assistant (10), Machine (10), Computer (8), Technology (5), Car (3), Digital Universe (3), Invention (2), Compass (2), Artificial Flower (2), Search Engine (1), Mill (1), Small Home Appliances (1), Nuclear Energy (1), Investment (1), Time Machine (1)	76
Live Assets	Human (26), Baby (7), Parent (3), Hand-Foot (3), Tree (2), Animal (2), Player (2), Octopus (1), Horse (1), Plant (1), Chameleon (1), Sheep (1), Bird (1), Spider (1), Chef (1)	53
Education and Mental Expressions	Brain (13), Intelligence (6), Teacher (5), Wise (3), Imagination (3), Dream (2), Encyclopedia (1), Counselor (1), Educational Coaching (1), Idea (1), Logic (1), Renaissance (1), Simulation (1), Dictionary (1), Savings (1), Method (1)	42
Nature and the Universe	Space (9), Light (4), Fire (2), Moon (2), Avalanche (2), Night (2), Shadow (2), Solar System (2), Ocean (2), Earth (2), Star (2), Time (2), Cloud (1), Night and Day (1), Sky (1), Daisy (1), Spring (1), Milky Way Galaxy (1), Horizon Line (1),	40
Daily Life and Objects	Mirror (3), Copy of Life (2), Gold (1), Key (1), Movie (1), Wrench (1), Tightrope Walking (1), Swiss Army Knife (1), Remote Control (1), Lemon (1), Potato (1), Clock (1), Cooking (1)	16
The Future and the Unknown	The Future (5), The Closed Box (2), The Unknown Path (1), The Puzzle (1), The Invisible Part of the Iceberg (1), The Bottomless Pit (1)	11
Magical and Imaginary Elements	Aladdin's Genie (2), Oracle (2), Miracle (2), Ghost (1), Light (1), Magic Wand (1), Demigod (1)	10
Health	Drug (3), Antidepressant (1), DNA (1), Cell Nucleus (1), Heart (1), Scalpel (1), Cigarette (1)	9
Security	Weapon (4), State (1), Commander (1), Virus (1)	7

In Table 4, the metaphors created by the teachers for the concept of AI are grouped under certain categories. These metaphors were classified under 9 different categories in total. The highest number of metaphors and coding occurred in the Technology and Machines category ($f=76$). The lowest number of metaphors was found in the category of Security, with a total of 7 codings in this category. In the context of this research question, the categories presented in Table 4 are explained below under the headings respectively.

3.3 Technology and machines category

As seen in Table 4, 16 metaphors were created under this category, in particular, metaphors such as the robot, assistant, machine, and computer stand out in this category. Teachers perceive Artificial Intelligence as a programmable and automatically functioning entity, thinking of it as a robot.

Sample participant views:

Artificial Intelligence is just like a robot because robots are also directed by others (T-51).

Artificial Intelligence is like a machine because it makes our work easier (T-1).

Artificial Intelligence is like an assistant because it helps us in every subject (T-93).

Artificial Intelligence is like a computer because it can search, learn, and apply every piece of information (T-245).

3.4 Live assets category

According to Table 4, a total of 15 metaphors were created under this category, and metaphors such as human, baby, parent, hand-foot, tree, and animal are at the forefront in this category. These metaphors were coded 53 times in total and focused on associating AI with living beings and equipping it with human-like features.

Sample participant views:

Artificial Intelligence is like a human who uses 100% of his/her brain because it has the potential and energy to do all kinds of creativity (T-117).

Artificial Intelligence is like a newborn baby because it learns what we teach. If we teach good things, he takes it, if we teach bad things, he grasps it. He adopts our way of life and culture and exhibits behavior accordingly (T-109).

Artificial Intelligence is like foster parents because protective parents guide cautious behavior with their predictions (T-77).

Artificial intelligence is like a hand and foot because it helps us fulfill our needs (T-66).

3.5 Education and mental expressions category

A total of 16 metaphors were produced under this category (Table 4): metaphors such as brain, intelligence, teacher, and wise stand out in this category. These metaphors were coded 42 times in total and associated with the mental and educational aspects of AI.

Sample participant views:

Artificial Intelligence is like an artificial brain because if it is used correctly, it works like a brain (T-242).

Artificial Intelligence is like human intelligence because many things that are done with human intelligence are imitated in a way to makes different beings capable of doing them (T-202).

Artificial Intelligence is like a teacher because it makes our lives easier and enables us to obtain information that is more difficult to obtain more easily (T-76).

Artificial Intelligence is like a sage who knows everything. Because whatever you ask, it has an idea (T-145).

3.6 Nature and the universe category

A total of 19 metaphors were generated in this category (Table 4), with notable examples including space, light, moon, avalanche, and night. These metaphors were coded 40 times in total, emphasizing the comparison of AI to elements in the universe and nature.

Sample participant views:

Artificial Intelligence is like space because it is full of unknowns and surprises (T-107).

Artificial Intelligence is like light because light enlightens us and artificial intelligence enlightens us (T-17).

Artificial Intelligence is like the moon because the moon reflects the sunlight and artificial intelligence uses the example of human beings (T-181).

Artificial Intelligence is like an avalanche because as it progresses, it causes new growth (technological) in every field (T-168).

3.7 Daily life and objects category

A total of 13 metaphors were generated in this category (Table 4), with prominent examples including mirror, copy of life, gold, and key. These metaphors were coded 16 times in total, focusing on the association of AI with everyday life and objects.

Sample participant views:

Artificial Intelligence is like a mirror because we see ourselves in front of it (T-58).

Artificial intelligence is like a copy of life because it is similar to the things in life, it is the reflection of life to us with slight changes (T-262)

Artificial intelligence is like a key because it opens the door to new worlds (T-271)

Artificial intelligence is like a lemon because it looks good and smells nice but it is sour in the mouth. Artificial intelligence is also good to use, but if it is not used correctly, it will harm people. (T-63)

3.8 Future and the unknown category

A total of 6 metaphors were produced under this category (Table 4), metaphors such as future, closed box, and unknown road stand out in this category. These metaphors were coded 11 times in total, emphasizing the uncertainty and unexplored potential of AI for the future.

Sample participant views:

Artificial Intelligence is like a future full of secrets because the benefits it will provide to humanity cannot even be predicted yet. (T-35)

Artificial Intelligence is like walking on an unfamiliar path because walking on the road is exciting and scary. (T-216).

Artificial Intelligence is like a puzzle because as you solve it, your mind opens (T-36).

Artificial Intelligence is like the invisible part of the calf because I think that we have discovered very few things that can be done with artificial intelligence (T-7).

3.9 Magical and imaginary elements category

A total of 7 metaphors were produced under this category (Table 4), metaphors such as Aladdin's Genie, clairvoyant, and miracle stand out in this category. These metaphors were coded 10 times in total and focused on the association of AI with magical and imaginary elements.

Sample participant views:

Artificial Intelligence is like Aladdin's Genie because it offers us what we want immediately (T-188).

Artificial Intelligence is like a soothsayer because it predicts the next step (T-141)

Artificial Intelligence is like a miracle because artificial intelligence is something that affects and facilitates our lives just like miracles, it is something that has no limits, and just as new miracles can happen at any moment, artificial intelligence is renewable (T-210).

Artificial intelligence is like a ghost because it does not have a certain shape and weight. It does not occupy space, but it frightens humanity (270, Location 1-2)

3.10 Health category

A total of 7 metaphors were produced under this category (Table 4), metaphors such as drugs, antidepressants, and DNA stand out in this category. These metaphors were coded 9 times in total, emphasizing the role and effects of AI in health.

Sample participant views:

Artificial Intelligence is like medicine because what determines whether it is useful or harmful is its correct use (T-116).

Artificial Intelligence is like an antidepressant because when the dosage is not adjusted well, it gets out of control (T-102).

Artificial Intelligence is like a DNA helix because as you enter into it, endless new information welcomes you. (T-126)

Artificial Intelligence is like a scalpel because if you give the scalpel to a doctor, it will save a person's life, but if you give it to a tramp, it will ruin both his life and someone else's life (T-244)

3.11 Security category

A total of 4 metaphors were produced under this category (Table 4), metaphors such as weapon, state, and commander stand out in this category. These metaphors were coded 7 times in total and focused on associating AI with security and assuming a controlling role.

Sample participant views:

Artificial Intelligence is like a weapon because it kills people's brains (T-59).

Artificial Intelligence is like a commander because it orders the commands that the brain will receive to its systems in its format like the functioning of the human mind (T-236).

Artificial Intelligence is like a state because you know its existence but you cannot touch it (T-32).

Artificial Intelligence is like viruses because it will enter our lives suddenly and when it becomes strong enough, it will take control and threaten the existence of the human species (T-172).

After categorizing the metaphors from 264 teachers in total within the scope of the research, it presents a word cloud focusing on the most coded metaphors in each category. The most coded metaphors among the categories analyzed in detail in this section are highlighted in Figure 1 with the word cloud.

Figure 1

Word Cloud Representation of Teachers' Most Frequently Coded Metaphors Related to the Concept of AI



The word cloud in Figure 1 visually expresses the most prominent metaphors coded at least twice for each category and the frequency of these metaphors. This visual provides an important summary to determine teachers' perceptions of the concept of AI.

4. Discussion and Conclusion

The findings show that teachers use various metaphors to understand and define the concept of AI. The findings also show that teachers generally associate AI with technology and machines, but they also evaluate this concept under different categories. These categories include "Living Beings," "Education and Mental Expressions," "Nature and Universe," "Daily Life and Objects," "Future and Unknown," "Magical and Imaginary Elements," "Health," and "Security."

Among the prominent metaphors in the technology and machines category are technological terms such as "Robot," "Assistant," "Machine," and "Computer". Teachers perceived Artificial Intelligence as a programmable and automatically functioning entity. When these perceptions are supported with examples from teachers' opinions, metaphors can be explained in a more meaningful way. For example, "Artificial Intelligence is just like a robot. Because robots are also directed by others" (T-51). Similarly, metaphors such as robot, machine, and computer were frequently used in studies conducted with different target groups in the literature (Aydın et al., 2022; Demir & Güraksin, 2022; Saçan et al., 2022).

In the category of Living Beings, teachers associated AI with living beings such as "Humans," "Baby," "Parents," "Hand-Foot," and "Animals". These metaphors tend to equip AI with human-like characteristics. Excerpts from the teachers' views explain how teachers understand AI by underlining these metaphors. For example, "Artificial Intelligence is like a human who uses 100% of his/her brain. Because it has the potential and energy to do all kinds of creativity" (T-117). Similarly, in Aydın et al.'s (2022) study, both the human metaphor was used and the human category was created. Additionally,

this study included metaphors like baby and plant. This finding is also supported by the research of Demir and Güraksin (2022) and Saçan (2022).

The use of metaphors in understanding and explaining the concept of Artificial Intelligence offers deep insight into how teachers perceive and make sense of this advanced technology. By associating AI with living beings, everyday life, objects, and even magical/imaginary elements, teachers can convey a wide range of features and implications of AI. This diversity allows teachers to make sense of AI in their context and bring different perspectives to this concept. Teachers' perspectives taken in this context play a crucial role in curriculum planning (Chiu & Chai, 2020), promoting students' well-being (Dai et al., 2020), and improving teaching effectiveness (Lin, 2022). Moreover, teachers' attitudes toward AI influence the reliability of educational research evidence (Cukurova et al., 2020) and their confidence in AI-enabled educational technology (Nazaretsky et al., 2022). Moreover, teachers' perceptions influence the development of AI literacy (Zhao et al., 2022), the design of AI-supported pedagogical actions (Kasepalu et al., 2022), and the investigation of the impact of AI on teaching and learning (Bearman et al., 2023). The study emphasizes that these diverse metaphors are a valuable resource for understanding the role and potential implications of AI in education. The diverse interpretations of AI can assist educators in adopting this technology more efficiently and effectively imparting its knowledge to students. However, the study's focus on examining teachers' perspectives on AI in a specific region may have limited the coverage of all potential perspectives on AI in education. Additionally, the use of a sentence completion method could have influenced teachers' metaphor choices, potentially restricting the diversity of viewpoints expressed.

Future research could examine AI-related metaphors used by teachers from diverse cultural and educational backgrounds and conduct longitudinal studies to explore how teacher perceptions evolve as AI becomes more prevalent in education.

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