




Original article

Metaphorical Perceptions of Ninth-Grade Students Regarding the Concept of Forest

Melek Sertkaya ^a, Ahmet Sinan Gökçekli ^a, Ahmet Muhammed Meydan ^a & Enver Eserli ^{a*}

^a Safranbolu Science and Art Center, Ministry of National Education, Karabük, Türkiye

Abstract

The aim of this research is to determine the perceptions of 9th-grade students regarding the concept of forest through metaphors. The research was conducted within the framework of a qualitative research model using a phenomenological design. The study group consists of 237 ninth-grade students receiving education in the city center of Karabük and the districts of Safranbolu and Yenice. To determine the metaphors held by the students, data were collected through a semi-structured metaphor form. In the form prepared by the researchers, students were asked to complete the sentence “A forest is like...; because...”. Content analysis technique was used for data analysis. The average inter-coder reliability was determined to be 94%. Findings revealed that students produced 638 metaphors in total, comprising 261 unique metaphors regarding the concept of forest. The most frequently mentioned metaphors were “home, life, breath, lung, human, nest, peace, source of life, heart, mother, book, family, school, water, etc.” These metaphors were classified into 12 distinct categories: “Source of Life,” “Living Space/Natural Habitat,” “Source of Serenity and Peace,” “Main Part of the Ecosystem,” “Protective and Healing,” “Natural Aesthetic Element,” “Mirror of Social Consciousness,” “Guiding/Pathfinder,” “A Mysterious and Risky Place,” “Natural Resource and Raw Material Provider,” “Source of Hope,” and “Regulator.” Consequently, it was determined that students conceptualize the forest in a holistic manner, encompassing ecological, affective, and social dimensions.

Keywords: Forest, Metaphor, Perception, Environmental Awareness.

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Corresponding author:

Enver Eserli is an English teacher at the Safranbolu Science and Art Center (BİLSEM) in Türkiye. He received his master’s degree with thesis in Curriculum and Instruction from Gazi University, Institute of Educational Sciences. His research interests include language education, curriculum studies, and the integration of educational technologies into teaching and learning processes. He has served as an advisor for several TÜBİTAK student research projects and actively participates in academic and educational research activities.
Email: enver.eserli@gmail.com

INTRODUCTION

Throughout history, humans have been in a constant interaction with nature, remaining dependent on the resources it provides to sustain their lives and carry out their production activities (Keniger et al., 2013, p. 914). Within this interaction, forests stand out as critical ecosystems that both provide essential life resources for humans and preserve the integrity of the natural environment. Forests are natural areas that cover approximately one-third of the Earth's land surface and hold strategic importance for the continuity of ecosystems and the sustainability of human life. The destruction of these areas poses a threat not only to the global environmental balance but also to social welfare and economic livelihoods, becoming a central issue in the fight against the climate crisis and biodiversity loss (WWF, n.d.). Therefore, the threats facing forests are fueled not only by ecological processes but also by rapidly increasing human-induced pressures. With the world's population reaching approximately 8 billion, the pressure on forests and natural resources has progressively increased, leading to a more pronounced emergence of concerns regarding the sustainability of these resources (Grebner et al., 2021, p. 1).

Türkiye possesses high ecological diversity within its 78-million-hectare surface area, and forests constitute a significant component of this diversity (General Directorate of Forestry, 2021). According to the records of the General Directorate of Forestry (2024), forest areas in Türkiye have exhibited steady growth over the last fifty years. The forest area, which was 20.2 million hectares in 1973, rose to 23.4 million hectares in 2024, recording an increase of approximately 3.2 million hectares. While this increase reflects the impact of afforestation and rehabilitation projects carried out in the country, it also suggests that there may have been a rise in social and ecological awareness regarding forests. Figure 1 shows the distribution of forest areas in Türkiye between the years 1973–2024.

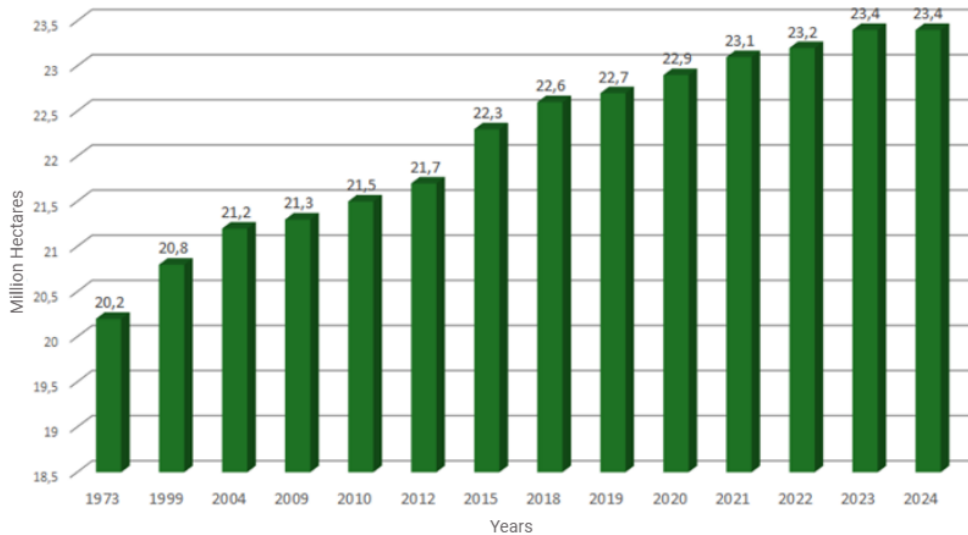


Figure 1. Forest Presence in Türkiye (General Directorate of Forestry, 2024)

When the data from the General Directorate of Forestry (2021) are examined, it is observed that forest areas in Türkiye show significant variations between provinces, and the fact that approximately

29.4% of the total 78-million-hectare surface area is covered by forests demonstrates that the country possesses a substantial ecological potential. However, as a result of approximately 6,800 forest fires that occurred across Türkiye in 2025, a total of 80 thousand hectares of forest area were damaged (Türkey, 2025).

When the data from the General Directorate of Forestry (GDoF, 2021) are examined within this national distribution, Karabük is the province with the highest forest density in Türkiye, with 71.6% of its total area of 389,553 hectares being forested; this ratio indicates that the province holds a strategic position in terms of ecosystem integrity. Furthermore, Karabük's total forest stock of 49,977,933 m³ reveals that the province both plays a critical role in the continuity of ecosystems and possesses a significant capacity for economic activities based on forest products (GDoF, 2021). However, in the fires that began on July 23, 2025, and continued intermittently throughout the summer, a total of 36 forest fires occurred across Karabük, resulting in the destruction of 6,865.6 hectares of forested area (Ajansyedisekiz, 2025). This situation highlights the necessity of strengthening environmental awareness through the educational process.

Within the scope of the Green Homeland mobilization, which was launched by the Ministry of Agriculture and Forestry on November 6, 2019, and gained institutional identity with the declaration of November 11 as National Afforestation Day, it is aimed to combat climate change, reforest burned areas, and increase the participation of all segments of society in environmental responsibility through sapling planting activities (Ministry of Agriculture and Forestry, 2025). This national mobilization approach aligns with education policies aimed at strengthening environmental awareness and a culture of sustainable living across society, increasing the importance of environmental awareness programs specifically for students. The Green Homeland Thematic Calendar Implementation and Management Guide, prepared by the Ministry of National Education, aims to develop environmental consciousness, awareness levels, a culture of sustainable living, and sensitivity toward the protection of forests among students (Ministry of National Education General Directorate of Support Services, 2025). This approach makes it essential to research how students perceive the concept of forest and what values they assign to this concept in their mental representations.

Metaphor is a tool representing the imaginative thinking process of language (Davidson, 1978, p. 31). In educational research, metaphors are regarded as an important form of expression that strengthens the production of conceptual meaning. In this regard, it is suggested that metaphors serve both an explanatory and a facilitating function in presenting challenging concepts clearly and effectively (Midgley et al., 2013, p. 1). The capacity of metaphors to make complex and abstract concepts more explicit or concrete is one of the primary subjects attracting the attention of cognitive linguists and scientists from various fields. Additionally, the power of metaphors to shape thought and guide actions is a focal point of research (Bratož, 2013, p. 46).

When the relevant literature is examined, it is observed that students' environmental perceptions are generally investigated within the broader framework of environmental awareness, nature, or tree concepts, rather than focusing directly on the concept of forest. Many studies have examined students' metaphorical perceptions regarding environmental or nature-related concepts at the primary and middle school levels. For example, Kahyaoğlu (2015) examined elementary school students' metaphorical perceptions of the concept of nature and found that students produced various metaphors emphasizing the vital functions, diversity, and aesthetic dimensions of nature. Similarly, Çeliker and Akar (2015) analyzed the metaphors developed by middle school students regarding nature and determined that students conceptualized nature through a wide range of metaphors grouped under several thematic categories. In addition, studies focusing on specific environmental elements such as trees have also been conducted. For instance, Güngör Cabbar (2020) investigated primary school students' metaphorical perceptions of the concept of tree and reported that students produced numerous metaphors describing trees as living beings, sources of life, and shelters. However, despite the existence of studies examining students' perceptions of concepts such as nature, environment, and trees, research focusing directly on the concept of forest remains relatively limited. Moreover, existing studies are predominantly conducted with primary or middle school students, while research exploring metaphorical perceptions at the secondary education level is comparatively scarce. Addressing this gap is important for understanding how high school students conceptualize forests and for evaluating the outcomes of environmental education.

In this regard, when the curricula are examined, it is seen that the current 9th-grade students completed their primary education process in line with the learning outcomes of the 2018 Life Studies and 2018 Social Studies Curricula. Therefore, the selection of 9th-grade students in this study is related to the fact that their perceptions and knowledge accumulation regarding fundamental concepts such as forest, environment, nature, and ecosystem were shaped in light of the content of these programs. The 2018 Life Studies Curriculum aims for students to recognize nature and the animate-inanimate beings in their environment, to notice natural elements, and to develop sensitive attitudes toward the environment. Among the specific objectives of the program is raising individuals who are sensitive to nature and the environment, and core skills such as protecting nature and efficient use of resources are explicitly defined (MoNE, 2018). At the same time, within the scope of the Life in Nature unit, it is particularly emphasized that students should observe the natural environment, participate in nature education, and engage in activities aimed at protecting the environment. This structure indicates that the forest ecosystem is indirectly included in the teaching process as a natural environment. Similarly, the 2018 Social Studies Curriculum aims for students to recognize the geographical features of the environment they live in, to understand the human-environment relationship, and to develop environmental sensitivity and a sustainable environmental understanding based on the limitedness of natural resources (MoNE, 2018). Among the specific objectives of the Social Studies Program,

recognizing the natural environment, protecting environmental values, and having a sustainable environmental understanding are directly included. These statements show that forests are addressed at a conceptual level within the curriculum as a part of the natural environment. Considering that the current 9th-grade students completed their primary education according to the 2018 programs, it can be said that their environmental awareness regarding the forest theme was shaped mostly at a basic level. The 2024 Life Studies and Social Studies Curricula, prepared on the basis of the "Türkiye Century Maarif Model", aim to provide students with environmental literacy and sustainable life awareness by enabling them to recognize the natural environment, question the human-nature relationship, and develop consciousness regarding the protection of natural resources (MoNE, 2024).

In this study, 9th-grade students were selected as the study group because these students acquired the basic conceptual infrastructure regarding forest, nature, environment, and human-environment relationships through Life Studies and Social Studies courses during their primary education process. The advanced level of abstract thinking, symbolic expression, and analogical association skills at the 9th-grade level makes it possible to reveal how students make sense of the concept of forest in a more in-depth and systematic way through metaphors. The findings obtained may provide a scientific contribution to the development of the content, methods, and learning outcomes of life studies, social studies, and geography curricula in a way that increases environmental sensitivity.

The Green Homeland theme, carried out by the Ministry of National Education, emphasizes the necessity of strengthening environmental consciousness, protecting natural resources, and integrating a culture of sustainable living into educational processes. The findings obtained through student metaphors will make visible the extent to which the Green Homeland approach is reflected in education, how younger generations make sense of the forest, and upon which mental foundations they build their perception of environmental risk.

The aim of this research is to examine the metaphorical perceptions of 9th-grade students toward the concept of forest and to reveal their mental representations regarding the forest ecosystem, the natural environment, and human-environment relationships. In this context, it is aimed to determine how students perceive the forest and the spatial, ecological, and functional meanings they attribute to it through metaphor analysis, examining them in thematic categories. The findings obtained are intended to contribute to the development of environmental awareness in geography education, the strengthening of sustainable living consciousness, and the understanding of students' attitudes toward the natural environment.

Within this scope, answers to the following questions were sought:

1. What are the metaphors specified by 9th-grade students regarding the concept of forest?
2. What is the distribution of the metaphors specified by 9th-grade students regarding the concept of forest into conceptual categories in terms of their common characteristics?

MATERIALS and METHODS

Method

This research was prepared using the phenomenology design within the scope of the qualitative research model. Phenomenology is an approach that requires considering simultaneously how people give meaning to the phenomena in their environment and to life. According to this perspective, even if everything continues to exist objectively in the outside world, it only gains meaning and value through an individual's experiences and intentional thinking processes (Farina, 2014, p. 50).

According to Patton (1990) the phenomenological (phenomenology) design is an approach that centers on individuals' lived experiences and examines how participants perceive events and the meanings they attribute to these experiences. In this research design, the primary aim is not to generalize but to describe phenomena by seeking answers to the question, "What is reality?" In this context, the phenomenological design was preferred in this study in order to reveal how 9th-grade students perceive the concept of forest and the meanings they attribute to it through metaphors. Since the study aims to explore students' subjective perceptions and mental representations of the forest concept, the phenomenological approach was considered appropriate for understanding these experiences in depth.

Study Sample

The study group of the research consisted of 237 ninth-grade students studying in secondary education institutions located in the central district of Karabük, as well as in the Safranbolu and Yenice districts of Karabük province during the first semester of the 2025–2026 academic year. In this study, the purposive sampling method was employed, which allows the selection of participants who are expected to provide the most appropriate data for addressing the research problem (Kabakçı Yurdakul, 2013). In determining the study group, accessibility and voluntary participation were taken as the main criteria. In addition, being a ninth-grade student and voluntarily participating in the research were determined as the basic inclusion criteria.

In this study, criterion sampling, one of the purposive sampling methods, was employed. Criterion sampling involves selecting participants who meet predetermined criteria relevant to the research purpose and who are expected to provide information-rich data about the phenomenon under investigation (Palinkas et al., 2015). The main criterion for selecting the participants was being a 9th-grade student. The reason for selecting this group is that these students have completed their primary education and have been exposed to fundamental concepts such as forest, nature, and environment through formal education. Therefore, it is considered appropriate to examine how these students have developed their perceptions of the concept of forest. In addition, the study was conducted in Karabük and its districts, as Karabük is one of the provinces with the highest forest density in Türkiye. This context provides a meaningful setting for examining students' perceptions of the forest concept. In

qualitative research, it is essential to assess whether the study fulfills its intended objectives and whether the selected sample is appropriate for addressing the research topic (Luborsky & Rubinstein, 1995).

Of the students participating in the research, 39.24% (n = 93) were students from Karabük Mehmet Vergili Science High School, located in the central district of Karabük. Among these students, 43 were male and 50 were female. 37.13% (n = 88) of the participants were students from Şehit Murat Akdemir Anatolian Imam Hatip High School, located in the Safranbolu district. Of these students, 46 were male and 42 were female. 23.63% (n = 56) of the participants consisted of students from Yenice Anatolian High School, located in the Yenice district. Among these students, 26 were male and 30 were female. In total, the study group consisted of 237 students, including 115 males (48.52%) and 122 females (51.48%). Selecting students from schools located in different districts enabled the examination of students' metaphorical perceptions of the concept of forest within different environmental and socio-cultural contexts.

Instruments and Procedures

Within the scope of this article, the data were obtained through a metaphor-based interview form consisting of a single semi-structured question developed by the researchers. To determine the metaphors of the students participating in the research regarding the concept of forest, each student was asked to fill out a form consisting of the template sentence: "Forest is like/similar to Because" In such question statements, the word "like" is mostly preferred to make the relationship between the target of the metaphor and the source of the metaphor more distinct. This is because, for an expression to be considered a metaphor, the target element, the source element, and the characteristics (justifications) intended to be transferred from the source to the target must be clearly stated (Forceville, 2002). After the forms were distributed to the students, an explanation regarding the concept of metaphor was provided, and they were requested to fill out the form based on their own feelings and thoughts without any external guidance. No time limit was imposed during the process of filling out the form, thereby allowing the students to express their views freely and comfortably.

The data collection process was carried out during the first semester of the 2025–2026 academic year and was completed within a period of approximately three weeks. Prior to the data collection process, research application permission was obtained from the Ministry of National Education (MoNE). Participation in the study was based on voluntary consent, and students were informed about the purpose of the research. Since the participants were under the age of 18, parental consent forms were obtained in accordance with institutional procedures. During the data collection process, students were asked to complete the metaphor form individually. The data collection process was conducted under the supervision of the researchers in the classroom environment. After the forms were collected, they were carefully examined. Forms that did not include a clear metaphor or did not contain a valid justification

were excluded from the analysis. In this context, a total of four forms were considered invalid and were not included in the study.

Data Analysis

Content analysis method was used in the analysis of the metaphors obtained in this study. The primary objective of content analysis is to clarify the data by reaching meaningful concepts and the connections between these concepts in line with the collected data (Yıldırım and Şimşek, 2016, p. 242). In content analysis, the researcher must follow specific stages. These stages are as follows:

- Careful review and analysis of the data,
- Identification and exclusion of data that should not be included within the scope of the research,
- Restructuring and integration of the data to be used in the investigation process,
- Ordering of documents according to a specific sequence and numbering them by coding,
- Detailed analysis of text contents,
- Identification of basic categories and themes,
- Classification of textual data according to the established category headings,
- Implementation of procedures for ensuring the validity and reliability elements of the study,
- Demonstration of the numerical frequencies of recurring expressions in the data,
- Interpretation of the findings obtained and making sense of them in line with the purpose of the research (Ekici, 2016).

These stages specified by Ekici (2016) in content analysis were followed in this article for the purpose of systematically analyzing the metaphorical perceptions of 9th-grade students toward the concept of forest and classifying these metaphors into thematic categories.

At this stage, all student responses were read repeatedly to ensure a comprehensive understanding of the metaphors and their justifications. In this process, responses that did not contain a clear metaphor or lacked a logical justification were excluded from the analysis. During this stage, metaphors were grouped based on their underlying meanings and common characteristics reflected in students' explanations (the "because" part of the metaphor form). In this classification process, the same metaphor could be placed in different categories depending on the justification provided by the students. In other words, metaphors were not categorized solely based on their surface expressions but according to the meanings attributed to them by participants. Therefore, even if the same metaphor was produced by different students, it could contribute to different categories depending on the reasoning provided, and this situation was taken into account in the calculation of category frequencies. Frequencies were

calculated based on the number of valid metaphor statements, and each response was evaluated independently according to its assigned category.

Validity and Reliability

To ensure reliability in the study, after excluding unsuitable metaphors, the remaining metaphors were associated with conceptual categories determined by two researchers. During this process, the metaphors were read aloud by one of the researchers, and a consensus was reached with the other researcher regarding which category they should be included in; subsequently, the frequency table was arranged accordingly. A researcher whose field of expertise is metaphor studies was requested to match all metaphors, without exception, with the relevant conceptual categories. Then, these matchings performed by the expert were examined by comparing them with the classifications made by the researchers. As a result of the comparisons, the numbers of agreed and disagreed items between the researchers and the field expert were determined; the reliability level of the study was calculated using the formula $\text{Reliability} = \text{consensus} / (\text{consensus} + \text{disagreement})$ suggested by Miles and Huberman (1994). The average reliability between coders was determined to be 94%. Considering that the authors accept cases where the reliability level is 90% and above as appropriate, the 94% consensus rate reached in this research demonstrates that the study is sufficient in terms of reliability.

RESULTS

Findings Regarding the First Research Question

The first research question of the study was formulated as: What are the metaphors specified by 9th-grade students regarding the concept of forest? The metaphors stated by the 9th-grade students regarding the concept of forest are presented in Table 1.

Table 1. Distribution of metaphors provided by 9th grade students regarding the concept of forest

| Metaphor Rank | Metaphor | Frequency | Metaphor Rank | Metaphor | Frequency |
|---------------|----------|-----------|---------------|------------------|-----------|
| 1 | House | 79 | 26 | The Earth's Lung | 4 |
| 2 | Life | 36 | 27 | Factory | 4 |
| 3 | Breath | 24 | 28 | Oxygen Source | 4 |
| 4 | Lung | 23 | 29 | Ocean | 4 |
| 5 | Living | 17 | 30 | Community | 4 |
| 6 | Human | 14 | 31 | A Living Being | 3 |

| | | | | | |
|----|--------------------------|----|----|------------------------|---|
| 7 | Home | 14 | 32 | Green | 3 |
| 8 | Peace | 12 | 33 | Buddy | 3 |
| 9 | Source of Living | 12 | 34 | The Lungs of the Earth | 3 |
| 10 | Heart | 11 | 35 | World's Heart | 3 |
| 11 | Mother | 10 | 36 | Shield | 3 |
| 12 | Book | 9 | 37 | History Book | 3 |
| 13 | Family | 8 | 38 | History | 3 |
| 14 | School | 8 | 39 | Library | 3 |
| 15 | Water | 8 | 40 | Oxygen Tank | 3 |
| 16 | Nature | 7 | 41 | Health | 3 |
| 17 | Animals' Home | 7 | 42 | A Green House | 2 |
| 18 | Medicine | 6 | 43 | Hospital | 2 |
| 19 | Labyrinth | 6 | 44 | Zoo | 2 |
| 20 | Hair | 6 | 45 | Habitat | 2 |
| 21 | Source of Life | 5 | 46 | Mirror | 2 |
| 22 | Art | 5 | 47 | Garden | 2 |
| 23 | Tree | 4 | 48 | Shelter | 2 |
| 24 | Heaven | 4 | 49 | Nutrition Source | 2 |
| 25 | Our Lungs | 4 | 50 | A City | 2 |
| 51 | A Home for Living Beings | 2 | 90 | A Country's President | 1 |
| 52 | World | 2 | 91 | Flowing Water | 1 |
| 53 | Cell | 2 | 92 | Sphere of Life | 1 |

| | | | | | |
|----|-------------------------------|---|-----|-------------------------------|---|
| 54 | The Human Heart | 2 | 93 | An Art Painting | 1 |
| 55 | A Place of Escape | 2 | 94 | A Little Kid | 1 |
| 56 | Hair on the Head | 2 | 95 | A Huge House | 1 |
| 57 | Happiness | 2 | 96 | Pawns | 1 |
| 58 | Oxygen Reservoir | 2 | 97 | The Home of Living Things | 1 |
| 59 | Army | 2 | 98 | The Heart of Life | 1 |
| 60 | Orchestra | 2 | 99 | The Center of Health | 1 |
| 61 | Piece of Art | 2 | 100 | A Spacious House | 1 |
| 62 | Painting | 2 | 101 | Resource | 1 |
| 63 | The Grass Growing in the Soil | 2 | 102 | A Green Organ of the Earth | 1 |
| 64 | Space | 2 | 103 | Oven | 1 |
| 65 | Time | 2 | 104 | The Place Where We Find Peace | 1 |
| 66 | Living Center | 2 | 105 | A Ring of Fire | 1 |
| 67 | Light | 2 | 106 | Crops Planted in the Field | 1 |
| 68 | Vitality | 1 | 107 | Therapy | 1 |
| 69 | A Source of Peace | 1 | 108 | Our Planet's Lungs | 1 |
| 70 | A Reflection of People | 1 | 109 | An Unappreciated Friend | 1 |
| 71 | Flora | 1 | 110 | Quilt | 1 |
| 72 | An Eraser | 1 | 111 | Carpet | 1 |
| 73 | Fresh Air | 1 | 112 | Storehouse | 1 |
| 74 | Hive | 1 | 113 | Affection | 1 |

| | | | | | |
|-----|---|---|-----|--------------------------|---|
| 75 | Those Who Helps Us In Our Lives | 1 | 114 | Treasure Chest | 1 |
| 76 | A Place We Need To Protect | 1 | 115 | Sanctuary | 1 |
| 77 | Natural Resources | 1 | 116 | Home of Animals | 1 |
| 78 | Source of Income | 1 | 117 | Home of Living Beings | 1 |
| 79 | Savage | 1 | 118 | An Energy That Unites Us | 1 |
| 80 | Baby | 1 | 119 | Our Means of Relaxing | 1 |
| 81 | Therapist | 1 | 120 | A Refuge for People | 1 |
| 82 | Spirit | 1 | 121 | Eternity | 1 |
| 83 | Medicine for Humans | 1 | 122 | Dad | 1 |
| 84 | The Combination Of Natural Beauty | 1 | 123 | Huge Lawns | 1 |
| 85 | Half of Life | 1 | 124 | The Best Place to Live | 1 |
| 86 | A Peaceful Room That Doesn't Belong To Us | 1 | 125 | Google | 1 |
| 87 | A House for Everyone | 1 | 126 | Respirator | 1 |
| 88 | Vacation | 1 | 127 | Human Life | 1 |
| 89 | Renewal | 1 | 128 | Trust | 1 |
| 129 | Heritage | 1 | 164 | The Capital of a Country | 1 |
| 130 | Future | 1 | 165 | The Continuity of Life | 1 |
| 131 | Poem | 1 | 166 | Kingdom | 1 |
| 132 | A Paradise Full of Greenery | 1 | 167 | A Loyal Friend | 1 |
| 133 | A Holiday Camp For Animals | 1 | 168 | Us | 1 |

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|-----|---|---|-----|---------------------------------------|---|
| 134 | Inspiration | 1 | 169 | Food Storage | 1 |
| 135 | Natural World | 1 | 170 | Wild | 1 |
| 136 | Brain | 1 | 171 | A Human Body's Balance | 1 |
| 137 | A Place Where Only Animals and Trees Exist | 1 | 172 | The City of Animals | 1 |
| 138 | Wilderness | 1 | 173 | Filter | 1 |
| 139 | Cell Structure | 1 | 174 | Oxygen Factory | 1 |
| 140 | Thoughts | 1 | 175 | Palace | 1 |
| 141 | Inner Self | 1 | 176 | A Person Trying to Hold on to Life | 1 |
| 142 | Grape | 1 | 177 | Car | 1 |
| 143 | Order | 1 | 178 | Greengrocer | 1 |
| 144 | Cloud | 1 | 179 | Dictionary | 1 |
| 145 | Haunted House | 1 | 180 | Market | 1 |
| 146 | A Book That Tells About the Past | 1 | 181 | To Live | 1 |
| 147 | To Gain Knowledge | 1 | 182 | Another Universe | 1 |
| 148 | Dream | 1 | 183 | A Pool of Water In The Desert | 1 |
| 149 | Solitude | 1 | 184 | Rainbow | 1 |
| 150 | Equanimity | 1 | 185 | A Region Where We Are Free | 1 |
| 151 | Cover | 1 | 186 | Clusters | 1 |
| 152 | Exam | 1 | 187 | Math | 1 |

| | | | | | |
|-----|--|---|-----|--------------------------------------|---|
| 153 | Soldier | 1 | 188 | Love | 1 |
| 154 | Life Partner | 1 | 189 | Treasure | 1 |
| 155 | A Friend We Can Talk in | 1 | 190 | Challenges | 1 |
| 156 | A Magical Place That Gives You Good Energy | 1 | 191 | Lifetime | 1 |
| 157 | Doctor | 1 | 192 | A Crowded City | 1 |
| 158 | Greenery | 1 | 193 | Legs | 1 |
| 159 | Main Example of The Word Positive | 1 | 194 | The Living Form of Green | 1 |
| 160 | A Necessary Medication For Breathing | 1 | 195 | A Sack Whose Contents Are Unknown | 1 |
| 161 | A Hospital Where We Wake Up Alone | 1 | 196 | Stream | 1 |
| 162 | Calmness | 1 | 197 | Herd | 1 |
| 163 | A Bird Feeding Its Nestling | 1 | 198 | The Lives of People on Earth | 1 |
| 199 | The Breath of Humans and Living Beings | 1 | 231 | Jewellery | 1 |
| 200 | A Way That Helps Us Hold on to Life | 1 | 232 | Child | 1 |
| 201 | Sibling | 1 | 233 | Essence of Aesthetics | 1 |
| 202 | Happiness and Peace | 1 | 234 | Prosperity | 1 |
| 203 | Ivy | 1 | 235 | Brown | 1 |
| 204 | Planets | 1 | 236 | Bookcase | 1 |
| 205 | Friend | 1 | 237 | A Market That Contains a lot of Food | 1 |
| 206 | The Place Where One Earns One's Livelihood | 1 | 238 | A Minaret Decorated with Trees | 1 |

| | | | | | |
|-----|---|---|-----|---|---|
| 207 | A Storage Building Used For Agricultural Products | 1 | 239 | World's Umbrella | 1 |
| 208 | Natural Environment | 1 | 240 | The Feeling of Being Disciplined | 1 |
| 209 | To Live One's Destiny | 1 | 241 | Lands Waiting To Be Discovered | 1 |
| 210 | The Population of The World | 1 | 242 | Our True and Real Home | 1 |
| 211 | A Relaxing Environment | 1 | 243 | An Area Full of People's Regrets | 1 |
| 212 | A Home of Peace and Love | 1 | 244 | The Place Where You Find the Most Peace | 1 |
| 213 | An Abandoned House | 1 | 245 | A Home Where People Can Feel Safe | 1 |
| 214 | The Land Our Ancestors Left Us | 1 | 246 | Our Fate | 1 |
| 215 | Cemetery | 1 | 247 | The Future of Humans | 1 |
| 216 | A Place to Calm Down | 1 | 248 | Animal Habitat | 1 |
| 217 | Greenhouse | 1 | 249 | A Relaxation Space for Us | 1 |
| 218 | A Place for Fun and Spending Time | 1 | 250 | A Mother's Heart | 1 |
| 219 | A Glass | 1 | 251 | Refraction | 1 |
| 220 | Helpful | 1 | 252 | A Food Source | 1 |
| 221 | Sea | 1 | 253 | The Light of Life | 1 |
| 222 | The Heart of Nature | 1 | 254 | To Be Hopeful | 1 |
| 223 | Raw Milk | 1 | 255 | Extraordinary Events | 1 |
| 224 | Our Nature's Beauties | 1 | 256 | Life-Giving | 1 |

| | | | | | |
|-----|-----------------------|---|-----|------------------------------|---|
| 225 | Divine Justice | 1 | 257 | Freshness | 1 |
| 226 | A Fancy Painting | 1 | 258 | Sandglass | 1 |
| 227 | The War to Stay Alive | 1 | 259 | Protector | 1 |
| 228 | Painting Table | 1 | 260 | Eye | 1 |
| 229 | Sketchbook | 1 | 261 | Animal | 1 |
| 230 | Playground | 1 | | | |
| | Type:261 | | | Total Metaphor Count: 638 | |

When the table is examined, it is observed that the students produced a total of 638 metaphors regarding the concept of forest, showing a diversity of 261 different types. The concentration of the most frequently used metaphors around vital, protective, and shelter-oriented concepts such as “House” (79), “life” (36), “breath” (24), and “lungs” (23) shows that these metaphors are frequently associated with life-related meanings. This concentration indicates a tendency to associate the forest with physical and biological aspects of life. The high level of metaphor diversity demonstrates that students produced a wide range of metaphorical expressions related to the concept of forest. The co-occurrence of metaphors such as “heart,” “mother,” “our lungs,” “oxygen source,” and “home” reflects that students expressed the concept of forest through both functional and affective meanings. Furthermore, metaphors such as “piece of art,” “library,” “history book,” “inspiration,” and “happiness” indicate that students associated the forest with aesthetic, cultural, and cognitive dimensions. The presence of metaphors such as “haunted house,” “solitude,” or “wild,” although limited in number, shows that some students also expressed different and less frequent associations related to the concept of forest. In general, the findings present a wide range of metaphorical expressions in terms of both variety and content. Table 2 presents the distribution of the metaphors stated by the 9th-grade students regarding the concept of forest into conceptual categories in terms of their common characteristics.

Findings Regarding the Second Research Question

The second research question of the study was formulated as: What is the distribution of the metaphors specified by 9th-grade students regarding the concept of forest into conceptual categories in terms of their common characteristics? The distribution of the metaphors specified by 9th-grade students regarding the concept of forest into conceptual categories in terms of their common characteristics is presented in Table 2.

Table 2. Distribution of metaphors stated by 9th-grade students regarding the concept of forest into conceptual categories in terms of common characteristics

| Categories | Type Of Metaphor | Total Metaphor |
|--|------------------|----------------|
| <p><i>1. Source of Life Category</i></p> <p><i>Metaphors:</i> Life(26)*, Breath(23)*, Lung(21)*, Living(16)*, Source Of Living(12), Heart(11), Source Of Life(5), Water(5)*, Tree(4), The Earth's Lung(4), Oxygen Source(4), Our Lungs(3)*, The Lungs Of The Earth(3), World's Heart(3), Oxygen Tank(3), Factory(2)*, The Human Heart(2), Oxygen Reservoir(2), Living Center(2), A Minaret Decorated With Trees(1), Legs(1), The Capital Of A Country(1), A Pool Of Water In The Desert(1), World(1)*, House(1)*, Our Planet's Lungs(1), Life Partner(1), The Light Of Life(1), A Way That Helps Us Hold On To Life(1), The Continuity Of Life(1), The Heart Of Life(1), Half Of Life(1), Medicine For Humans(1), The Breath Of Humans And Living Beings(1), Sandglass(1), A Necessary Medication For Breathing(1), Oxygen Factory(1), Ivy(1), Respirator(1), Fresh Air(1), Life-Giving(1), To Live(1), A Green Organ On Earth(1), Spirit(1)</p> <p><i>* Source of Life Category refers to metaphors emphasizing the forest as a vital element sustaining life (e.g., oxygen, breath, heart).</i></p> | 44 | 176 |
| <p><i>2. Living Space/Natural Habitat Category</i></p> <p><i>Metaphors:</i> House(67)*, Home(14), Animal's Home(7), Garden(2), Shelter(2), A City(2), A Home For Living Beings(2), Zoo(2), Hair On The Head(2), Habitat(2), A Green House(2), Hive(1), The Home Of Living Things(1), Home Of Living Beings(1), Natural Environment(1), The Heart Of Nature(1), World(1)*, The Population Of The World(1), Another Universe(1), Animal Habitat(1), The City Of Animals(1), Home Of Animals(1), A Crowded City(1), A Huge House(1), Clusters(1), A Place Where Only Animals And Trees Exist(1), Space(1)*, Sphere Of Life(1)</p> <p><i>*Living Space/Natural Habitat Category includes metaphors describing the forest as a place where living beings exist and interact.</i></p> | 28 | 121 |
| <p><i>3. Source of Serenity and Peace Category</i></p> <p><i>Metaphors:</i> Peace(12), House(10)*, A Place Of Escape(2), Happiness(2), Water(2)*, Inner Self(1), A Peaceful Room That Doesn't Belong To Us(1), Our Means Of Relaxing(1), Buddy(1)*, A Place For Fun And Spending Time(1), The Place Where You Find The Most Peace(1), Freshness(1), A Spacious House(1), Our True And Real Home(1), Eye(1), Life(1)*, A Holiday Camp For Animals(1), A House For Everyone(1), The Place Where We Find Peace(1), A Source Of Peace(1), A Home Of Peace And Love(1), A Home Where People Can Feel Safe(1), A Refuge For People(1), Brown(1), Book(1)*, Happiness And Peace(1), Breath(1)*, Playground(1), A Region Where We Are Free(1), A Relaxation Space(1), A Relaxing Environment(1), Prosperity(1), A Place To Calm Down(1), Calmness(1), Affection(1), Sanctuary(1), Equanimity(1), Vacation(1), Therapy (1), Therapist(1), Living(1)*, The Best Place To Live(1)</p> <p><i>* Source of Serenity and Peace Category refers to metaphors emphasizing emotional comfort and psychological well-being.</i></p> | 42 | 65 |
| <p><i>4. Core Part of Ecosystem Category</i></p> <p><i>Metaphors:</i> Human(12)*, Nature(7), Life(6)*, Family(5)*, Hair(4)*, Community(4), A Living Being(3), Cell(2), Animal(1), Stream(1), Car(1), Us(1), Vitality(1), The Lives Of People On Earth(1), Order(1), Planets(1), The War To Stay Alive(1), Cell Structure(1), Human Life(1), Lifetime(1), Herd(1), Natural World(1), The Grass Growing In The Soil(1)*, Renewal(1), Time(1)*, Challenges(1)</p> <p><i>* Core Part of the Ecosystem Category includes metaphors highlighting ecological balance and interconnectedness.</i></p> | 26 | 61 |
| <p><i>5. Protective and Healing Category</i></p> | 27 | 47 |

Metaphors: Mother(8)*, Medicine(6), Shield(3), Health(3), Family(2)*, Buddy(2)*, Hospital(2), Lung(2)*, A Mother's Heart(1), Friend(1), To Gain Knowledge(1), Those Who Helps Us In Our Lives(1), Cloud(1), Our Lungs(1)*, Raw Milk(1), Doctor(1), World's Umbrella(1), House(1)*, Filter(1), Carpet(1), Life(1)*, A Magical Place That Gives You Good Energy(1), Sibling(1), Protector(1), The Center Of Health(1), The Grass Growing In The Soil(1)*, Quilt(1)

** Protective and Healing Category refers to metaphors emphasizing the forest's protective and restorative functions.*

6. Natural Aesthetic Element Category

27

39

Metaphors: Art(5), Heaven(4), Green(3), Orchestra(2), Piece Of Art(2), Painting(2), Flowing Water(1), An Art Painting(1), Child(1), Sea(1), The Combination Of Natural Beauty(1), Our Nature's Beauties(1), Essence Of Aesthetics(1), Rainbow(1), Refraction(1), Inspiration(1), Huge Lawns(1), Cover(1), Sketchbook(1), Painting Table(1), A Fancy Painting(1), Poem(1), Grape(1), Flora(1), The Living Form Of Green(1), Greenery(1), A Paradise Full Of Greenery(1)

** Natural Aesthetic Element Category includes metaphors related to beauty and visual harmony.*

7. Mirror of Social Consciousness Category

28

32

Metaphors: Mirror(2), Life(2)*, Hair(2)*, History(2)*, The Land Our Ancestors Left Us(1), A Ring Of Fire(1), Baby(1), An Energy That Unites Us(1), A Glass(1), An Unappreciated Friend(1), The Feeling Of Being Dicipined(1), Trust(1), A Person Trying To Hold On To Life(1), An Area Full Of People's Regrets(1), A Reflection Of People(1), Divine Justice(1), To Live One's Destiny(1), A Place We Need To Protect(1), Kingdom(1), A Little Kid(1), Cemetary(1), Heritage(1), Jewellery(1), Pawns(1), Dream(1), Exam(1), Water(1)*, Time(1)*

** Mirror of Social Consciousness Category reflects metaphors associated with social values and awareness.*

8. Guiding/Pathfinder Category

11

28

Metaphors: Book(8)*, School(7)*, Library(3), History Book(3), Family(1)*, Dad(1), A Book That Tells About The Past(1), Google(1), Light(1)*, Dictionary(1), Bookcase(1)

** Guiding/Pathfinder Category includes metaphors emphasizing knowledge and guidance.*

9. Mysterious and Risky Place Category

17

26

Metaphors: Labyrinth(6), Ocean(4), Human(2)*, Treasure Chest(1), Wilderness(1), A Sack Whose Contents Are Unknown(1), Lands Waiting To Be Discovered(1), Haunted House(1), Math(1), Extraordinary Events(1), Eternity(1) An Abandoned House(1), Space(1)*, Wild(1), Savage(1), A Hospital Where We Wake Up Alone(1), Solitude(1)

** Mysterious and Risky Place Category refers to metaphors associated with uncertainty and danger.*

10. Provider Of Natural Resources and Raw Materials Category

20

23

Metaphors: Mother(2)*, Nutrition Source(2), Factory(2)*, A Food Source(1), Storehouse(1), Natural Resources(1), The Place Where One Earns One's Livelihood(1), Oven(1), Source Of Income(1), A Market That Contains A Lot Of Food(1), Resource(1), Greengrocer(1), Market(1), A Loyal Friend(1), Palace(1), Greenhouse(1), A Storage Building Used For Agricultural Products(1), Helpful(1), A Bird Feeding Its Nestling(1), Food Storage(1)

** Provider of Natural Resources and Raw Materials Category includes metaphors related to economic and material benefits.*

| | | |
|--|-----|-----|
| <i>11.Source of Hope Category</i> | 11 | 11 |
| <i>Metaphors: Love(1), Thoughts(1), Future(1), Treasure(1), Light(1)*, A Friend We Can Talk In(1), The Future Of Humans(1), Main Example Of The Word Positive(1), History(1)*, Crops Planted In The Field(1), To Be Hopeful(1)</i> | | |
| <i>* Source of Hope Category reflects future-oriented and optimistic meanings.</i> | | |
| <i>12. Regulatory Element Category</i> | 8 | 9 |
| <i>Metaphors: Army(2), Soldier(1), Brain(1), An Eraser(1), A Country's President(1), A Human Body's Balance(1), Our Fate(1), School(1)*</i> | | |
| <i>* Regulatory Element Category includes metaphors emphasizing balance and order in nature.</i> | | |
| <i>The metaphors house, life, breath, lung, living, human, mother, book, school, water, hair, our lungs, factory, buddy, history, light, time, space, family, the grass growing in the soil and world have been repeated across different categories. This situation arises from the fact that the distribution is determined based on the explanation section of the metaphor, expressed with the word "because."</i> | 289 | 638 |
| <i>Due to the distribution of metaphors into different categories, there is a difference between the total types of metaphors (289) and the number of unique metaphors (261).</i> | | |

When the table is examined, it is observed that the metaphors attributed by the students to the concept of forest are gathered under 12 basic conceptual categories, and these categories provide important clues as to how students position the forest at cognitive and affective levels. The fact that metaphors are most densely concentrated in the "Source of Life" category (176 metaphors) shows that this category includes the highest number of metaphorical expressions. High rates in the "Living Space/Natural Habitat" (121 metaphors) and "Source of Serenity and Peace" (65 metaphors) categories indicate that these categories are also prominently represented in the data. The presence of the "Core Part of the Ecosystem" (63 metaphors) and "Protective and Healing" (47 metaphors) categories demonstrates that these categories constitute an important portion of the metaphor distribution. Metaphors in the "Natural Aesthetic Element" (39 metaphors) and "Mirror of Social Consciousness" (32 metaphors) categories reflect the diversity of metaphorical expressions across different thematic dimensions. Metaphors in the "Guiding/Pathfinder" (28 metaphors) and "Mysterious and Risky Place" (26 metaphors) categories show that these themes are also represented among students' responses, although at relatively lower frequencies. This situation reveals that students' perceptions of the forest include negative connotations involving caution and anxiety alongside positive learning potential. The "Provider of Natural Resources and Raw Materials" (23 metaphors) category indicates that this category is represented with a limited number of metaphors compared to others. The "Source of Hope" (11 metaphors) and "Regulatory Element" (9 metaphors) categories show that these categories have the lowest frequencies among all categories. Overall, the findings present a distribution of metaphors across multiple categories in terms of both frequency and variety. Below, explanations regarding each metaphor included in the said categories are presented with examples based on the participants' expressions.

1. Metaphors in the category of "Source of Life" and examples of participant explanations:

- The Human heart: *"Just as the human heart enables one to sustain their life, forests, like a heart, enable all living beings on earth to sustain their lives."* (S142)

- Life: *"Trees in the forest are very precious because they are the source of oxygen for all living beings."* (S8)

2. Metaphors in the category of "Living Space / Natural Habitat" and examples of participant explanations:

- Home: *"Plants and animals continue their lives here. Forests host plants and animals."* (S52)

- A crowded city: *"Forests, like cities, harbor many living beings. Trees remind me of buildings, and the animals living there remind me of people."* (S231)

3. Metaphors in the category of "Source of Serenity and Peace" and examples of participant explanations:

- Peace: *"Forests are quiet. When we are in distress, we can relax by talking to ourselves and doing activities in the forest. Therefore, it is similar to peace."* (S106)

- Our means of relaxing: *"The sounds made by the leaves as the wind blows and the sounds of living beings give people peace and serenity."* (S53)

4. Metaphors in the category of "Core Part of the Ecosystem" and examples of participant explanations:

- Stream: *"Forests are always in a flow. There is always a cycle. As time flows by, trees circulate as a requirement of the ecosystem."* (S36)

- Human: *"Plants in the forest are living beings just like us humans, and they are a part of this life."* (S135)

5. Metaphors in the category of "Protective and Healing" and examples of participant explanations:

- Hospital: *"The cure for all our illnesses and troubles is hidden in the forests."* (S93)

- Shield: *"It saves us from the polluted air of cities and gives us clean air. It is actually like a shield. It takes in dirty air and offers us clean air."* (S36)

6. Metaphors in the category of "Natural Aesthetic Element" and examples of participant explanations:

- The Combination Of Natural Beauty: *"The lush green trees and that river passing through the trees are almost like the combined state of an entire beauty; the features are endless."* (S1)

- Heaven: *"Everywhere is lush green, rivers, waterfalls... like heaven."* (S209)

7. Metaphors in the category of "Mirror of Social Consciousness" and examples of participant explanations:

- Exam: *"If we cut too many trees, our end will come. Or if we cause fires, it will be our disaster. We must constantly plant trees so they do not run out."* (S197)
- History: *"If we do not take lessons from recent and distant history regarding forests, it could be our end."* (S179)

8. Metaphors in the category of "Guiding / Pathfinder" and examples of participant explanations:

- Book: *"It allows us to understand things like how living beings live, their characteristics, and how they contribute to life."* (S217)
- Library: *"Like a library, it contains a lot of information within it, and this information sheds light on our lives."* (S158)

9. Metaphors in the category of "Mysterious and Risky Place" and examples of participant explanations:

- Labyrinth: *"The forest is like a labyrinth; you never know what you will encounter while wandering in the forest. It is vast and endless."* (S13)
- Lands Waiting To Be Discovered: *"When you go to the forest, it feels as if it has no end. It is a place that is dangerous and contains mystery, but it is just as beautiful."* (S171)

10. Metaphors in the category of "Provider of Natural Resources and Raw Materials" and examples of participant explanations:

- Factory: *"People meet most of their needs from trees. Paper, lumber, and many other things could not be produced without forests."* (S65)
- The Place Where One Earns One's Livelihood: *"Thanks to forests, many people earn money from forestry and bring bread to their homes."* (S203)

11. Metaphors in the category of "Source of Hope" and examples of participant explanations:

- To Be Hopeful: *"Even when a person plants a sapling, they become hopeful, wondering if it will grow."* (S29)
- Main Example Of The Word 'Positive': *"It converts carbon dioxide into oxygen, provides both physical and mental benefits to humans, and because of many more positive aspects, the forest is a beautiful example of positive thinking."* (S148)

12. Metaphors in the category of "Regulatory Element" and examples of participant explanations:

of life” or “living space,” but also include metaphors reflecting uncertainty, risk, and the need for protection. While earlier research (e.g., Genç et al., 2010; Kahyaoğlu, 2015; Güngör Cabbar, 2020) generally emphasizes the life-supporting and aesthetic aspects of nature and forest concepts, the emergence of categories such as “mysterious and risky place” in this study indicates a more complex and multidimensional perception structure. This difference may be associated with the geographical and ecological characteristics of Karabük, a region with a high forest density, where students are more likely to interact directly with forest environments and observe both their benefits and potential risks.

Consistent with this difference, the research results show that by depicting the forest as a mysterious, risky, or dangerous area, students' perception of the forest does not consist solely of positive associations; they also view the forest as a sensitive and risk-bearing ecosystem that must be protected. In this context, it reveals that the theme of "forest" resonates in students' mental representations with a strong ecological consciousness, value-oriented environmental sensitivity, and an understanding of sustainable living.

Another factor that may explain students' perceptions of the forest is the socio-economic relationship established between humans and forest ecosystems in the region. In addition to ecological and emotional meanings, some students conceptualized the forest as a “source of income,” “factory,” or “livelihood,” which indicates that they associate the forest with economic production and human labor. This finding can be interpreted in relation to the regional characteristics of Karabük and its surroundings, where forests constitute one of the most significant natural resources and play an important role in local economic activities. In such contexts, forests are not only ecological systems but also spaces where human labor, including forestry-related occupations, is actively involved (Öztekinçi & Coşkun, 2021). From this perspective, the presence of production- and livelihood-oriented metaphors in students' responses may reflect their indirect awareness of forest-based economic activities, such as forestry and resource utilization. This suggests that students' perceptions of the forest are shaped not only by environmental education but also by the socio-economic structure of their local environment.

The findings of the present study indicating that students frequently associated the forest with metaphors such as “peace,” “relaxation,” “escape,” and “therapy” can be explained through the restorative and healing effects of forest environments. In the literature, forests are defined as environments that contribute to both physical and psychological well-being, reducing stress levels and promoting mental relaxation (Deniz, 2024). In this respect, the “Source of Serenity and Peace” category identified in this study reflects not only students' subjective experiences but also aligns with scientific evidence emphasizing the therapeutic and calming effects of forest environments.

The results of the study largely overlap with similar studies in the literature. In the research conducted by Zengin and Kunt (2013), which examined secondary school students' attitudes toward trees and the environment, it was determined that students had a high level of positive attitude toward

the environment and evaluated the benefits of forests predominantly in the context of human life. Similarly, in Özcan's (2022) study, which addressed high school students' attitudes toward the forest ecosystem, it was found that environmental awareness had been established among the students. The fact that the results obtained in this study show that students have positive perceptions of the concept of forest is consistent with the aforementioned research.

The findings of the present study are largely consistent with those reported in the existing literature. In a phenomenographic study conducted by Genç, Demirkaya, and Karasakal (2010), students were found to conceptualize forests primarily as elements essential for life, places that provide various benefits to humans, and natural environments where individuals spend time. Similarly, the results of the current study revealed that students frequently described forests through metaphors such as "source of life," "oxygen source," and "breath." These metaphors indicate that students strongly associate forests with the continuity of life and perceive them as indispensable components of ecological balance. Therefore, the findings of this study appear to be in line with those reported in previous research.

According to the results of the study, the second most prominent conceptual category is "living space/natural habitat." Within this category, students described forests using metaphors such as "home," "house," "animals' home," and "living space." These expressions suggest that students perceive forests not only as environments that support human life but also as essential habitats for other living organisms. In this respect, the findings of the present study demonstrate that students recognize forests as ecosystems that sustain biodiversity and provide shelter for various forms of life.

Similarly, Güngör Cabbar (2020) reported that a considerable proportion of students' metaphors related to the concept of tree were grouped under the categories of "home" and "source of life." This result indicates that environmental concepts such as forest and tree are commonly perceived by students as fundamental ecological structures that support life and maintain the balance of natural systems. In this context, the results of the present study further support the view that students tend to conceptualize nature primarily through life-supporting and habitat-related meanings.

The findings of the present study also have important implications for environmental education, geography teaching, and values education. In terms of environmental education, the prominence of categories such as "source of life," "protective and healing," and "core part of the ecosystem" indicates that students have developed a strong ecological awareness and recognize the forest as a vital component of sustainable life. From the perspective of geography education, the influence of Karabük's forest-rich geographical context suggests that students' perceptions are shaped by their direct interaction with their natural environment, highlighting the importance of place-based and context-oriented teaching approaches. Furthermore, in terms of values education, the presence of both positive and risk-related metaphors (e.g., "mysterious and risky place") demonstrates that students not only appreciate the benefits of forests but also perceive them as entities that require protection, responsibility, and ethical

awareness. These findings suggest that environmental topics can be effectively integrated into interdisciplinary teaching practices that foster both cognitive understanding and value-based learning outcomes.

Limitations of the Study

This study has several limitations. First, the research was conducted with 9th-grade students from specific districts of Karabük, which may limit the generalizability of the findings to different regions and educational contexts. Second, the data were collected using a single metaphor-based form, and students' responses were limited to their written expressions, which may restrict the depth and richness of the data. Therefore, the absence of additional qualitative data sources such as interviews or observations may limit a more comprehensive understanding of students' perceptions. Another limitation is that the study focused on students' perceptions at a single point in time and does not reflect potential changes in perceptions over time. In addition, the participants of this study received their primary education based on the 2018 Life Studies and 2018 Social Studies Curricula. However, these curricula were revised within the framework of the Türkiye Century Maarif Model in 2024. Therefore, the findings of this study reflect students' perceptions shaped by the previous curriculum structure and may not fully capture the potential influence of the updated curriculum. This situation may limit the transferability of the findings to educational contexts shaped by the revised curriculum.

Future Research Directions

Future studies may focus on strengthening environmental education programs by addressing forest and ecosystem themes through more in-depth, sustainability-oriented, and interdisciplinary approaches. In particular, considering that students predominantly conceptualized the forest as a "source of life" and a "living space/natural habitat," future research may examine how curriculum designs can further reinforce these life-centered and ecological perspectives. In addition to classroom practices, future studies may also focus on curriculum development and policy-level implications. Considering that students conceptualize the forest not only as a biological entity but also as a value-laden and experiential space, curriculum frameworks in courses such as Social Studies, Geography, and Life Studies may be revised to integrate cognitive, affective, and value-based learning outcomes in a more balanced way. Furthermore, assessment tools may be designed to capture not only students' conceptual knowledge but also their ecological awareness and value-oriented perceptions. In addition, research can be conducted on the effects of nature-based learning practices such as field trips, ecosystem observations, and outdoor education activities on students' environmental awareness. These practices may be especially effective in enhancing the experiential dimension of students' perceptions, which were reflected in categories such as "source of serenity and peace" and "natural aesthetic element," and may be examined through qualitative and mixed-method designs focusing on students' metaphorical expressions and experiential reflections. Further studies may also examine how regional ecological risks,

such as forest fires, influence students' environmental perceptions and responsibility. In this regard, the presence of metaphors under the category of "mysterious and risky place" suggests that students are already aware of potential environmental threats, and future research may explore how this awareness can be transformed into proactive environmental responsibility through participatory environmental education practices and problem-based learning approaches. Moreover, expanding research to different grade levels and regions would provide a more comprehensive understanding of students' perceptions of the forest concept. Comparative studies conducted across different educational levels may reveal how metaphorical perceptions evolve over time. Finally, future research may focus on integrating values education, environmental ethics, and sustainability awareness into educational practices and examining their impact on students' attitudes and behaviors toward nature. Considering that students associated the forest with categories such as "mirror of social consciousness" and "protective and healing," future studies may explore how these value-based perceptions can be systematically supported through educational interventions. This suggests that educational interventions designed on the basis of students' existing metaphorical perceptions may be more effective in promoting long-term environmental attitudes and behaviors.

CONCLUSION

In this study, the metaphorical perceptions of 9th-grade students toward the concept of "forest" were examined, and it was determined that students made sense of the forest under 12 conceptual categories by producing a total of 638 metaphors. The research results indicate that students' perceptions of the forest are most intensely concentrated in the themes of source of life, living space/natural habitat, and source of serenity and peace. In addition, metaphors were also identified in categories such as core part of the ecosystem, mirror of social consciousness, and protective and healing. Furthermore, metaphors were distributed across categories such as natural aesthetic element, guiding/pathfinder, mysterious and risky place, provider of natural resources and raw materials, source of hope, and regulatory element. The distribution of metaphors across these categories indicates that students produced a wide range of metaphorical expressions in relation to the concept of forest. Overall, these findings reveal that students conceptualize the forest in a multidimensional manner, encompassing ecological, emotional, social, and functional meanings. This multidimensional perception suggests that the concept of forest occupies a significant place in students' cognitive and affective frameworks, reflecting a strong level of environmental awareness and sensitivity.

Additional Declaration

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Author Contributions

In this study, the contribution of the authors was equal; all four authors contributed equally to the development of the research idea, data analysis, writing and proofreading stages.

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Responsible Artificial Intelligence Statement

In this study, artificial intelligence tool Grammarly was utilized for language editing and linguistic refinement. We declare that we, as the authors, take full responsibility for the problems that may arise from the content produced by artificial intelligence.

Conflicts of Interest

The authors declare that there are no conflicts of interest related to the publication of this study.

Ethics Approval

In all processes of this study, the principles of Pen Academic Publishing Research Ethics Policy were followed.

The study received all required legal permissions in accordance with the Research Application Permissions Circular (2024/41) of the Ministry of National Education, under the Research Permission Application No .2025.034714.02, which authorized the implementation and data collection procedures of the research.

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