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# PRIMARY PRE-SERVICE TEACHERS' METAPHORICAL PERCEPTIONS OF THE CONCEPT OF ENVIRONMENTAL POLLUTION

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## Introduction

The environment is a system that includes all living things on Earth as well as elements such as air, soil, and water that are required for life (Bonnett, 2007). The environment, which is a network of relationships, is critical for living things to live a healthy life and includes also all self-arising things. Thus, environment should be seen from a holistic view and unfortunately, majority of people, love their pets and hate bacteria. But this point of view cannot be seen as holistic. However, it could be argued that the rejection of holism here is a manifestation of an underlying instrumentalism - loving only what we believe meets our needs and desires - which, in turn, is an expression of the metaphysical mastery that has resulted in an atomistic dominance of nature. Furthermore, and perhaps more importantly, it has limited our understanding of what the world has to offer and who we are (Bonnett, 2007).

According to Tay and Diener (2011), while needs appear to be a relatively inelastic part of people's consumption, wants in the form of desires are more variable as they are shaped by cultural perceptions of what is important or valuable. People in general do not know which behaviours shaped by their desires affect others' use of available resources, and they do not receive specific feedback about the outcomes of behaviour changes (Gatersleben et al., 2002). As a result, when someone is aware that others are in pain, they can act altruistically by feeling obligated to alleviate that pain (Schwartz, 1977), while they can more easily engage in behaviours about which they are unaware of the extent to which they affect the other person. In a similar perspective throughout the history of mankind, environmental changes have inevitably emerged as a result of people's desire to meet their needs and desires, such as physical comfort, mobility, labour savings, enjoyment, power, status, personal security, tradition and care of family, technology, etc. (Stern, 2000, Tay & Diener, 2011) without knowing that some people are causing someone pain. Actually, many different factors contribute to the problems encountered, including population growth, unintentional use of natural resources, environmental degradation, and urbanization (Bonnett, 2004).

People's need for natural resources, unconscious consumption, and environmental insensitivity also contribute to a gradual increase in environmental pollution. Indeed, studies show that human factors are the root



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**Abstract.** *Metaphors are expressions that are frequently used in people's minds to explain concepts with other unrelated concepts and have a personal emphasis on learning. The purpose of this study is to determine and interpret the metaphorical perceptions of primary school pre-service teachers towards environmental pollution. The "phenomenology" research design was used in this study. The study group of this research consists of a total of 372 primary pre-service teachers. Data were collected using semi-structured forms to determine the metaphorical perceptions of primary school pre-service teachers. The pre-service teachers were asked to complete the sentence, "Environmental pollution is like... because...". At the conclusion of multiple comparisons, by the relation degree between environmental pollution and its metaphors, it was determined that significant difference was in favour of the 2nd year between the 2nd and 4th years and in favour of the 3rd year between the 3rd and 4th years. As a result of the research, it was discovered that the majority of the metaphors produced by the pre-service teachers were in the "human" and "harmful/dangerous/uncomfortable situations" categories. Furthermore, the study discovered that as the year level increased, the number of related metaphors about environmental pollution decreased.*

**Keywords:** *environmental pollution, metaphorical perceptions, primary pre-service teachers*

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causes of environmental pollution (Gardner & Stern, 1996; Tung et al., 2002). While humans use rapidly depleting natural resources to meet all of their wants and needs, they also pollute the environment with residues from production and consumption, gradually breaking a link in the chain that maintains natural balance (Şanlı, 1984). As a result, educators bear a great deal of responsibility in reducing and halting the recent increase in environmental pollution. Individual environmental awareness, which can be gained through education, can allow the elimination of problems that may be hazardous to our world (Davis, 1998). As a result, educators must instil environmental awareness in students. While humans cause environmental problems consciously or unconsciously in order to meet their needs, they also play a significant role in eradicating these problems (Bonnett, 2007).

Environmental education studies must be conducted in order to find a solution to this problem that threatens our future. According to the studies, environmental education should begin at a young age in order to eliminate this problem because unfortunately, many families in all over the world do not have enough awareness and equipment to educate their children about the environment (Mandel, 2013; Payne, 2005). Environmental education, which should be continued throughout one's life, should begin at a young age. Because interests and attitudes are formed at a young age allow human behaviour to be positively shaped (Davis, 1998). Although the young generation do not cause the existing environmental problems, they will be the most affected by them (Ateş & Karatepe, 2013). People's environmental awareness can enable them to live a happier, healthier, and more peaceful life (İpek, 2014; Yalçınkaya, 2012).

The concept of "environmental pollution," the subject of our research, has been evaluated using the "metaphors" to reveal different ways of thinking. Metaphors are expressions that are frequently used in people's minds to explain concepts with other unrelated concepts and have a personal emphasis on teaching (Botha, 2009). Metaphors serve an important purpose in expressing the desired explanation in fewer words and with greater emphasis. In other words, it is possible to determine the chance of expressing a strong expression with fewer words with metaphors. It is possible to list the characteristics of metaphors as follows (Kalyoncu, 2012; Tompkins & Lawley, 2002):

- Defining a concept with a different concept
- Describing a concept by analogy with a different concept
- Seeing a concept in a different dimension
- Interpreting a concept with a different pattern

As the definitions show, metaphors are words that help to express what is wanted to be known or said in the simplest, most creative, and permanent way possible, in a scope that can correspond to many words that are wanted to be said in daily life (Koç, 2014). Metaphors generate ideas and hypotheses that can be investigated and possibly tested. They serve as powerful cognitive models through which educators and students can comprehend educational phenomena by relating them to something previously encountered (Botha, 2009). Metaphors also allow you to compare two things, highlight similarities between two things, or explain one thing by substituting it for another (Saban, 2004). The way different concepts are understood by individuals is attempted to be shown through metaphors in metaphor studies (Ateş & Karatepe, 2013). The metaphors developed for the concept of "environmental pollution" discussed in our study have not only revealed the perceptions of university students about environmental pollution, but also have reflected the importance given to the environment and environmental pollution.

When the literature is examined, it has been seen that many metaphor studies have been carried out in the field of education. In some of these studies, for example Yılmaz et al. (2013) and Ekiz and Koçyiğit (2012) have explored pre-service teachers' perceptions about "teacher" concept by metaphors. Similarly, Kalyoncu (2012) has also explored "teaching profession" perceptions of visual arts pre-service teachers and Koç (2014) has searched primary pre-service teachers' "teacher and teaching profession" perceptions by metaphors. In a similar manner, Navari et al. (2009) have investigated "teacher and learner" perceptions of students, Şengül et al. (2014) have searched "mathematics teacher" perceptions of students by metaphors. Additionally, Furuoka and Nikitina (2008) have searched "language teacher" perceptions. While Dönmez Usta and Ültay (2015) have explored pre-service teachers' "chemistry" perceptions, Ekici (2016) has searched "microscope" perceptions, and Ergen and Yanpar-Yelken (2015) have focused on "technology" perceptions of students by metaphors. Bessette and Paris (2020) in their studies analysed teachers' professional identities by eliciting textual (written) and visual (drawn) metaphors of teaching to reflect on their teaching role(s) and circumstances.

When we look at metaphor studies on the environment, we can see that the studies are primarily concerned with the environment and environmental problems. For example, Aydın (2011) and Doğan (2017) have focused on "environment" concept perceptions by metaphors. A content analysis has been used by Çakmak (2018) to



review the metaphor studies on the environment. At the end of her research, she has reviewed 27 studies on environmental metaphors in Turkey and has discovered that only one study on "environmental pollution" has been conducted by 2018. Apart from this study, two studies were also found about the metaphoric perceptions related to environmental pollution. Köseoğlu (2017) has explored the concept of "water pollution" perceptions of biology pre-service teachers through metaphors. Arık and Yılmaz (2017) have studied on science pre-service teachers' metaphorical perceptions of "environmental pollution." When the literature is examined, no other study has yet been found that examines the metaphorical perceptions of primary school pre-service teachers towards the concept of "environmental pollution." In this regard, it is anticipated that this study can significantly contribute to the literature and serve as an example for future research.

#### *Research Purpose*

The purpose of this study was to determine and interpret the metaphorical perceptions of primary school pre-service teachers studying at Giresun University, Education Faculty, Primary Education Department, towards environmental pollution. The following questions were addressed in this study:

1. What metaphors do primary school pre-service teachers use to explain their understanding of the concept of "environmental pollution"?
2. How can the metaphors created by primary school pre-service teachers about the concept of "environmental pollution" be classified?
3. Is there a difference in association levels between classes?

#### **Research Methodology**

##### *Research Design*

The "phenomenology" research design was used in this study to determine primary school pre-service teachers' metaphorical perceptions of environmental pollution. The goal of the phenomenological design is to reveal common practices as well as define and explain the meanings created by the participants (Anells, 2006). Data sources in phenomenological studies are people or communities who have experienced the phenomenon under study and can express or reflect on it (Patton, 1990).

##### *Participants*

The study group of this research consisted of a total of 372 pre-service teachers from 1st, 2nd, 3rd and 4th years studying at Giresun University, Education Faculty, Primary Education Department in the fall semester of the 2017-2018 academic year. These pre-service teachers, whose ages ranged from 18-24, were 148 boys and 224 girls. No sample selection was made, and all of the pre-service teachers registered at that time were included in the study. The reason for the selection of pre-service teachers studying in primary school was that, as mentioned in the introduction, teaching environmental education and environmental awareness at an early age can yield good consequences. For this reason, it was considered important to include these pre-service teachers, who will be the first teachers of our children, in this study.

##### *Data Collection Tools*

Data were collected using semi-structured forms to determine the metaphorical perceptions of primary school pre-service teachers who participated in the research on the concept of environmental pollution. The researcher carried out the implementation of the research with the permission of the course lecturer. First and foremost, the pre-service teachers were educated on the metaphor technique. Later, the pre-service teachers were given a form for writing a sentence, and they were asked to complete the sentence, "Environmental pollution is like... because..." pre-service teachers were given ten minutes to complete this task. As a result, the metaphors and explanations as the research data were formed.



### Data Analysis

Before starting the data analysis, it should be decided whether to use parametric or non-parametric tests. In order to perform parametric tests on quantitative data, the data must have a normal distribution and homogeneous variances (Patton, 1990). Because these two conditions were not met in this study, we used the Kruskal-Wallis Test, which is one of the non-parametric tests used to compare the averages of more than two groups, instead of Parametric Tests for analysis. The quantitative data from the study were analysed using IBM SPSS v22.

The descriptive content analysis method was used to analyse the qualitative data from the study. Descriptive content analysis is defined as a systematic, repeatable technique in which some words from a text are summarized into smaller content classes using coding based on specific rules (Ültay et al., 2021). Descriptive content analysis is useful for summarizing, standardizing, comparing, or transforming existing data (Smith, 1975; Huberman & Miles, 1994). In three stages, metaphors created by classroom pre-service teachers were analysed in this context (Kalyoncu, 2012; Saban, 2008). These stages are used in data analysis;

- a. Naming stage
- b. Elimination stage
- c. Category development stage

*a. Naming Stage:* At this stage, the metaphors created by the primary school pre-service teachers for the concepts of "environment" and "environmental pollution" were transferred and sorted on the computer. Meaningful metaphors and their explanations were examined following the ranking process. The sentences before and after "because" that were thought to be related were given 2 points, sentences that were thought to be less related were given 1 point, and unrelated sentences were given 0 (zero) points. At this stage, codes were written for the metaphors to create a transition to the categorization stage.

*b. Elimination Stage:* Metaphors produced by primary school pre-service teachers at this stage, as in Saban (2008);

- The subject of the metaphor,
- The source of the metaphor,
- The relationship between the subject of the metaphor and its source is discussed.

In this direction;

Metaphors which do not contain a source,

Those who do not give a reason for the metaphor produced

Metaphors that do not contribute to the explanation of the concepts of "environment" and "environmental pollution" were determined and they were excluded from the scope of the study.

*c. Category Development Stage:* The concepts of "environment" and "environmental pollution" produced by primary school pre-service teachers were analysed and conceptualized in terms of their characteristics. Metaphors with similar themes were included in the same category.

### Reliability and Validity

The researchers divided the metaphors produced by the primary school pre-service teachers into categories, and validity and reliability studies were conducted. To increase the validity of the research study, the participants' statements were taken directly, and the process was detailed. Four independent researchers classified the metaphors created by pre-service teachers. The researchers then came together, compared their lists, and held discussions until agreement was reached on the ideas that differed. The resulting categories were tabulated and expressed as frequencies and percentages based on how frequently they were used. The data were interpreted in light of the findings.

### Ethics

The consent of the primary school pre-service teachers was obtained for the sharing of the data obtained during the data collection process. In addition, it was clearly stated that some demographic information of the participants would be shared with the reader, and their consent was obtained, and it was stated that they would not be harmed by this. Within the framework of research ethics, pre-service teachers of each class in the data collection process were coded as "1P1, 1P2, ..., 1P90", "2P1, ..., 2P69", "3P1, ..., 3P83", "4P1, ..., 4P130" respectively. The number at the beginning of the code represents the year level. The last number represents the participant's sequence number.



## Research Results

Data were collected using a semi-structured data collection form. The pre-service teachers' metaphors were classified as related (2), partially related (1), or unrelated (0), and then the categories were created.

### Quantitative Results

After the definition of a total of 352 metaphors and the distribution of these metaphors into categories, all data were transferred to the IBM SPSS v22 statistical program. After this process, the number of pre-service teachers representing each metaphor, the mean and standard deviation of the relationship scores of the classes were calculated and shown in Table 1.

**Table 1**

*Descriptive Statistics*

Study Year	N	$\bar{X}$	SD
1st Year	90	1.289	0.838
2nd Year	69	1.565	0.581
3rd Year	83	1.530	0.704
4th Year	130	1.315	0.778
Total	372	1.403	0.751

The average score of the metaphors written by the 1st year pre-service teachers was 1.289, the average of the 2nd year pre-service teachers' scores was 1.565, the average of the 3rd year pre-service teachers' scores was 1.530, and the 4th year pre-service teachers' average scores were 1.315. In total, the mean of the scores of 372 classroom pre-service teachers was calculated as 1.403 and the standard deviation as .751. In order to determine the significant difference between the correlation means of the classes, the sample must be at least 30, the data must show normal distribution, and the variances must be homogeneous in order to perform parametric tests. Since the sample is larger than 50, the normal distribution test, which is the second step of the parametric tests, was performed and is shown in Table 2.

**Table 2**

*Test of Normality*

Study Year		Kolmogorov-Smirnova		
		Statistics	df	p
1st Year	Related Score	0.335	90	< .05
2nd Year	Related Score	0.382	69	< .05
3rd Year	Related Score	0.398	83	< .05
4th Year	Related Score	0.318	130	< .05

According to Table 2, since Kolmogorov-Smirnov (Test of Normality) p values are <.05, the data do not show a normal distribution. The homogeneity test of the variances was performed and is shown in Table 3.



**Table 3**  
*Homogeneity of Variances Test*

Levene Statistic	df1	df2	p
7.531	3	368	< .05

According to Levene's test, the variances are not homogeneous as the p value is <.05. Since two conditions were not met, non-parametric tests were used instead of parametric tests for analysis. The Kruskal-Wallis test, one of the non-parametric tests, was used to compare the means of more than two groups.

Since the p value was <.05 according to the Kruskal-Wallis test results, it was concluded that there was a significant difference between at least two of the study years [ $\chi^2(df=3)=7.70, p<.05$ ]. In the study, the Mann-Whitney U test was used to determine which study years were significantly different (for multiple comparisons), and the Mann-Whitney U Tests' Results for cross-year analyses are shown in Table 4.

**Table 4**  
*Cross-year Mann-Whitney U Tests*

Study Year	Mann-Whitney U	Z	p
1st and 2nd years	2637.000	-1.826	.068
1st and 3rd years	3188.000	-1.885	.059
1st and 4th years	5821.000	-0.068	.945
2nd and 3rd years	2835.000	-0.124	.901
2nd and 4th years	3790.500	-2.001	.045
3rd and 4th years	4581.500	-2.078	.038

According to the cross-year Mann-Whitney U tests' results, since the p (2-tailed) value is >.05, there is no significant difference in the mean relationship scores between the 1st and 2nd years, the 1st and 3rd years, the 1st and 4th years, and the 2nd and 3rd years. However, as can be seen from the table, since the p (2-tailed) value is <.05, there are significant differences in the mean relationship scores between the 2nd and 4th years, and the 3rd and 4th years.

The Kruskal-Wallis test revealed a significant difference between the relationship scores of the four classes [ $\chi^2(df=3)=7.70, p<.05$ ]. At the conclusion of the Mann-Whitney U test multiple comparisons, it was determined that this difference was in favour of the 2nd grade between the 2nd and 4th grades and in favour of the 3rd grade between the 3rd and 4th grades. Table 5 summarizes these results.

**Table 5**  
*Summary of Statistical Results*

Years	N	df	$\chi^2$	p	Significant Difference
1st Year	90	3	7.701	.048	2nd-4th
2nd Year	69				3rd-4th
3rd Year	83				
4th Year	130				

#### Qualitative Results

According to the study's findings, 352 metaphors were classified based on their year level. The metaphors elicited from participants as a result of the content analysis are listed below under the headings of 1st, 2nd, 3rd, and 4th year participants' metaphors for the concept of "environmental pollution" and their categories. Table 6 shows



the metaphors obtained from the first year pre-service teachers, as well as frequency and percentage analyses of their categories, as a result of the content analysis.

**Table 6**  
*Participants' Metaphors about Environmental Pollution*

Category	Metaphors of 1st year	Metaphors of 2nd year	Metaphors of 3rd year	Metaphors of 4th year
<b>Human</b>	Stealing (2), Taking one's own life (2), An evil spirit (1), Man who talks unnecessarily (1), Cruelty (1), Hostility to nature (1), Soul pollution (1), Insensitivity (1), Death (1), Evil (1), Unhappiness (1), Doing unfairly (1), Insensitive people (1), A person in prison (1), Suicide (1), the living dead (1)	Death (5), Smoking (4), Unnecessary waste (2), Evil (2), Drinking alcohol (2), Disease (2), End of living (1), Decay of life (1), Beast (1), Oxygen (1), Cigarette (1), Loud sound (1), Virus (1), Weapon (1), Loud music (1), a diseased body (1), a breathless lung (1), a healthy life (1), Faded lungs (1), Swamp (1), Vascular occlusion (1), Despair (2), Betrayal (1), Human Pollution (1), Gossip (1), Carnage (1), Human mind (1), Human psychology (1)	Heart full of bad thoughts (8), Apathy (2), Germ (2), Cancer (1), Communication (1), Disrespecting oneself (1), Characterless people (1), Human mind (1), Distorted psychology (1), Thought pollution (1), a smoking lung (1), Window (1), Garbage (1), Swamp (1), Polluted world (1)	Human (2), Pessimistic thinking person (1), Person in the dark (1), Person in danger of life (1), Uncared person (1), Man in a primitive life (1), Gathering of bad people (1), People's fault (1), Person with a stopped heart (1), Human guilt (1), A dead person (1), Throwing garbage on the ground (1), Polluting the sea (1), Bad thoughts of people (1), Stress (1), Disrespect (1), Anger (1), a negative behaviour (1), Murder (1), Traffic accident (1), Evil (1), Traffic monsters (1), Sadness of the world (1), Lack (1), Exhaustion of life (1), Everybody saying something (1), Prolonging school (1), Disorderly life (1)
Example sentences	<i>Pollution of the environment is equivalent to injustice. Because it makes it impossible for people to live in a beautiful environment.</i>	<i>Environmental pollution is like a monster that accelerates the end of the world because it destroys the ecological balance by destroying nature and our beauties, therefore the world becomes unlivable.</i>	<i>Environmental pollution is like a smoked lung, because it is a deliberate harm done by people with their own hands.</i>	<i>Environmental pollution is like a disease. It has negative consequences for humans and even all living things.</i>
<b>Harmful / dangerous / uncomfortable situations</b>	Cigarette (2), Smoker human body (1), Smoker human lung (1), Alcohol (1), Smoking (1)	Germ (4), A smoking lung (1), the end of the world (1), a smoking liver (1), Failing machine (1), a growing lake (1), Broken phone (1), Avalanche (1), Tortured death (1), Cancer (1), Problem (1), Illness (1)	Disease (7), Death (4), End of the world (3), Disruption of natural balance (2), Human (2), Virus (2), Disaster (1), Killer (1), Experimental waste (1), Pest (1), Infested hair (1), Cancer (1), Influenza (1), Extinction (1), Can't breathe (1), Darkness (1), Visual pollution (1), Surplus (1), World (1), Noise (2), Messy room (1), Truck wheel (1), Socks (1), Cold food (1), Visual pollution (1)	-
Example sentences	<i>Environmental pollution is like the body of a smoker because gradually the environment becomes polluted and poisoned.</i>	<i>Environmental pollution is like a growing lake because it continues to increase as it increases. As it grows, an insignificant drop turns into a huge lake.</i>	<i>Environmental pollution is like death because it kills nature.</i>	-



Category	Metaphors of 1st year	Metaphors of 2nd year	Metaphors of 3rd year	Metaphors of 4th year
<b>Nature and Life</b>	Life without oxygen (2), Catastrophe (2), Virus (2), Cancer (2), Crocodile (1), Rotten lung (1), Nature massacre (1), Killing a human (1), Filth (1), the end of the world (1), Today's problem (1), Lung (1), Not breathing in an oxygen environment (1), a life without forest (1)	Nature pollution (1), Virus (1), Natural disaster (1), Cut one's own throat (1), Disturbance (1), Hot tea (1), Marriage (1), Dirty toilet (1), Not getting ready for the exam (1), Dirtying our house (1), University (1), Human life (1), the person who doesn't take a shower (1), the uncared woman	Being unable to breathe (4), Death (1), Being deaf (1), Living in a garbage dump (1), a dirty house (1), Disruption of the natural balance (1), an axe hitting a tree (1), Life without water (1), Murderer (1), Self-harm (1), A dirty house (1), Not being able to breathe (1), Looking at the world with astigmatic eyes (1)	-
Example sentences	<i>Environmental pollution is like cancer because it slowly destroys all beauty.</i>	<i>Environmental pollution is like a dirty toilet because it is nauseous, dirty, and living conditions are unfavourable.</i>	<i>Environmental pollution is like a dirty house because nature is our living space.</i>	-
<b>Waste and garbage</b>	Trash (4), Vomit (1), Not flogging the toilet (1), Rotten pear (1), Fruit (1), Dirty our house (1), Insect (1), Piggy bank (1), Living in the trash (1)	-	-	Garbage (16), Pollution of life (1), Trash can (1), Living in a dirty house (1), Throwing garbage on the ground (1), Rotten fruit (1), Withered flower (1), Noise pollution (1), Living in garbage (1), Water-soil-sea pollution (1), Visual pollution (1), Microbe (1)
Example sentences	<i>Environmental pollution is like vomit because it disturbs people with their appearance and sense organs.</i>	-	-	<i>Environmental pollution is like a trash can because the pollution of the environment over time is like a trash can; it gets worse over time.</i>
<b>Health</b>	Disease (7), Garbage (3), Bacteria (3), Virus (2), Rotting fungi (1), Microbe society (1), Sick human (1), a huge microbe (1), Living in the trash (1)	-	-	Respiratory failure (4), Disease (4), A contagious disease (3), Cancer (2), Inability to sense (1), A black lung (1), Disease that will bring the end of the world (1), Complementary organs (1), Depleted lung (1), Breath (1), An injured creature (1), Heart attack (1), Antibiotic (1), Harmful substance in the body (1), Substance that harms human (1), Bad breath (1), The stomach of the man who eats everything (1), Stomach disease in the human body (1), Nausea (1), An ecological society (1), Turbid water (1), Life (1)
Example sentences	<i>Environmental pollution is like garbage because it is the source of human diseases, it contains microbes.</i>	-	-	<i>Environmental pollution is like organs that complement each other because deterioration in one affects the other.</i>



Category	Metaphors of 1st year	Metaphors of 2nd year	Metaphors of 3rd year	Metaphors of 4th year
<b>Various ideas (uncategorized)</b>	Student house (1), Mountain (1), Negligent woman (1), Paper (1), Ungrateful cat (1), Surveyors (1), Bleeding eye (1), Bad life (1), Raining in the desolate desert (1), Worship (1), Killing the environment (1), Venus (1), Adana kebab without red pepper (1), Festival (1), Regret (1), the beast (1)	-	-	Unwashed dishes (1), a pillowless mattress (1), a stinky container (1), a collapsed house (1), a black colour (1), Dishes (1), Dominoes (1), Stuck gum (1), Open-ended question (1), Wet toilet slippers (1), Messy room (1), a wilted flower (1), a broken smartphone (1), a piece of cake (1), a punching bag (1), Dirty socks (1), Messy house (1), a dirty house (1), Socks ripped (1), a very nice dress dirty (1), Vacuum cleaner (1), Air - water - soil (1), Waste dispersal (1), Rushing river (1), a dead world (1)
Example sentences	<i>Environmental pollution is like a student house because it is not normal, it is abnormal.</i>	-	-	<i>Environmental pollution is like wet toilet slippers because we cannot understand the gravity of the event before it happens to us.</i>

According to Table 6, six metaphor categories were formed. The only metaphor category identified as common at all year levels is "human". In this category, pre-service teachers stated a lot of different metaphors related to "human" such as "stealing, death, evil, cruelty, smoking, etc." 1st, 2nd, and 3rd year pre-service teachers said some metaphors such as disease, cigarette, germ, etc. in the category of "harmful/dangerous/uncomfortable situations" and additionally, in the category of "nature and life." In the categories of "waste and garbage", "health", and "various ideas (uncategorized)", 1st and 4th year pre-service teachers stated several metaphors.

## Discussion

The study included 372 primary school pre-service teachers, and the total number of valid metaphors for environmental pollution was 352, with these metaphors examined in six different categories. The reason for producing too many metaphors could be that pre-service teachers were instructed on how to produce metaphors at the start of the application. Bessette and Paris (2020) stated that it is recommended that an instruction should be given to the participants about what metaphor means before exploring their metaphoric perceptions. Another reason for this could be that the environmental issue is very broad, comprehensive, and complex (Aydın, 2011), and the participants may not be well-versed in environmental issues. Tung et al. (2002) stated that students' knowledge of environment is limited and incomplete. On the other hand, it was discovered that there was a statistically significant relationship between the pre-service teachers' education level and their perceptions of environmental pollution. It was discovered that as pre-service teachers' education levels increased, they were able to make less related sentences about environmental pollution. The reason for this could be that the 2nd and 3rd years are required to take the "Environmental Education" course as part of their curriculum. The freshness of the information on this subject may have been reflected in the research findings and it might have led pre-service teachers' sensitive thoughts. On the other hand, it is observed that as the class levels of the pre-service teachers increase, they define environmental pollution with a more individual thought, and it might have been thought as they had internalized their knowledge about environmental pollution. In some studies, conducted in the literature (Arik & Yılmaz, 2017), it is seen that different results (socialist perspective) have been reached. Contrary to these studies, it has been observed in some studies that attitudes towards environmental pollution are more individual, and social thinking is more in the background (Erol, 2005). As Tung et al. (2002) said, it is not evident in all areas of environmental issues yet. Despite these different results, it is a well-known fact that pre-service teachers' knowledge and attitudes towards environmental pollution are not generally reflected in their behaviours (Esa, 2010). Garbage, for example, can be discovered in the faculty where these pre-service teachers learn as well as in the faculty's garden. This demonstrates that there is a serious distinction between knowing something is incorrect and putting it into practice. But still, it is expected of pre-service teachers to think and behave in a correct way



and responsibly because they will be teachers and educate young individuals who do not have information about the environment and environmental pollution.

It has been discovered that the human category contains the greatest number of metaphors across all year levels. As Geary (2011) said, metaphor is such a wonderful thing that it mixes the known with the unknown and creates a wonderful world." In this sense, pre-service teachers stated metaphors from a very large viewpoint from stress to murder, and even to gossip. This greatest number of metaphors can be interpreted as pre-service teachers' individualistic views on environmental pollution. However, whether one's way of thinking is individual or socialist, the outcome affects the entire society. Individual and socialist perspectives can be said to be inextricably linked. That is, there are people at the bottom of society, and people's interventions in the environment lay the groundwork for environmental problems (Buell, 2004). Furthermore, even local human interventions in the environment have resulted in global environmental problems over time (Cairns, 2002; Chawla, 1998). The association of the first, second, and third classes with environmental pollution with harmful/dangerous/disturbing situations indicates that environmental pollution causes negative situations. Similarly, when we examine the category of associating with nature and life, we see that they have a negative/hopeless outlook. As a result, pre-service teachers' perspectives on preventing/reducing environmental pollution are hopeless/negative. The reason for this could be that they believe it is extremely difficult to prevent environmental pollution and thus environmental problems. Indeed, Arık and Yılmaz (2017) emphasized in their study that environmental pollution of science pre-service teachers is a process that spreads quickly and unevenly. As a result, he discovered that pre-service teachers consider environmental pollution to be an irreversible process. All in all, pre-service teachers' negative metaphors about environmental pollution in several categories are understandable, and also interesting. According to Tung et al. (2002), the knowledge of students can be increased, it is reasonably simple, but their values, beliefs and attitudes are generally difficult to change. Pre-service teachers' negative viewpoints can arise from their pessimistic thoughts about the world. In general, they cannot be seen as unfair due to global warming, extinction of some animals, and also depletion of some food resources, wars, terrorism, etc.

It was discovered that participants focused on the types of damages caused by environmental pollution and the effects of these damages in the metaphor categories established. Similarly, Çakmak (2018) concluded in his study of metaphor studies on the environment in Turkey that the focus is primarily on environmental pollution and its consequences. As a result of the data obtained within the scope of this research, it can be said that primary school pre-service teachers have a high level of sensitivity towards environmental pollution, but they do not have a strong perspective on environmental pollution. It is clear that the participants do not use terms like global climate change, greenhouse effect, carbon emission, or acid rain to describe environmental pollution. Based on this, it is not possible to say that the participants' knowledge of environmental pollution is advanced. The fact that the participants did not mention species extinction or natural disasters (avalanches, floods, earthquakes, etc.) in their metaphors or explanations is further evidence of this. According to Arık and Yılmaz (2017), pre-service teachers have low perceptions of environmental problems and pollution. In fact, in the twenty-first century, the environment and environmental problems are among the most pressing concerns around the world (Akgün et al., 2016). Specifically for this sample, pre-service teachers may be bored of talking about this negative trend. They may not have wanted to discuss it any longer, as environmental, and global problems, as well as their fears for the future, have pushed them to this gloomy viewpoint.

Metaphors are labels, meanings, or conceptual expressions that a concept generates in a person. It's a process of seeing and comprehending. It is more significant and powerful mental production than simply explaining one concept with another because it expresses the breadth and depth of the associated concept (Eraslan, 2011). From this vantage point, creating metaphors about environmental pollution is both difficult and simple. It is simple because almost everyone has had some exposure to environmental pollution. It is difficult because it requires in-depth knowledge of environmental pollution in order to generate metaphors on the subject. Furthermore, Arık and Yılmaz (2017) discovered that pre-service teachers lacked special knowledge (global warming, climate change, etc.) about environmental pollution. In this case, it can be stated that some pre-service teachers lack knowledge about environmental pollution, while others, despite having knowledge, are unable to convey or apply that knowledge.



## Conclusions and Recommendations

The primary goal of this study was to identify the metaphors developed by pre-service teachers for the subject of "Environmental Pollution" and to see if there was a difference between year levels. As a result of the research, it was discovered that the majority of the metaphors produced by the pre-service teachers were in the "human" and "harmful/dangerous/uncomfortable situations" categories. Furthermore, the study discovered that as the year level increased, the number of related metaphors about environmental pollution decreased. According to the findings of the study, the metaphors used by pre-service teachers to describe environmental pollution are human and human movements, as well as situations that directly affect people are harmful or disrupt their health/comfort. Also, at the conclusion of multiple comparisons, by the relation degree between environmental pollution and its metaphor, it was determined that significant difference was in favour of the 2nd year between the 2nd and 4th years and in favour of the 3rd year between the 3rd and 4th years.

As a result of the research, it was discovered that the primary school pre-service teachers had only a cursory understanding of environmental pollution and lacked a comprehensive understanding or perspective. As a result, it can be stated that pre-service teachers' perceptions of environmental pollution are low. To improve primary school pre-service teachers' environmental knowledge and interests, it is suggested that the "Environmental Education" course in the curriculum can be taught through the active learning model, with pre-service teachers actively learning their knowledge through practice and interaction with the environment. As a result, by internalizing their knowledge of the environment and environmental problems or pollution, they can contribute to taking steps in the right direction for society. Universities can help/mediate the formation of specific social clubs and social societies to raise environmental awareness. It is suggested that participants participate in extracurricular activities, expand their knowledge, and become active members of school clubs.

## Endnote

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