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## Investigation of elementary school students' perceptions about “Soil”

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### Abstract

Soil is one of the most important non-renewable natural resources. Because of its' vital importance in terms of production, economics and ecology, it is important to understand how people perceive soil. According to studies in the field of education, values and attitudes begin to emerge during elementary school years. The aim of this study is to investigate fourth grade students' perceptions about the concept of soil through metaphors. One hundred and three 4<sup>th</sup> grade students from two elementary schools participated in this study. Findings revealed that most commonly used metaphors for soil are mother, sand and home.

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### 1. Introduction

Soil is one of the most important non-renewable natural resources. Because of its' vital importance in terms of production, economics and ecology, it is important to understand how people perceive soil. Even though soil is a finite resource, the number of people using it increases exponentially (Seylan and Ünal, 2011). Hence, the emphasis on the importance how to protect soil was given by many organizations and institutions. In order to create awareness about soil, as early as elementary school, many governments include the topic in elementary education programs. In this vein, course curricula for 'Introduction to Science', 'Social Sciences' and 'Science and Technology' courses prepared by the Board of Instruction and Education of Turkish Ministry of National Education include the topic of soil as part of the environmental education.

Many scientists put forward different definitions for what is generally called 'soil'. The perception of soil as a material that is merely conducive to plant growth is an understatement of the significance soil has (Bahtiyar, 2011). In addition to being the primary medium of plant life, soil constitutes a habitat also for a multitude of other creatures, exhibiting great biological diversity.

Since soil is crucial for production, economics and ecology, it is equally crucial to have a clear grasp of how people perceive soil. Metaphor analysis is considered to be a suitable means to achieve this clear grasp on what elementary school students think about the soil. Metaphor is usually considered to be the art of saying (Davidson, 1978). In recent years, metaphor is considered to be a robust mental tool, which the individual can employ to

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understand as well as explain abstract, complex, or theoretical concepts (Yob, 2003). In this respect, the study of students' perception of soil, carried out with reference to metaphors, would serve as a valuable research tool in determining complex mental structures regarding the concept at hand.

The aim of this study is to use metaphor analysis to develop a better understanding of the perceptions of fourth grade students with respect to the concept of soil. In order to achieve this goal, the study aims to find answers to the following questions:

1. Which metaphors are used by fourth grade students to represent their perceptions regarding the concept of soil?
2. Which categories do the common aspects among the metaphors voiced by students on the concept of soil give rise to?

## 2. METHOD

### 2.1. Study Group

The study is carried out during the spring semester of the 2010-2011 academic year, with the participation of 103 fourth graders, 60 boys and 43 girls. Participants were selected through convenience sampling.

### 2.2. Data Collection

In social sciences, metaphors are used as a means to achieve indirect inferences about data, which elude direct and objective collection (Yıldırım and Şimşek; 2006). The process of data collection which puts metaphor in a pivotal position is not significantly different from data collection via individual or focus group interviews based on open ended questions. The inherent qualities of data thus collected make it easier and more practical to achieve the study objectives in comparison to certain types of individual interviews, focus group meetings, observation or document-based studies. The ease and practicality in question is due to the fact that a wide variety of metaphors can be heard from participants who are asked one or more open ended questions during the process of qualitative data collection (Yıldırım and Şimşek, 2006).

In this vein, the process of data collection formulated by the researchers in line with the objectives of the study can be divided into two parts. The first part consists of the collection of demographic information about the participants. In the second part, students were asked to complete an open ended expression: "*Soil is like..... because....*"

In metaphor analyses, the concept of likeness is used to establish a connection between the concept that is being investigated and the metaphor. During the data collection stage, the word "because" is utilized as a connective. Saban (2006) identifies the word "because" as a means to lead the participant to justify their metaphors in a logical manner. It is a crucial connective that facilitates understanding what makes metaphors meaningful to the participant (Oğuz, 2005). The analysis of the used metaphors is based on the reasons why a given metaphor is used

### 2.3. Data Analyses

The students' perception of the concept of soil was studied using the method of content analysis. The analysis process is carried out in four stages: (1) The analogies used by the students on the data collection forms were sorted, and certain analogies among them which are not suitable for analysis or do not demonstrate a direct and concrete metaphor were removed. (2) The metaphors developed by the students were classified via the methods of content analysis and metaphor analysis. (3) The metaphors classified per analogy were then categorized according to the reasoning provided alongside the analogy. (4) The data were examined in detail by two researchers to ensure validity and reliability.

Detailed reporting of the data collected and the description of the process leading the researcher to his/her conclusions is among the important criteria of validity in qualitative studies (Yıldırım and Şimşek, 2006). Furthermore, the examples illustrating why students came up with these metaphors were discussed in the section on findings. On the other hand, according to Lecompte and Goetz (1982) internal reliability requires a clear statement

of the role researchers' play in the study. In this study, the roles and responsibilities of the researchers consist of the planning and implementation, execution of the necessary analyses, and reporting of the findings and results. Furthermore, in order to ensure/improve the reliability of conclusions, metaphors were categorized by two distinct experts, and unanimity was required in all categorizations.

### 3. FINDINGS AND RESULTS

One hundred-three students, who participated in the research, developed a total of 44 metaphors regarding the concept of soil. The metaphors developed by the students belong to 5 general categories. These are "Soil as shelter", "Soil and its importance", "Soil as a benevolent protector", "Soil as a source of nutrition", and "Soil with reference to its properties". In this section, the percentage-frequency distribution of the metaphors to each corresponding categories are provided, along with examples of student statements regarding the most frequent metaphor in each category. The students are identified as S1-S103.

The frequency and percentage distribution of the metaphors developed by the students and the corresponding categories are provided in Table 1.

**Table 1. The Frequency and Percentage Distribution of the Developed Metaphors in Each Category**

<i>Category Name</i>	<i>Metaphors</i>	Frequency(f)	Percentage(%)
Soil as shelter	Home	9	50.0
	Mother	3	16.6
	Other (Realm of bugs, Zoo, Homeland, Habitat, Protector, Haven)	1	5.5
	Total	18	100
Soil and its importance	Water	4	28.6
	Recycling box	2	14.3
	Fertilizer	2	14.3
	Other (Skeleton, Factory, Gold, Air, Source of Energy, Source of Oxygen)	1	7.1
	Total	14	100
Soil as a benevolent protector	Mother	7	58.3
	Doctor	3	25.0
	Other (Ozone layer, Refrigerator)	1	8.3
	Total	12	100
Soil as a source of nutrition	Mother	4	44.4
	Source of life	3	33.3
	Nature	2	22.2
	Total	9	100
Soil with reference to its properties	Sand	12	21.4
	Baby	9	16.1
	Liquid (water)	6	10.7
	Rock	6	10.7
	Modeling clay	4	7.1
	Mud	4	7.1
	Friend	2	3.6
	Book	2	3.6
	Meal	2	3.6
	Other (Cotton, Seasons, Infinity, Library, Salt, Flour, Grounded coffee, Mixture, Tree)	1	1.8
	Total	56	100

An examination of Table 1 reveals that the metaphors developed per category, and the frequency of these metaphors. The most frequently mentioned metaphor belonging to the category "Soil as shelter", and an example of the participants' statements justifying the use of this metaphor are provided below:

"In my opinion, soil is like a house. Because many bugs live in it, the soil is home to them." [S5]

The most frequently voiced metaphor belonging to the category "Soil and its importance", and an example of the participants' statements justifying the use of this metaphor are provided below:

"In my opinion soil is like water. Because without water, there can be no life. Just like water is important for life, soil is also crucial and valuable for life, because trees, flowers, plants and all grow in soil." [S21]

“In my opinion, soil is like the skeleton that keeps one standing. Because soil keeps the nature on its feet. If there was no soil, trees, grass and other living things would not be able to live. If everywhere was covered with only sand and stones, where would the trees take root and generate oxygen? For sure, no living thing can live without oxygen.” [S72]

The most frequently voiced metaphor belonging to the category "Soil as a benevolent protector", and an example of the participants' statements justifying the use of this metaphor are provided below:

“I consider soil to be similar to my mom. If we assume that I am a plant, soil would protect me and help me grow. I couldn't exist if it weren't for my mom.” [S2]

The most frequently voiced metaphor belonging to the category "Soil as a source of nutrition", and an example of the participants' statements the use of this metaphor are provided below:

“In my opinion, soil is like the mother of living things. Because, it feeds both plants and animals. Furthermore, it also scents the nature with its nice smell. I planted an apple tree, and the mother of living things, the soil is now making it grow. What would happen if the living things had no mother? There would be no nature.” [S29]

The most frequently voiced metaphor belonging to the category "soil with reference to its properties", and an example of the participants' statements justifying the use of the metaphor are provided below:

“In my opinion, soil is like sand. Because sand and soil refers to the same thing, but sand does not contain as much stones as soil does.” [S35]

“In my opinion, soil is like sand. Because both sand and soil are grainy materials. If sand gets wet, it turns into mud. The same thing happens to soil as well. Soil contains pebbles. Sand may contain them too.” [S22]

“In my opinion, soil is like a newborn baby. Because infants are nursed with care.” [S11]

“In my opinion, soil is like a baby. Because soil is composed of small parts, and the baby is small too. When we plant something in the soil, it would be small at first, yet it will grow in time, which is what babies also do.” [S4]

#### 4. CONCLUSIONS AND RECOMMENDATIONS

It is important to examine elementary school students' perception of the soil to determine the correct method to be employed in teaching topics that are related to soil in the elementary school curricula. The purpose of this study is to uncover the elementary school students' perception of soil through metaphors. The findings obtained in this study revealed that the perception of soil of elementary school students can be classified in 5 categories: "Soil as shelter", "Soil and its importance", "Soil as a benevolent protector", "Soil as a source of nutrition", and "Soil with reference to its properties".

A detailed analysis of the metaphors and the corresponding categories indicate that the students tend to perceive soil most frequently "Soil with reference to its properties" ( $f=56$ ), and least frequently as "Soil as a source of nutrition" ( $f=12$ ). The attitudes of the students regarding these concepts are shaped according to their lives and past experiences. The results suggest that the frequent occurrence of the composition of soil in students' metaphors may have something to do with their upbringing in urban environments, away from soil, and inside concrete-based buildings and environs. The emphasis of elementary school students regarding the physical properties of soil lead to the conclusion that their perception regarding soil does not extend much beyond mere information, and that they have yet to internalize the concept of soil and develop a perception with an affectionate dimension. The students' integration of the new information they learn to their daily life, their application of science to their daily experiences are necessary to ensure that what is learned is retained for a long time. Low frequency of metaphors belonging to the category of "Soil as a source of nutrition" may indicate the unfamiliarity of the individuals living in metropolitan areas of Turkey with the nutritious character of soil, despite the fact that Turkey is a country where agriculture still constitutes a substantial sector of the economy. Taking into consideration the ever increasing economic importance of soil, which is an indispensable material for all living things, raising the awareness of the youth with respect to the vital role of soil in life would be a prudent course of action.

An overall analysis of the categories regarding the concept of soil reveals that the most frequently voiced metaphors are mother ( $f=7$  for "Soil as a benevolent protector",  $f=4$  for "Soil as a source of nutrition", and  $f=3$  for "Soil as shelter", adding up to a total of  $f=14$ ), sand ( $f=12$ ), home ( $f=9$ ), and baby ( $f=9$ ). Those analogies formulated

by students, which compare soil to what they hold dearest (*i.e.* mother and home), can be interpreted as a sign of positive attitudes towards and ascription of due importance to soil. The second most frequent metaphor ‘sand’ though, reveals that the students are not informed enough about the composition and formation of soil and they have misconceptions about the composition and formation of soil.

In the light of the findings obtained in the study, the following recommendations may be proposed with respect to both the education of students, and future research:

1. Elementary school students, who are at an age when attitudes and behaviors are shaped, should be provided with educational environments that will help them develop positive perceptions about the concept of soil.
2. Through detailed interviews with the subjects, it may be possible to learn why they chose a specific metaphor, and the reasons for this preference. This may help us discover what constitutes the basis of the soil-perceptions of students.
3. The study can be repeated with elementary school students from rural areas, and a comparative analysis of the perception of soil in children growing up in urban and rural environments can be made.
4. A vertical analysis can be conducted by repeating the study at various grades, and changing perceptions of soil in higher grades can be analyzed.
5. The study can also be repeated with elementary school teachers as participants, in order to determine teachers' perceptions concerning soil.

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