



An Analysis of University Students' Perceptions of the Concepts of "Water" and "Water Pollution" through Metaphors

Pınar Köseoğlu
Hacettepe University, TURKEY

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ABSTRACT

This study aimed to determine university students' perceptions concerning the concepts of "water" and "water pollution" by means of metaphors. The study group was composed of 258 undergraduate students attending Hacettepe and Gazi Universities in the 2015–2016 academic year. A semi-structured questionnaire containing the statement "water/water pollution is like..... because" was administered to the participants. The technique of content analysis was employed in analysing the data, for which the MAXQDA 12 software programme was used. Results showed that the students perceived the concept of water as a need and an indispensable part of life, while they perceived the concept of water pollution as the end of life.

Keywords: metaphor, perception, water, water pollution

INTRODUCTION

Water – which emerged with the creation of the world and has a longer history than the history of humanity – is a substance that is in a liquid state under normal heat and pressure conditions, has a molecular structure of one atom of oxygen and two atoms of hydrogen, and is colourless, odourless and tasteless (Ozsoy, 2009). One of the essential elements of life, water is irreplaceable for all living creatures on earth. Humans cannot survive without water. The need for water in daily life – for cooking, sanitation, agricultural irrigation, heating, entertainment, sport, putting out fire, industrial uses, etc. – in addition to drinking water, occupies an important place in life. Two-thirds of the human body is composed of water, and it is the most commonly analysed substance in the world due to its importance (Chaplin, 2001).

Given its importance for human life, water should be provided in a way that is not harmful to humans. Yet 2.5 billion people currently do not have access to fresh water (Gleick & Ajami, 2014). Water pollution is the contamination of water by humans or by human-caused events or actions, such as the results of manufacturing processes. The acceleration in industrialisation and population growth have increased water pollution to the extent that it today has dangerous effects (Eryilmaz, Ipek, & Yalcin, 2014); it is recognised as a widespread global problem facing humanity in the twenty-first century (Ebenstein, 2012; Hoekstra & Wiedman, 2014; Schwarzenbach, Egli, Hofstetter, von Gunten, & Wehrli, 2010; Whitmee et al., 2015).

Metaphors can provide considerable benefits in understanding students' perceptions concerning the concepts of water and water pollution. Lakoff and Johnson (1980) described metaphors as vehicles of mental

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Correspondence: Pınar Köseoğlu, *Biology Education, Hacettepe University, Eğitim Fak. Matematik ve Fen Eğitimi, Biyoloji A.B.D., Ankara 06800, Turkey.*

✉ koseoglup@gmail.com

State of the literature

- Analysing perceptions through metaphors is a method used in education.
- There are several studies related with education that have analysed metaphorical perceptions.
- There are no studies analysing perceptions concerning water and water pollution through metaphors.

Contribution of this paper to the literature

- University students perceive that water is indispensable for humans; water pollution is the end of life.
- An analysis of the students' perceptions demonstrates that they have positive perceptions about the concept of water.
- Metaphors can be used as an important instrument of research in studies that examine perceptions and revelation of those perceptions concerning the issues of water and water pollution.

development in their book entitled "Metaphors We Live By", and Lakoff & Johnson (2005) defined metaphors as likening a phenomenon to another phenomenon and describing it in this way. Metaphors link new knowledge to previous knowledge by associating it with knowledge available in our memory while learning the unknown things (Arslan & Bayrakci, 2006). Metaphors are used so as to explain the unknown concepts by means of known concepts in written and oral communication (Guerra-Ramos, 2011). We use many concrete or abstract concepts in various fields of daily life. Since it is difficult to explain the meaning of abstract concepts, metaphors can be used to explain them (Er Tuna & Mazman Budak, 2013; Yucel, Kocak, & Cula, 2010). Metaphors are considered as powerful mental vehicles in understanding and explaining complicated, theoretical, and abstract phenomena (Yob, 2003). Metaphors are effective instruments in determining individuals' perceptions. In addition to explaining unknown concepts with known concepts and thus facilitating cognitive processes in individuals (Aydogdu, 2008), metaphors also influence the affective process (Girmen, 2007). Interpreting concepts through their mental perceptions, individuals are also influenced by their knowledge, skills, habits, and attitudes (Oguz, 2009).

The concept of metaphor, which can be used in many fields of education, encourages learning and develops creative thinking in individuals (Aydin & Pehlivan, 2010). As mental tools, metaphors can be learning instruments for teachers and students in educational settings (Acikgoz, 2002; Vadebonceour & Torres, 2003).

There are many national studies (Arik & Ozdemir, 2015; Ekiz & Kocyigit, 2013; Eren, Celik, & Akturk, 2014; İbret & Aydingozu, 2011; Turhan & Yaras, 2013) as well as international reports (Alger, 2006; Leavy, Mcorley, & Bote, 2007; Martinez, Sauleda, & Huber, 2001) that have analysed metaphorical perceptions (Zeren, 2015). Akgun, Duruk, and Gungormez (2016), Ates and Kartepe (2013), Aydin (2013), Guven (2014), Kaya (2014), and Meral, Kucuk, and Gedik (2016) have made efforts to describe students' perceptions of the concept of the environment through metaphors. However, there are no studies describing perceptions concerning the concepts of water and water pollution through metaphors; therefore, we believe that this study contributes to the literature.

Purpose of the Study

This study aims to reveal university students' perceptions of the concepts of "water" and "water pollution" by means of metaphors.

Research Problem

1. What types of metaphors do university students use to describe their perceptions of the concepts of "water" and "water pollution"?
2. What conceptual categories are students' metaphors concerning the concepts of "water" and "water pollution" divided into according to their similar properties?

METHOD

Research Design

This study employed a phenomenology design, a method of qualitative research. Because phenomenology is used to focus on phenomena of which we are aware but for which we do not have in-depth and detailed understanding (Creswell, 2013; Firat, Yurdakul, Ersoy, Firat, Kabakci-Yurdakul, & Ersoy, 2014; Gocer, 2013), this method has been preferred.

Study Group

The study group was composed of 258 (181 female, 77 male) undergraduate students attending Biology Education Department of Hacettepe and Gazi Universities in the 2015– 2016 academic year.

Data Collection

The participants were given a semi-structured questionnaire containing the statements “Water is like because” and “water pollution is like because”, and they were asked to complete the form. No substantive comments were provided on the questionnaire in order to ensure reliability.

Data Analysis and Interpretation

The collected data were analysed by using the technique of content analysis. The basic aim in content analysis is to reach the concepts and relations capable of explaining the data collected. The procedures followed in content analysis are to bring similar data together according to certain concepts and themes, to organise them in a way that readers can understand and interpret them (Yildirim & Simsek, 2008). We employed a five-stage evaluation process used by other researchers (Saban, 2008; Aydin & Unaldi, 2010, Ates & Karatepe, 2013): (1) coding/elimination, (2) classification, (3) categorising, (4) attaining validity and reliability, and (5) entering the data into a computer for further analysis. In Stage 4, data as well as the way the data were reached and the resulting conclusions were clearly described, and the categorised metaphors were revised by consulting expert opinion at the stage of attaining reliability: The results were calculated using Miles and Huberman’s (1994) formula “Reliability = agreement / agreement + disagreement X 100”. In consequence, 93% agreement was found between the researcher’s and experts’ views. Reliability is considered to be sufficient when agreement between researchers and experts is 90% or above (Saban, 2008; Saban, 2009; Saban, Kocbeker, & Saban, 2006). On that basis, all data were entered and the number, frequencies (f), and percentages (%) of the metaphors were calculated.

MAXQDA 12, a qualitative data analysis programme, was used in coding the data.

FINDINGS

Tables 1 and 2 summarise the metaphors in relation to the concepts of “water” and “water pollution” that were offered by the 258 university students, in addition to the frequency of mention and the resulting percentages.

Conceptual Categories

Our needs: This category contains statements made by students perceiving the concept of water mostly as an entity that we need, a category that encompasses the largest number of metaphors. In this category, students usually described water in connection with entities that are necessary to life, such as the following:

“Water is like life because it assures the continuity of life.”

“Water is like breath because it assures living.”

“Water is like blood because the majority of human body is composed of water.”

Table 1. Findings Concerning the Statement "Water is like because"

1. Water is like because	Frequencies	Percentages
Our needs	216	86.7%
Life	169	67.9%
Breath	23	9.2%
Blood	3	1.2%
Human	3	1.2%
Heart	3	1.2%
Liveliness	3	1.2%
Love	3	1.2%
The sun	3	1.2%
A meal	2	0.8%
Remedy	2	0.8%
Family	2	0.8%
Protection and care taking	19	7.6%
Substance	4	1.6%
Innocence	4	1.6%
Cleanliness	3	1.2%
Harmless	2	0.8%
Soul	2	0.8%
Baby	2	0.8%
Life	2	0.8%
Health	2	0.8%
Essence of man and nature	2	0.8%
Statement of happiness and peace	3	1.2%
A nice view	1	0.4%
Spring (season)	1	0.4%
Happiness	1	0.4%
No answer	11	4.4%
Total	249	100

Protection and care taking: This category contains perceptions of water as an entity needing protection and care, or exhibiting fragility. Statements included the following:

"Water is like a substance because it has minerals."

"Water is like innocence because it is pure and clean."

"Water is like cleanliness because it prevents illnesses."

Statement of happiness and peace: Metaphors in this category mostly stressed beauty, happiness, or peace. Included among these statements were the following:

"Water is like a beautiful view because people find peace with it."

"Water is like the spring season because it makes people happy."

"Water is like happiness because it nourishes our body and soul."

Table 2. Findings Concerning the Statement "Water pollution is like because"

2. Water pollution is like because	Frequencies	Percentages
End results	131	56.0%
End of life, death	69	29.5%
Poison	13	5.6%
Destruction of life	8	3.4%
Garbage	7	3.0%
Disaster	7	3.0%
Breathless life	6	2.6%
Evil	5	2.1%
Murder	5	2.1%
Unhappiness	3	1.3%
Choking	3	1.3%
Hell	3	1.3%
A strike on life	2	0.9%
Disturbing natural balance	22	9.4%
Dirtiness of life	11	4.7%
Darkness	3	1.3%
Marsh	2	0.9%
Sewage	2	0.9%
Unclean life	2	0.9%
Destroying life	2	0.9%
Necessity for taking precautions	40	17.1%
Disease	25	10.7%
Threat	7	3.0%
War	2	0.9%
Germ	2	0.9%
Disrespect	2	0.9%
Virus	2	0.9%
No answer	41	17.5%
Total	234	100

Conceptual Categories

End results: This category contains statements made by students considering water as an entity that is spoilt and will vanish. The conceptual understanding was that water would be continually destroyed by pollution. Statements included the following:

"Water pollution is like the end of life because it causes harm."

"Water pollution is like death because it influences the environment."

"Water pollution is like poison because it causes death."

Disturbing natural balance: University students creating the metaphors in this category stated that any intervention with water has an impact, and impacts would disturb the natural balance. Metaphors included the following:

"Water pollution is like dirtiness of life because it reduces the standards of life."

"Water pollution is like darkness because it carries any type of dirt."

"Water pollution is like marsh because we cannot see what it hides beneath."

Necessity for taking precautions: Metaphors in this category described water as having a value that should be protected. The statements in this category included these:

"Water pollution is like a disease because ecological balance is disturbed."

"Water pollution is like a threat because it influences life."

"Water pollution is like a war because it destroys."

DISCUSSION AND CONCLUSION

This study aimed to uncover university students' perceptions in relation to the concepts of water and water pollution through metaphors. The metaphors obtained were categorised according to shared properties.

Metaphors created in relation to the concept of water were divided into three conceptual categories: "our needs", "protection and care taking", and "happiness and peace".

Each conceptual category was important in that it highlighted a different aspect of the concept of water. For 68% of the students, water was viewed as "like life because...", and thus they considered water as indispensable and necessary for life, and they believed that life could not continue without water. Nie & Chen (2008) analysed the concept of water with six metaphors (nature, sustainer of life, movement, power, purity, and woman). According to Akin and Akin (2007), water has essential importance in our life and is necessary for all our biological and physiological activities. Water maintains the continuity of life for all living creatures, and this essential aspect means that life without water cannot be imagined (Benjamin, Garman, & Funston, 1997; Himes, 1991). For 19% of the students, water was conceptually perceived as an element that should be protected and cared for. Protection of water and clean water is essential for human health (Stednick, 2000). Because water sources – which have vital importance – face the danger of depletion, it is important that usable clean water should be protected and its continuity maintained (Guclu, Celik, & Serin, 2006). Since the sample of the research was composed of individuals who were to take on significant roles in society in the future, it may be said that based on the three conceptual categories, university students thought that we needed water and that it should be more under our care and protection. A universal need, water should be protected and kept from diminishment due to population growth (Matta, 2010).

Metaphors created in relation to the concept of water pollution were divided into three conceptual categories: "end results", "disturbing natural balance", and "necessity for taking precautions". For 42% of the students, water pollution was described with metaphors relating to death: end of life, death, poison, murder, choking; and these students were found to think that water pollution brings the end of human life. Water pollution is the main source of infectious diseases and has negative effects due to pathogenic organisms within it (Alrumman, El-kott, & Keshk, 2016). Water pollution is one of the biggest threats to public health and can cause deadly health problems (Azizullah, Khattak, Richter, & Häder, 2011). Worldwide, 1.7 million people, the majority of whom are children, die every year due to water pollution (Ashbolt, 204). Each conceptual category provides an idea about how university students perceive water pollution. Based on these categories, it may be said that the problem of water pollution has gone beyond natural balance; consequently, this disturbance has negative results that affect people in negative ways, and precautions should therefore be taken – a feeling held by 17% of the students. Since water pollution is an environmental problem caused by humans, and is a source of great anxiety in the world, it is essential that necessary precautions be taken (Eguabor, 1998; Owa, 2014).

The results of the study support the following conclusions:

Metaphors can be important sources of research in prospective studies concerning perceptions about water and water pollution and concerning the revelation of these perceptions. Additionally, metaphors can be used to determine perceptions about multi-dimensional concepts such as environmental pollution (Meral, Kucuk, & Gedik, 2016).

Students' metaphors about the concept of water that were obtained in this study are positive. Therefore, materials to be prepared about the subjects of water, water pollution, and environmental education on the basis of students' positive metaphors will ensure that their positive perceptions will be strengthened

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