

Full Length Research Paper

Secondary school students' perceptions towards global warming: A phenomenographic analysis

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This research was put forth to reveal the analysis of the definitions of secondary school students by qualitative phenomenological research methods about "global warming". About 166 students at a secondary school in Istanbul participated in the research within 2009 - 2010 academic year, second term. The research datum were obtained by students' completing the sentence "according to me, global warming means ...". According to the findings of the phenomenological research, secondary school students formed 6 different global warming definition categories. These definition categories are as follow: (1) Global warming is the rise of average temperature of earth, (2) Global warming is the change of climates and seasons, (3) Global warming is the destruction of natural (ecological) balance, (4) Global warming is the result of the destruction by people, (5) Global warming is an environmental problem that can be prevented if necessary precautions are taken. (6) Global warming is the end of humankind and the world. It is thought that global warming theme should be emphasized in the secondary schools curriculum and the students should be given an effective environment education.

Key words: Environmental education, phenomenography, secondary education, global warming.

INTRODUCTION

Environmental problems are caused by the exploitation of the environment of human beings in order to earn more showing the priority for individual benefits more than common benefits and values of people. Industrialization which began in the 17th century and developed rapidly in the 19th century, rapid increase of population, the pressure of this population over sources on earth and ecological systems, nutrition, accommodation, education, problems of health services, extinction of species, over pollution, global warming, climate changes, rapid urbanization and ordinary industrialization caused significant environmental problems that our world faced in the 21st century (Geray, 1995; Yücel and Morgil, 1998).

One of the most important environmental problems that our world faces is global warming. Global warming is the process that atmospheric layers and solid earth temperature incline artificially as a result of the increase of some gases called "green house gases" occurred by some activities of people. A number of recent studies indicate that the rise in the temperature of the world and melting of the mass icebergs are the indications of global warming. There are some reasons of global warming. These are the cumulation of greenhouse gases in the

atmosphere because of the usage of fossile fuels, destruction of plants and vegetation, rapid and ordinary urbanization and rapid industrialization (Cepel, 2008).

The individuals and future generations who are conscious about; global warming, the reasons of global warming, the predicted results of it and the possible precautions will be sensitive about the environment and will be a part of the society as responsible and conscious adults. The basic way of overcoming global warming and other environmental problems necessitate a conscious and organized environment education. Environment education can be explained by an individual's acquisition of knowledge, skills and behaviours in accordance with the people around, educating people that have responsibility from water consumption to rubbish production, consumption of energy to active involvement in the solution of problems (Kilinc et al., 2008; Erten, 2005; Demirkaya, 2008).

Main purpose of environment education is to acquire consciousness of all parts of the society, positive and permanent changes of behaviours and active involvement. Environment education should be a lifelong education, starting from the preschool stage to all the formal

and public education stages (Yucel and Morgil, 1998; Ünal and Dimiski, 1999; Dastan, 2007).

When literature is examined, it is possible to meet qualitative and quantitative studies on varied level of students' perceptions of global warming. Some of the researches done as follows: Boyes et al. (2009), Boyes and Stanisstreet (1992), Shepardson et al. (2009), Khalid (2003), Mason and Santi (1998), Sadler et al. (2004), Demirkaya (2008), Summers et al. (2001), Groves and Pugh (1999), Rye et al. (1997), Kilinc et al. (2008), Eroglu (2009) and Güley (2009). Some of the researches were given below.

In the study which was done by Rye et al. (1997), alternative concepts about global warming put forth by 24 students at 6 - 8th grades. Most of the students mention about "the ozone layer" or "ultraviolet rays" as the answer to the question; "What does global warming remind you?". It was emerged that nearly 50% of the students see the ozone layer as the reason of global warming and CO₂ gives damages to the ozone layer.

In Grove and Pugh's (1999) study it was aimed to put forth the perceptions of students from different faculties towards global warming. As a result of the research most of the students think that global warming is caused by weakening of ozone layer, there will be an increase in the skin cancer cases because of global warming.

In his study Demirkaya (2008) analyzed teacher candidates' perceptions over global warming. After the phenomenological analyses, seven different global warming concepts were determined. The global warming concepts from basic to complex are as follow: (1) Global warming is the rise of temperature of the earth, (2) Global warming is the widening of the hole in the ozone layer through time, (3) Global warming is the destruction of natural (ecological) balance, (4) Global warming is the change of climates and seasons, (5) Global warming is the destruction of mutual relations between people and natural balance, (6) The reason of global warming is people and responsible for preventing it, (7) Global warming is the reporter of extinction process of living things and human beings.

The study asserting secondary school students' thoughts towards global warming by Kilinc et al. (2008). In the study, a survey researching secondary school students' (15 - 16) common thoughts towards global warming was used. The frequencies about students' thoughts and conceptual fallacies about the reasons, results and precautions of global warming were determined. It was figured out that global warming has a causal relation with radioactivity, the radioactive leakage flowing out from nuclear power stations cause and increase global warming and by the decrease of global nuclear weapons global warming would dwindle. As the second point, it was seen that students confuse the reasons and results of global warming and weakening of the ozone layer. For instance, global warming was correlated with skin cancer which is caused by the weakening of the ozone layer. Only a few students

comprehended that electricity save had an effect on the dwindle of global warming.

THE PURPOSE OF THE RESEARCH

It is not possible to remove the problems completely emerged as a result of global warming. But, if every individual can do the necessary things and realize his/her responsibilities then he/she has a contribution in slowing down global warming. Recent environmental disasters in the world worry people and direct them towards taking precautions rapidly. Because of this reason giving environment education to students is very important. Environment education should start from pre-school period and continue through particular educational programs. Through the education process, experience should be prior to verbal expressions. In order to grow up susceptible individuals to environment, an education system that provide active involvement of environment and reactive to the negative conditions (Cabuk and Karacaoglu, 2003; Yucel and Morgil, 1998) should be encourage.

The conscious of environment is so crucial to maintain sufficient knowledge on global warming of the secondary school students and leaving the future world as liveable to the following generations by turning the knowledge into attitude. Since there is no similar study that asserts secondary school students' perceptions towards global warming with phenomenological research design it is assumed to be significant in environment education. Taking this into account this first research on the field is important both for the field and for being a source for the researchers. In relation to this, the purpose of the research is determining and categorizing the secondary school students' global warming concept definitions in terms of their own knowledge and experience.

Phenomenography

Phenomenography term is a Greek word. It was consisted of bringing 'Phainomenon' (appearance) and 'graphien' (definition) words together. So phenomenography means "the definition of appearances" (Hasselgren and Beech, 1997). It was mentioned about phenomenography term in Gothenburg University in 1979 for the first time and Marton used this term in his study in 1981 officially. Marton (1986) explained phenomenography as: A life with, people's phenomena around them, conceptualizing, perception, reception and building up a structure with qualitative ways using the varied perspectives of perceptions. As the data gathering method, face to face interviews, group interviews, observations and written scripts are used (Marton, 1994).

There is no standard data analysis method in phenolmenography. In all the phases from coding to classification, the datum should be revised. In phenomenography, it is

Table 1. The distribution of the frequencies and percentages of the research students according to gender.

Gender	Frequency (f)	Percentage (%)
Female	80	48.2
Male	86	51.8
Total	166	100.0

aimed to make generalizations from perceptions of objects and events towards expressions, in other words forming definition categories. The definition categories represent the basic meanings of similarities and differences of concepts and put forward the ways of different qualitative ways of defining, analyzing and perceiving a phenomenon (McCosker et al., 2003). The individuals of the research should represent their lifestyles and suitable language for it while they are giving definitions. The language being used for the research is very significant. Students state similar things but actually they have different meanings (Bowden, 1994). For this reason, biases should be avoided when interpreting students' concepts.

METHOD

Design of the study

Phenomenography which is among qualitative research methods was used in this study. It is possible to define a qualitative research with a process in which data gathering methods are used as observations, interviews and document analysis and perceptions and events put forward in a natural atmosphere in a realistic and integrated way (Yildirim and Simsek, 2006).

In other words, a qualitative study is for searching the "why" of individual and group work. A qualitative research investigates for why?, How? and in what ways? (Ergün, 2005). Phenomenography is a qualitative research approach revealing the experiences over the formation of concepts and the impressions of events of people (Patton, 1980).

Study group

The universe of this research is the students at secondary schools in Istanbul city center in 2009 - 2010 academic year. The sample of the study was formed by random choice. In such a preference, the samples are chosen randomly according to the given list. The important thing here is the items in the list should be similar (Cepni, 2007). The sample of the study was 166 students at a secondary school in the center of Istanbul city. Table 1 shows the distribution of the frequencies and percentages of the research students according to gender.

As seen in Table 1, in total of 166 secondary school students, 80% are female, 86% are male students.

Data gathering and evaluation

In order to determine the secondary school students' perceptions towards global warming concept, a half structured form with a short and open ended questions was given and asked for replies. In this

form the statements: "I think global warming means...", "According to me global warming means..." were written. In order for the students to write their thoughts about the given statements 20 minutes given. The replies given by the students' own handwritings were the main sources of datum for the research.

The datum gathered from the students was analyzed with phenomenographic analysis method later. The replies of secondary school students about global warming concept were checked rapidly in one session. Then the same replies were checked for the second and the third times rapidly. After the third check, some temporary pre categories were determined with the main lines. These pre categories were later used as a base. These categories were tested according to the students' replies. Further readings were used to ensure the categories and similar replies were put under the same categories. With the classification of the replies of the secondary school students using phenomenographic analysis some definition categories were formed. In the case where one student's reply in two or more of the categories, it was put into the highest one hierarchically. As a result of the analysis, six (6) global warming concepts were found.

FINDINGS

When the global warming definitions considering '6 different qualitative global warming concepts' were determined. These definition categories were put in a hierarchical order from the simplest (concept 1) to more complex and comprehensive ones (6 concepts). Secondary school students defined the first three concepts thoroughly, whereas, the last three definition categories emphasized the responsibilities of human beings to biosphere where they live by. As the result of the phenomenological analysis, 6 different global warming concepts were determined. The first three of them were classified as 'non-relational conceptions', whereas, the other three as 'relational conceptions'. Global warming was defined as the increase of temperature of the earth by the 26.5% (44 students). 10.2% of the secondary school students (17 students) defined global warming as the change of climates and seasons establishing a cause and result relation. 17.5% of the students (29 students) expressed global warming as destruction of natural balance. Human beings were seen as the reason of global warming by 23.5% of the secondary school students (39 students). 5% of the students (8 students) thought that global warming can be prevented, 17.5%, (29 students) claimed that living things and human beings living areas would be extinct due to the disasters caused by global warming

Concept 1: Global warming is the increase of average temperature of the world

In concept 1, global warming was defined as the increase of the earth's average temperature. Secondary school students emphasized the general increase of temperature and its effects using different expressions and terms. The students emphasized the melting of icebergs in relation with the increase of earth's average temperature. Some of the views in this category were given below:

(Nineteen students) Global warming is the melting of icebergs in relation with the rise of the temperature

(Nine students) Global warming is the increase of earth's temperature.

(Seven students) Global warming is the rise of the earth's average temperature.

(Five students) Global warming is the rise of water level in relation with the rise of the temperature

(Four students) Global warming is the warming and desertification of earth.

Concept 2: Global warming is the destruction of climates and seasons

In concept 2, global warming was defined as the change of climates and seasons. Some of the views in this category were given below:

(Four students) Global warming is the change of seasons.

(Three students) Global warming is the change of climates.

(Three students) Global warming is the change of climates in a worse direction.

(Three students) Global warming is the imbalance of climate.

(Two student) Global warming is the change of climates in the world by greenhouse gases.

(One student) Global warming is the destruction of temperature balance.

(One students) Global warming is the destruction of climates.

Concept 3: Global warming is the destruction of natural balance of the world

In concept 3, global warming with its results, was defined as the destruction of natural balance of the world. Some of the views in this category were given below:

(Ten students) Global warming is the living things' being under danger as a result of destruction of natural balance on earth....)

(Eight students) Global warming is the destruction of the natural balance.

(Seven students) Global warming is the destruction of the world due to several reasons.

(Three students) Global warming is the destruction of ecological system.

(One student) Global warming is the destruction of ecological balance with the accumulated greenhouse gases in the world.

Concept 4: Global warming is the result of the damages to nature caused by people

In concept 3, global warming, was defined as an environmental problem appeared as the result of the damages to nature caused by people. Some of the views in this category were given below:

(Fourteen students) Global warming is the hole in the ozone layer caused by deodorants used by people, perfumes and several gases.

(Eleven students) Global warming is caused by the damages given to nature by human beings.

(Seven students) Global warming has the ground of irresponsibility of people.

(Five students) Global warming is a problem originated by the imbalanced and unconscious fuel use with the development of industry and technology.

(Two students) The reason for global warming is human beings.

Concept 5: Global warming is an environmental problem that its effects can be reduced if necessary precautions taken

In concept 5, global warming, was defined as an environmental problem in which necessary precautions should be taken in order to prevent it. People have some important duties about it. Some of the views in this category were given below:

(Three students) Global warming is a preventable problem. For this, people should be conscious.

(Three students) We should take precautions in order to prevent global warming.

(Two students) We should save up water since the water sources are diminishing rapidly because of global warming.

Concept 6: Global warming is the end of human kind and the world

In concept 6, possible conditions were explained as a result of global warming. It is asserted that global warming may have some negative effects over living things and an important threatening factor for them. Some of the views in this category were given below:

(Eleven students) As a result of global warming, the balance of nature will be destroyed, the animal species will be extinct, some chronological ailments will appear, the water sources will run off, the icebergs will melt in other words; the world will be an unliveable place.

(Ten students) Global warming is the end of life.

(Five students) Global warming is the extinction of the world.

(Three students) Global warming will destroy nature.

RESULTS AND DISCUSSION

The findings of the research show that the definitions of secondary school students do not contain an exact definition of global warming term. The replies given by secondary school students involve statements in general. The findings gathered from this research are very close the ones carried out by Demirkaya (2008) on teacher candidates, Rye et al. (1997) on primary school students, Kilinc et al. (2008) on secondary school students.

Secondary school students' definitions towards global warming concept indicate that non relational definitions are more than relational ones. This condition shows that such themes are not considered and discussed sufficiently at secondary schools. Secondary school students' definitions on global warming have the level that they get from the means of communication.

This study was limited to 166 secondary school students. With Phenomenographic research method, the perceptions of students at different secondary schools in different parts of Turkey and students in different countries and cultures of the world about environment, global warming, extinction of species and such concepts can be researched. The datum gathered from students of different countries or cultures can be compared.

Considering the findings gathered from the research, some results can be inferred for the secondary school curriculum. Perceptions of students at different types of

schools (science high schools, Anatolian high schools, vocational high schools, etc.) can be applied about global warming concept. A more realistic and actual teaching programme can be applied to secondary school students about current problems of the world. A phenomenographic view can be used to analyze the differences between the first year and the last year before graduation of the students' perceptions of secondary schools.

Before to teaching some concepts about the environment, teachers should consider the fact that students may have misunderstandings about the targeted themes to be taught in the lessons. In relation to this, secondary school students' global warming concepts are not scientific in general. It is thought that most parts of the examined definition categories are not based on regular and programmed knowledge, they are based on television, internet, newspaper news and documentaries.

At some secondary schools, teacher centred educational approaches are being applied during the lessons causing that secondary school students' definitions about global warming are basic and simple. Another reason for this may be the university entrance exam, having a multiple question form which prevents students form their own knowledge. In the classroom atmosphere in which students are seen as didactic teaching instruments, it unexpected to acquire critical thinking, creative thinking, problem solving and investigating.

Environment education must be held with a comprehensive approach so as to cover all educational levels both indoor and outdoor activities and it should be supported by the public. It means that it should not be as the themes valid only at school students but must transform their knowledge in their social life. In relation to this cooperation between scientists and media dealers should be provided (Demirkaya, 2008). Environment education should be common in secondary schools and improved. Secondary school students need to be encouraged to be in environmental projects. It should be emphasized in the lessons that, environmental problems influence not only a particular region or a country but also the whole world.

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