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The Perceptions of Secondary School Students Towards Earthquakes: a Phenomenographic Research

Mücahit Coşkun, Hüseyin Kaya and Fatih Aydın

Department of Geography, Karabük University, Karabük - Turkey

Abstract: The purpose of the study is to define and explain how secondary school students perceive the earthquake concept. The study group of the research is the 118 students at a secondary school in Istanbul in 2009-2010 academic year. The datum of the research was taken by students' completing *"Earthquake means……..according to me"* or "*To me, earthquake is ……"* statements. Students' definitions were analyzed with qualitative phenomenographic research methods. As the result of the phenomenographic research "*eight different qualitative earthquake definition categories*" were determined. These definition categories are; (1) Earthquake is a natural disaster (2). Earthquake is the shake of earth (3) Earthquake is death (4) Earthquake is destroying and catastrophy (5) Earthquake is something that destroys people's psychology (6) Earthquake is a natural event that cannot be guessed and prevented before its occurance (7). Earthquake is a disaster that its damages can be prevented when necessary precautions were taken (8) Earthquake is a sudden shake that occur as a result of earth crust's movement.

Key words: Earthquake · Secondary School · Phenomenographic Research · Student · Geography Education

INTRODUCTION

Earthquake is one of the leading natural hazards that the world has encountered through history. Earthquake is the short term quakes that take place over the upper part of earth's crust under natural factors and processes [1]. Turkey is situated in the Alpine-Himalayas Line which is one of the most active regions in the world in terms of earthquake. Anatolian peninsula is surrounded by Asia in the east, Saudi Arabia in the South east and Eurasia plates in the North. Africa and Arabia plates' movement to the North, causes Anatolian Peninsula to drift through North Anatolian Fault Line against Eurasia Plate which is accepted constant. According to these movements there has been many destructive earthquakes in Anatolia from past to present. When the distribution of earthquakes according to their intensities, Primary earthquake zone areas are North Anatolian Fault Zone, Eastern Anatolian Fault Zone and most parts of Eagean Region. Secondary earthquake zone area is roughly the areas covering around the primary zone. Third and Fourth earthquake zones are Central Anatolia and South parts of Southeast Anatolian Region. The areas that destructive earthquakes took place in Turkey are generally the basins between the mountains, gulleys in other words lower plains and areas [2,3].

92 % of the lands, 98 % of the population in Turkey is under the risk of earthquakes. Most parts of the world are under risk as well. The generations knowing the definition of eartquakes, the results of them and the precautions that can be taken for them may be more sensitive to natural hazards and will be responsible people in the future. The basic way to overcome earthquakes and other natural hazards is to give a conscious and well planned natural hazards education.

Main aim of earthquakes and natural hazards' education is to raise awareness of all parts of the society about environment, acquiring positive and permanent behavioural changes and to maintain active involvement. Natural Hazards education should be lifelong education beginning from pre-school period going through all formal and informal education phases.

The Purpose of the Research: The purpose of this research is to analyse the secondary education students' perceptions towards earthquake concept using phenomenographic research method. Turkey is situated on the Alpine-Himalayas (The Mediterannean) faulty line which is one of the 3 important erthquake zones. Because of this Anatolia which was dismantled with the faults encountered very violent and destructive earthquakes and it is still continuing. The earthquakes

Corrsponding Author: Mücahit Coşkun, Department of Geography, Karabük University, Karabük - Turkey

occured affect the people deeply in terms of social, financial and psychological issues. However, not having enough conscious about earthquakes causes big damages in Turkey. On the contrary there are countries that earthquake damages can be reduced to the lowest level. As in Japan and similar countries, an effective and continuous education can reduce the damages caused by the earthquakes in Turkey as well [4]. For example in Japan only e few people die after an earthquake with 8.0 magnitude, more than 17000 persons died in Gölcük Earthquake with 7.4 magnitude in Turkey. As in the other natural hazards the importance of earthquakes is understood well after the disasters but then they are forgotten after a while [5].

It is possible to be protested from that damages of earthquakes or dwindle the expected destruction by an effective earthquake or in a general term hazard education. Natural hazard education It is It is possible to be protested from tha damages of earthquakes or dwindle the expected destruction by an effective earthquake or in a general term hazard education. Natural hazard education should start from preschool period and go through the educational process with particular educational programmes. Because of that it is necessary to prepare necessary conditions to provide a good earthquake education in the educational institutions.

Earthquakes are natural hazards that exact occurance time can not be predicted with todays technology. However earthquakes give damage to everybody in occurence area. Thus all people from every age should be well educated against earthquakes [6]. Earthquake education is the process beginning from the earth's crust structure, explaining the earthquake, the damages after the earthquake and then teaching how to get protected from these damages [7]. It is not possible to overcome the problems completely after an earthquake. But if everyone does what necessitates during and after the earthquake, its effects can be reduced.

Recently, in overcoming the earthquake in the world giving earthquake and natural hazards education is getting more important. Secondary school students' knowledge and sensitivity to earthquake and other hazards is very significant. There is not a similar study putting forth the students' perceptions with a phenomenographic research design in Turkey. Taking this into consideration, this first research is important in terms of being a source for the geography science and researchers. In relation to this the purpose of the research is forming categories determining secondary education students' earthquake definitions based on their own background and living styles.

MATERIALS AND METHODS

Research Model: In this research phenomenography was used among qualitative research methods. It is possible to define qualitative research as a research that qualitative data gathering tools such as observation, interview and document analysis are used and perceptions and events are put forth with a qualitative process is followed towards a realistic and coherent way [8]. In other words qualitative studies are for understanding the reasons of a person or group behaviour. Qualitative researches for Why? How? And In what ways? [9]. Phenomenography is a qualitative research approach putting forward concepts formed by people and the reflections of events [10].

Study Group: The universe of this study is comprised of high school students in İstanbul city center in 2009–2010 academic year. The sampling of the study is formed randomly sampling way. In such a preference the sampling is chosen from a particular list [11]. The sampling of the study is 118 students at a school in İstanbul city center. Distribution of the research students' frequency and percentage according to gender was presented in Table 1.

As seen in Table 1, among 118 high school students in the research, 47 of them are girls and 71 are boys.

Collecting and Evaluating Data: In order to determine how secondary education students perceive earthquake concept, a form with short and open ended questions were given and asked them to reply. In this form there are the expressions: "I think earthquake means…", "Earthquake means… according to me". 20 minutes were given to answer fill in the forms. The replies that secondary education students stated were the main source of data of the research.

The data gathered from the students evaluated by phenomenographic analysis method. In phenomenography there is not a standard data analysis technique. It is necessary to revise again and again from coding to classification phases. Phenomenography making generalizations of the expressed perceptions related to objects or events.

Table 1: Distribution of the research students' frequency and percentage according to gender

Gender	Frequency (f)	Percentage (%)
Girls	47	40.0
Boys	71	60.0
Total	118	100.0

Identification categories represent the main meanining of the concepts that put forth the similarities and differences of conceptions and again put forward the basic principles of how many qualitative ways can a phenomenon be perceived, defined and analysed [12].

All the secondary education students' replies towards earthquake concept were checked in one session rapidly. Then the same replies were checked again as the second and the third time. After the third check some temporary pre-categories were determined. These preliminary categories were considered as the basis for the further evaluations. In other words these categories were tested against students' answers. Further evaluations were used in the validation of the categories and similar replies were put in particular categories. By classifying secondary education students' replies some particular definition categories were formed after a phenomenographic analysis. In a case that a student's answer was in two or more categories it was placed the highest category hierarchically. As a result of the analysis 8 different earthquake categories were put forth.

Findings and Interpretations: When secondary education students' earthquake definitions were examined 8 different qualitative earthquake concepts were determined. These definition categories were placed in an hierarchical order from the simplest (concept 1) to the most complex and comprehensive one (concept 8). Secondary students defined the first 5 concepts broadly whereas in the last 3 definition categories they emphasized that it is not possible to prevent earthquakes but its effects can be reduced if necessary precautions taken. After the phenomenographic analysis 8 different earthquake concepts and some examples from students' expressions were given.

Concept 1. Earthquakes Are Natural Hazards. (Totally 9 Students): In concept 1, students defined earthquake as a natural hazard. The students defining like that are 7.6 % of the total research students. Some of the students' statements that emphasize the earthquake's being a natural hazard were given here:

(six students) "Earthquakes are natural hazards."
(three students) "They are natural hazards that all the destructions take place."

Concept 2. Earthquakes Are Quakes of the Earth. (Totally 25 Students): In concept 2, students defined earthquake as quakes of earth. The students defining like that are 21.1 % of the total research students. Some of the students' statements in this category were given here:

(ten students) "Earthquakes are quakes of the earth."
(six students) "Earthquakes are violent quakes of earth."(five students) "Earthquakes are shakening of earth."
(two students) "Earthquakes are deadly quakes."
(two students) "Earthquakes are the quakes of earth's crust."

Concept 3. Earthquakes Are Death. (Totally 16 Students): In concept 3, students defined earthquake as an expression of death because of the life loss in the earthquakes. The students defining like that are 13.5 % of the total research students. Some of the students' statements in this category were given here:

(nine students) "Earthquakes mean death."
(seven students) "Earthquakes are death and fear."

Concept 4. Earthquakes Mean Destruction and Disaster. (Totally 19 Students): In concept 4, students emphasized the destructive feature of earthquakes. The students defining like that are 16.1 % of the total research students. Some of the students' statements in this category were given here:

(ten students) "Earthquakes are disasters that change people's lives and destroy."
(seven students) "Earthquakes are the movements of earth's crust giving damage to nature and people."
(two students) "Earthquakes mean fear and seperation."

Concept 5. Earthquakes Are Events That Give Harm to People's Psychologies. (Totally 10 Students): In concept 5, students mostly emphasized earthquake's effects over people' psychology. The students defining like that are 8.5 % of the total research students. Some of the students' statements in this category were given here:

(five students) "Earthquakes are events that give harm to people's psychology."

(four students) "Earthquakes are events that spoil people's lives."

(One student) "Earthquakes are events that people's hopes and endeavors disappear."

Concept 6. Earthquakes Are Unrestrainable Natural Hazards That Can Not Be Predicted. (Totally 6 Students): In concept 6, students defined the earthquakes as sudden and unrestrainable events. The students defining like that are 5.1 % of the total research students. Some of the students' statements in this category were given here:

(two students) "Earthquakes are unrestrainable events."
(four students) "Earthquakes are disasters that can not be prevented and definitely occur."

Concept 7. Earthquakes Are Events That Their Harms Can Be Reduced When Precautions Taken. (Totally 5 Students): In concept 7, students emphasized that if some precautions taken their effects can be reduced. The students defining like that are 4.2 % of the total research students. Some of the students' statements in this category were given here:

(three students) "Earthquakes are events that their effects can be reduced in the countries that take precautions (i.e. Japan) but in underdeveloped countries (i.e. Haiti) their effects continue for a long time."
(two students) "Earthquakes are events that their effects can be reduced if necessary precautions taken."

Concept 8. Earthquakes Are Sudden Quakes of Earth after the Earth's Crust Movements. (Totally 28 Students): In concept 8, students emphasized how earthquakes occur. They stated that earthquakes occur over the fault lines and the effects of plate movements in this occurance. The students defining like that are 23.7 % of the total research students. Some of the students' statements in this category were given here:

(five students) "Earthquakes are violent quakes that are formed by the cracks in the fault lines."
(five students) "Earthquakes are quakes that occur in fault lines and around."
(six students) "Earthquakes are sudden quakes of earth after the earth's crust movements."
(four students) "Earthquakes are natural hazards that occur as a result of tectonic movements and cause life loss."
(four students) "Earthquakes are the movement of earth caused by the energy released by the currents in magma."
(four students) "Earthquakes are quakes that take place as aresult of energy releasing from magma over the fault lines."

RESULTS AND DISCUSSION

The findings as the result of the research show that secondary students' earthquake concepts do not contain an exact definition. The replies given by the students are generally broader expressions. Students' earthquake concept definitions are (first 5 concepts) non relational conceptions more than, (last 3 concepts) relational conceptions. This situation indicates that these matters are not examined and discussed sufficiently. Secondary education students' earthquake definitions are in the form of "general knowledge" emerged from communicational tools, their experience and from people around them.

7.6 % of the research students state that earthquakes are natural hazards, 21.1 % as quake of earth, 13.5 % as the expression of death, 16.1 % as destruction and disaster, 8.5% as events that give harm to people's psychology, 5.1 % as unrestrainable events, 4.2 % as events that their effects can be reduced when necessary precautions taken, 23.7% as sudden quakes of earth take place as a result of the earth crust's movement.

In this research some interesting and significant findings were reached as well. Some of the students (38.1 %) defined earthquakes as "death", "events that give harm to people's psychology" and "destruction". These expressions are the reflections of students' emotional break down caused by the earthquakes. In this point, students that were experienced earthquakes before should be supported psychologically.

The most destructive damages during earthquakes are seen in people's psychologies more than buildings. Earthquakes may shock people and their effect may continue for a long time. In this situation people need psychological treatments severely. Because the experiences during an earthquake may seen in any time in people's lives and cause pain. A voice, an image, anything resembling the earthquake make people feel the same pain and experience again [13].

One of the most repeated expression among the definitions of students towards earthquake concept is "earthquakes are quakes of earth". In Demirkaya's study (2007) some of the primary students stated the same expression [5].

This study is restricted with 118 secondary education students. Again secondary education students' perceptions towards global warming, environment, extinct animals and similar concepts can be searched. The results of these researches can be compared.

To acquire earthquake conscious is the students' knowing what to do before, during and after the earthquake and applying them appropriately. Because of this to determine the behaviours during an earthquake the things to be done before, during or after an earthquake and they should be taught to the students.

Taking the the findings emerged from this study some new idea or suggestions can be inferred to be used in secondary curriculum. A more realistic and actual curriculum about natural hazards can be applied in secondary education. Secondary school students can be asked to state how they perceive earthquakes in the first year and last year of their education and the differences can be analysed by phenomenographic research technique.

In defining the earthquake concept broadly may be a result of traditional teaching methods, in other words teacher centered education. In the new curriculum that takes constructivist approach as a basis, students are in the center of educational process. This way students actively involve in the lesson. In the classes that students centered education is applied students' success, motivation, interests towards the lesson increase. Also the structure of university entrance exams as multiple choice questions do give the opportunity to have the students construct their knowledge and this may lead broad knowledge only.

Natural Hazards education should be handled to cover all educational phases and address to all parts of society. They should not be the themes to be learnt valid for school, they should reflect their knowledge into their social lives outside the school. Natural hazards education should be spread and developed in secondary education. Secondary school students should be encouraged to be involved in the projects based on earthquakes or natural hazards.

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