

Science teacher candidates' views on climate change

Hatice Güler¹, Mehmet Akif Haşiloğlu^{1*} and Deniz Gelturan²

¹Ağrı İbrahim Çeçen University, Faculty of Education, Ağrı, Turkey.

²Graduate School of Natural and Applied Science, Faculty of Education, Ağrı İbrahim Çeçen University, Ağrı, Turkey.

ABSTRACT

This study was carried out to reveal the views of science teacher candidates about climate change. In the study, the case study method, which is among the descriptive research method, was used in order to reveal the situation that is one of the qualitative research methods. The sample group of the study consists of 10 science teachers' candidate studying at Agri İbrahim Cecen University in the Turkey. The most important reason for pre-service teachers to be selected as a sample for the research is due to the assumption that they will teach these students in the national education program when they become teachers in the future. Within the scope of the research, a semi-structured interview form developed by the researchers was used. After the interview questions were prepared, they were presented to the opinions of three experts and a pilot application was carried out with 2 teachers candidate. After the necessary corrections were made according to the course of the interview, the questions were finalized. Interview recording was carried out during the interview in the form of note-taking points. Descriptive, systematic and data analysis methods used in qualitative research were used in the analysis of the findings obtained. Some results of the research are as follows. Teacher candidates defined climate change as the air temperature rising above or below the normal value. Rather than the definition of climate change, they made predictions about the cause and outcome. Besides, teacher candidates stated that, as a result of the climate change both in Turkey and in the world, the bio-diversity decreases, ecological balance is deteriorated and drought begins, epidemic diseases will increase among people and cosmetic products and greenhouse gases cause climate change.

Keywords: Environmental education, teacher candidate, science, climate change, global warming.

*Corresponding author. E-mail: mehmet.hasiloglu@hotmail.com. Tel: +90-472 211 20 38.

INTRODUCTION

Climate is the name given to the air currents observed in any part of the world, depending on the weather events that took place for many years, the duration of these weather events, the severity of the weather changes and the variables (Türkeş, 2000). Climate affects living things in different ways. Living creatures lifestyle, nutrition, shelter, etc. habits change in relation to the climate of the region in which it is lived. Therefore, living things adapt to the environment they live in and are mentioned together with these conditions (Türkeş, 2008). However, the natural balance existing in the world deteriorates for some reason. As a result of these deteriorations, seasons change, biodiversity loss occurs, natural resources are disappearing, extremely arid and extremely cold climates are formed, glaciers are melting and sea level is rising.

Many negativities like these cause changes in the existing ecosystem of the world (Öztürk and Öztürk, 2002). As a result of all this, climate zones change places, extreme weather events occur and climate changes occur. Global climate change is expressed as the weather conditions that occur as a result of sudden changes of long-term atmospheric events in the world since geological periods, especially as a result of the overcooling and warming of the weather (Çepel, 2003). People, animals, plants and the natural ecosystem are severely affected by global climate change. Climate change, which has a significant impact on living and inanimate beings, is not only an environmental problem but also a health problem. As a result of climate change, living things can be caught by diseases such as

respiratory and lung diseases, various viral infections and bacterial diseases (Haşiloğlu and Karasu, 2019). Melting glaciers and rising sea levels as a result are among the symptoms of global climate change. Due to the global climate change, living environments of living things deteriorate. Living things either migrate from place to place, or their generation may be at risk of extinction. Examples of these creatures are the reduction of delicate bird species, polar bears, and Mediterranean seal (Samur, 2005). As a result of global warming, the climate changed and evaporations occurred in the warmed air. As a result of evaporation, the heated air falls on the earth with various precipitation patterns. Depending on climate change, the severity of precipitation varies by region (Postel, 2000). These precipitation patterns and weather events cause various negative consequences all over the world. Disasters such as floods, storms, droughts create more difficult conditions in human life. These situations, which are the result of weather events especially in Europe, are increasing. Extreme weather events around the world have manifested themselves since the early 1990s (European Environment Agency, 2004). Turkey is among the countries affected by global warming and climate change because it has a variety of climate types. This climate change manifests itself in different ways in different regions depending on the geological structure (Aksay et al., 2005).

Consequences of climate change in Turkey are as follows:

1. Natural ecological balance is disturbed and biological diversity decreases.
2. Destruction and depredation of forests are on the agenda.
3. Reductions occur in water resources, drought and desertification occur in some regions. Depending on this, ecosystem disruptions occur.
4. Moisture in the soil and fertile agricultural land decreases.
5. Long-term drought in the air causes various environmental, economic and social problems (Öztürk, 2002).

When the literature related to this research is scanned, there are various studies on climate change, environmental awareness and environmental education. Different results are mentioned in these studies. As a result of the research, Çelik et al. (2008) stated that the increase in the amount of greenhouse gases released into the atmosphere increases the global warming and causes various health problems directly or indirectly due to the global climate change. Aydın (2010) conducted a study called geography teacher candidates' views on environmental problems and environmental education. As a result of the research, geography teacher candidates stated that unconscious and excessive use of natural resources as one of the most important problems in the world. It is stated that education should be provided to

individuals and that this education should start at preschool level. Kılıç and İnal (2010) stated that the departments where university students are educated affect their attitudes towards the environment. Temelli et al. (2011) emphasized that elementary teachers had the necessary knowledge about global warming. However, they also stated that they need to learn more about global warming in order to work effectively with their students. Öztürk and Öztürk (2015) stated in their study about prospective teachers' views on environmental education that teacher candidates expressed the excessive use of natural resources as one of the serious environmental problems occurring all over the world. Güloğlu and Bulut (2016) According to the results of the research, it was stated that forestry students have sufficient information about climate change. According to the results of Küçük Biçer and Acar Vaizoğlu (2015) research, it was stated that the students of the nursing department did not have sufficient information about climate change and global warming. Oluk and Oluk (2007) stated that higher education students have misconceptions and lack of knowledge in their perception of global warming and climate change. In the study named Tok et al. (2017) examining the climate change awareness of the elementary teacher candidates, it was stated that the pre-service teachers' awareness about the physical consequences of climate change such as increased atmospheric temperature, increased sea water level, and increased salinity of water. In the study entitled Atik and Doğan (2019) high school students' views on global climate change, it was concluded that students' knowledge level about climate change is low and there may be many reasons. When the aforementioned literature is analyzed, it can be seen that studies on climate change education are carried out on students studying in different grades and at different degrees. However, in the field of science, where climate change issues are mostly included, there are no studies regarding the opinions of prospective teachers who will be the future teachers of this subject. Therefore, this research, which is thought to contribute to the field, was deemed necessary. Therefore, what is the science of climate change in teachers' research, the cause of climate change, climate change and climate change in the status of Turkey and world views about the impact on human health are taken.

Purpose of the research

This study was carried out to reveal the views of science teacher candidates about climate change. For this purpose, the following questions were asked to science teacher candidates in the form of a semi-structured interview:

- What do we think of when it comes to climate change?
- What is the situation in Turkey and the world about

climate change?

- What are the factors affecting climate change?
- What are the effects of climate change on human health?

METHODOLOGY

Research pattern

In this research, the case study method was used. The special case research method is used to reveal the existing situation and is within the descriptive research methods. In this method, an in-depth examination is made on current events, situations and a social group. While conducting this research, the most distinctive feature of the researcher is that she or he does not have prejudices about the subject (Çepni, 2007; Ekiz, 2009). In accordance with the nature of the research problem, data was collected using a semi-structured interview method. The information obtained from these data was analyzed by content analysis method (Çepni, 2007). The sample of the study consists of 10 science teacher candidates studying at Agri İbrahim Cecen University in the Turkey in 2018-2019. The most important reason for teacher candidates to be selected as a sample for the research is due to the assumption that they will teach these students in the national education program when they become teachers in the future. The demographic characteristics of the teacher candidates who make up the participants are as follows. 6 girls and 4 boys, between the ages of 21-24, consisting of 3 and 4 grades, are prospective teachers.

Data collection tool

In order to reveal the opinions of teacher candidates about climate change, an interview form consisting of five "open-ended" questions was prepared to determine the opinions of the participants. For this purpose, the interview questions developed by three experts were asked to 2 teacher candidates according to the course of the interview, sometimes the way the questions were asked changed, and sometimes the answers to the questions were among the answers to the previous questions, so the question was abandoned. After making the necessary corrections, the interview questions were reduced to four and the final form was given. Interviews consisting of semi-structured questions were conducted with teacher candidates in a room at the faculty of education, each of which lasted between 15-20 min. During the interview, the interview was made by drawing attention to important points (Çepni, 2007).

Data analysis

Descriptive, systematic and data analysis methods used

in qualitative research were used in the research. This analysis method is defined as the descriptive and systematic analysis method combined with data analysis and carried out together. In other words, after the data obtained from the interviews are converted into numerical data with certain codes, this is done by analyzing the data (Altunışık et al., 2010; Patton, 2018). While analyzing the data, the answers of teacher candidates were examined by two researchers and the answers were presented in a table with certain themes. Later, this information was supported by the statements of teacher candidates. As required by the research ethics, the identities of the participants participating in the sample were kept secret and codes were given to the participants (S1, S2...).

RESULTS

This study was carried out to reveal the views of science teacher candidates about climate change. For the purpose of the research teachers' views on the definition of climate change candidates, climate change related to Turkey and views on the situation in the world, climate change views on the factors affecting, as their views on the effects of climate change on human health are presented under four headings.

Science teacher candidates' views on what climate change is

When Table 1 is examined, we can see the answers of teacher candidates about what the climate is. It was determined that 5 of the 10 teacher candidates who participated in the research defined the climate as "the air temperature rises above or below the normal level". 4 teacher candidates define it as "Global warming means", 2 teacher candidates describe it as "Chemicals used by people unconsciously, unconscious tree cutting, wastes harmful to nature cause deterioration of natural balance and climate change occurs" and 1 teacher candidate is "Changes in atmosphere". They defined as. Although 1 teacher candidate stated opinions about both the cause and the result of climate change, 1 teacher candidate stated the reason, and 8 teacher candidates stated only the result.

Science teachers' views about climate change in Turkey and in the world

What is the situation in Turkey and the world on climate change when examined 10 teachers participated in the survey? (Table 2). We see the answers they answered to the question. Teacher candidates' answers to this question for most as a result of climate change live in reduced biodiversity, the ecological balance is disrupted

Table 1. What comes to our minds when it comes to climate change? The answers given by teacher candidates to the question.

Answers	Codes
Chemicals that people use unconsciously, unconscious tree cutting, wastes harmful to nature cause disruption of natural balance and climate change occurs. (Reason)	S1, S8
It is the changes that occur in the atmosphere. (Result)	S2
It is that the climate goes above or below the normal level. (Result)	S3, S7, S8, S9, S10
It means global warming. (Result)	S4, S5, S6, S10

Table 2. What about Turkey and the world with climate change? The answers given by teacher candidates to the question.

Drought S1, S2, S3, S5, S7, S8, S9	Precipitation S1, S2, S3	Extreme Cold S1, S2, S3, S5	Extremely hot S3, S5, S6, S7, S8
Desertification S6, S7	Forest fires S7	Ecological Degradation S2, S3, S4, S6, S7, S10	biodiversity loss S2, S4, S5, S6 S8, S10
Agricultural Inefficiency S1, S3, S8 (result)	Flood S9	The disappearance of the seasons S7, S10	Increase in Sea Level S5, S7
Decrease in Fresh Water Resources S1, S8	Reduction of Green Areas S1, S2	Melting of Glaciers S5, S7	

and in Turkey and began to show itself in the form of drought in the world. Only one prospective teacher about what is the situation in Turkey and in the world with climate change? He answered his question in the form of floods and forest fires. Sample sentences of teacher candidates on this subject are given below:

(S3) Climate change is a result of the extreme heat in Turkey; it is likely the occurrence of extreme precipitation and extreme cold.

(S8) As a result of climate change, temperature increases, biodiversity loss, agricultural yield loss and drought occur in the world.

Views of science teacher candidates about the factors affecting climate change

When Table 3 is examined, what are the factors affecting the climate change of the 10 teacher candidates participating in the research? We see the answers they answered to the question. The most frequent answer given by teacher candidates to this question is the effect

of cosmetic products and greenhouse gases. The least answer is that natural resources disappear, excessive drought, acid rains, chemical pollution and ecosystem degradation. Sample sentences of prospective teachers on this subject are given below:

(S2) We can divide the factors affecting the climate into two groups as human and natural factors. Human; it is the conscious harm of nature to people, cosmetic products, destruction of forests, unconscious use of surface waters. Natural; extreme drought, insufficient water resources and acid rains.

(S6) It is the density of greenhouse gases such as carbon dioxide and methane in the atmosphere.

Views of science teacher candidates on the effects of climate change on human health

When Table 4 is examined, what are the effects of climate change on human health of the 10 pre-service teachers who participated in the research? We see the answers they answered to the question.

Table 3. What are the factors affecting climate change? The answers given by teacher candidates to the question.

Changing the gas content in the atmosphere S1, S8	Fossil fuels S1, S7, S9	The disappearance of natural resources S1	Cosmetics S2, S3, S4, S9, S10
Unconscious water consumption S2, S5	Extreme Drought S2	Acid rains S2	Effect of Greenhouse Gases S3, S4, S6, S8, S10
Destruction of Forests S3, S5	Chemical Pollution S8	Ecosystem degradation S8	

Table 4. What are the effects of climate change on human health? The answers given by teacher candidates to the question.

Epidemic Diseases S1, S4, S6, S9	Infection S1, S2	Wounds on the skin S1, S2
Weakness S1, S2	Skin cancer S1, S3	Cancer S5
Malaria S7	Cholera S7	Economic Disruption S7
Social Impairment S7	Immune System Disorder S10	

While most of the answers given by teacher candidates towards this question cause epidemic diseases, the least answers are malaria, cholera, cancer, social disorder, economic disorder, and immune system disorder. Sample sentences of prospective teachers on this subject are given below:

(S9) Infectious diseases may increase with the effect of climate change and extreme hot weather.

(S1) Diseases caused by increased genetically modified organism (GMO) foods may increase due to insufficient natural resources.

DISCUSSION

This study was carried out to reveal the views of science teacher candidates about climate change. What comes to our minds when it comes to climate change? When the answers given by the teacher candidates to the question are examined, 50% of them defined that the air temperatures were above or below the normal level. Looking at the literature, there are various definitions related to climate change. According to these definitions, climate change is a kind of atmospheric or astronomical changes (Wikipedia) that are scientifically examined according to weather events (climatology) occurring in the atmosphere. In this study, teacher candidates defined climate change as more than or below the normal level of air temperatures. For this reason, the answers given by teacher candidates and the information in the literature are partially similar. In this study, teacher candidates mentioned the causes and consequences of climate change instead of its definition. According to Table 1, teacher candidates expressed their opinions about both cause and effect of climate change. While 8 teachers' candidates expressed opinions about the results of climate change, only 1 teacher candidates expressed opinions about the reason. In the research conducted by Atik and Doğan (2019) in high school, Güloğlu and Bulut (2016) studied on students studying in the forest faculty; the students came to the conclusion that the definition of climate change was defined by the changing of the weather conditions as the climate was too hot or too cold. If we compare the results of this study with the results of this study, the statements of the students about the definition of climate change are similar. What about Turkey and the world with climate change? When the question of the teacher answers given by the candidates

discussed, teachers of these questions for the most responses in vivo climate change results in biodiversity decreases, the ecological balance is disrupted and in Turkey and as he started to show itself drought in the world. In the study of Temelli et al. (2011), expression ethics were stated in the form of melting glaciers, rising ocean and sea water levels and increasing land losses in coastal areas according to the answers given by primary education teachers about global warming, which is one of the causes of climate change. Therefore, this study is partially similar to the research conducted. What are the factors affecting climate change? When the answers given by the teacher candidates to the question are examined, the most common answers given by the teacher candidates for this question are the effects of cosmetic products and greenhouse gases. In her study, Güloğlu and Bulut (2016) asked students studying at the forest faculty about the cause of climate change. The most common answer about the cause of climate change is the increase in human activities, rapid industrialization and deforestation. The result of this study is not similar with the research conducted. The reason for the lack of similarity between these two studies may have been due to the different education they received. Tok et al. (2017) looked at the pre-service teachers' awareness of the cause of climate change. The most frequent answer given by teacher candidates is to increase global temperature and to use fossil fuels. Therefore, the results of this study and the study show similarities in terms of the use of fossil fuels. In their study conducted with high school students, Atik and Doğan (2019) concluded that students respond to the causes of climate change as people behaving unconsciously and mostly environmental pollution. The results of this study show similarity with the answers given for the effects of fossil fuels and greenhouse gases. What are the effects of climate change on human health? While most of the answers given by the teacher candidates to the question are causing epidemic diseases, the least answer is to malaria, cholera, cancer, social disorder, economic disorder, and immune system disorder. In the study of Küçük Biçer and Acar Vaizoğlu (2015), students of the nursing department concluded that climate change stated that it causes cancer and respiratory system diseases, and at least mental problems on human health. This study is partially similar to the result of the research. Atik and Doğan (2019) stated in their study conducted with high school students that students stated that climate change caused diseases. However, in this study, he did

not make a detailed explanation about what diseases he caused. Depending on the results of the research, we can state that science teacher candidates' views on climate change are as follows. Preservice teachers defined climate change as the air temperature rising above or below the normal level. Rather than the definition of climate change, they made predictions about the cause and outcome. In addition, teachers, Turkey and the consequences of climate change on the world's biodiversity is reduced, the ecological balance is disrupted and drought that began, cosmetic products and that cause climate change, greenhouse gases, stated that increased epidemics among people with changing climate.

REFERENCES

- Aksay, C. S., Ketenoğlu O., and Kurt, L. (2005).** Global warming and climate change. Selcuk University Science Faculty Science Journal, 1(25): 29-42.
- Altunışık, R., Çoşkun, R., Yıldırım, E., and Bayraktaroğlu, S. (2010).** Research methods in social sciences. Sakarya: Sakarya Bookstore.
- Atik, A. D., and Doğan, Y. (2019).** Views of high school students about global climate change. Academy Journal of Educational Sciences, 3(1): 84-100.
- Aydın, F. (2010).** Geography teacher candidates 'views about environment problems and environment education (Gazi University Case). International Online Journal of Educational Sciences, 2(3): 818-839.
- Çelik, S., Bacanlı, H., and Görgeç, H. (2008).** Global climate change and its effects on human health. Telecommunications Branch Office, 1, 31.
- Çepel, N. (2003).** Ecological problems and solutions. Ankara: TÜBİTAK Publications.
- Çepni, S. (2007).** Introduction to research and project studies. Trabzon: Celepler.
- Ekiz, D. (2009)** Scientific research methods (2nd Edition), Ankara: Anı Publishing.
- European Environment Agency (EEA) (2004).** 2004 European Environment Agency update on certain issues. Official Office of Publications of the European Communities, Luxembourg, p.22.
- Güloğlu, Y., and Bulut, A. (2016).** Determination of knowledge levels of forestry faculty students on climate change (Example of Kastamonu University Forestry Faculty). Kastamonu University Journal of Forestry Faculty, 16(2): 640-654.
- Haşiloğlu, M. A., and Karasu, İ. (2019).** Environmental problems-environmental problems M. Kurt (Edt), Environmental education. (p. 143-156), Ankara: Educating Book.
- Kılıç, S., and İnal, M. E. (2010).** Environmental education in higher education.
- Küçük Biçer, B., and Acar Vaizoğlu, S. (2015).** Hemşirelik bölümü öğrencilerinin küresel ısınma/iklim değişikliği hakkındaki bilgi ve farkındalıklarının belirlenmesi. Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi, 2(2): 30-43.
- Oluk, E. A., and Oluk, S. (2007).** Analysis of undergraduate students' perceptions concerning greenhouse effect: Global warming and climate change. Buca Faculty of Education Journal, 22: 45-53.
- Öztürk, K. (2002).** Global climatic changes and their probable effect upon Turkey. Gazi University Journal of Educational Faculty, 22(1): 47-65.
- Öztürk, T., and Öztürk F. Z. (2015).** Opinions of pre-service teachers about environment and environmental education Ordu University sample. Balıkesir University Journal of Social Sciences Institute, 18(33): 115-132.
- Patton, M. Q. (2018).** Qualitative research and evaluation methods. (Trans. Edt. M. Bütün and S. B. Demir). (2. Baskı), Ankara: Pegem Akademy).
- Postel, S. (2000).** The last oasis, (Trans. F. Ş. Sözer), Ankara: TÜBİTAK – TEMA Vakfı Publishing.
- Samur, H. (2005)** Precoutinos' strategy for global climate changing and forthcoming global disaster (PhD Thesis) Selcuk University, Institute of Social Sciences.
- Temelli, A., Kurt, M., and Kurt, S. K. (2011).** Opinions of primary education teachers on global warming. Journal of Theoretical Educational Science, 4(2): 208-220.
- Tok, G., Cebesoy, Ü. B., and Bilican, K. (2017).** Investigating pre-service primary teachers' climate change awareness. The Western Anatolia Journal of Educational Sciences, 8(2): 23-36.
- Türkeş, M. (2000).** Hava, iklim, şiddetli hava olayları ve küresel ısınma. TC Başbakanlık Devlet Meteoroloji İşleri Genel Müdürlüğü, Teknik Sunumlar, Seminer Dizisi: 1, 187-205.
- Türkeş, M. (2008).** What is climate change? Basic definition, causes, observed and predicted results of climate change. İklim Değişikliği ve Çevre, 1(1): 26-37.
- Wikipedia,**
https://tr.wikipedia.org/wiki/%C4%B0klim_de%C4%9Fi%C5%9Fikli%C4%9Fi accessed on 27.03.2020.

Citation: Güler, H., Haşiloğlu, M. A., and Gelturan, D. (2020). Science teacher candidates' views on climate change. African Educational Research Journal, 8(3): S16-S21.
