American-Eurasian J. Agric. & Environ. Sci., 10 (2): 290-295, 2011
ISSN 1818-6769
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Geography Teacher Candidates' Perceptions Towards the "Greenhouse Effect"

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Abstract: The purpose of this study is to put forward geography teacher candidates' perceptions towards "greenhouse effect" concept. 161 students have participated in the Research in 2010-2011 academic year studying at the Department of Gazi University Faculty of Education, at Geography Teaching Department. In this research Survey model was used through a questionnaire developed by Selvi and Yıldız (2009). In the analysis of the data besides descriptive statistics, t-test, one-way variance analysis (ANOVA) and multiple comparison test (LSD) were used. According to the study results, Geography teacher candidates correctly answered all the descriptive questions about the greenhouse effect whereas they have been determined to have some misconceptions about the reasons, consequences and measures of increase in greenhouse effect as a result of the analysis. Geography teacher candidates' views on greenhouse effect did not show any significant difference of gender and grade level variable.

Key words: Geography education · The greenhouse effect · Geography teacher candidates and environmental education

INTRODUCTION

It is an indiputable truth that the teaching of geography have significant contributions over improving the conscious of environment and growing up susceptible citizens for environmental problems. The main target of the issues mentioned in their curriculums; either as geography education in some countries and as environmental education in some others is to remain a liveable world to the tomorrow's children. This can only be fullfilled through education.

Atalay (2008) stated that the natural environment of today's world started to change slowly with the people start producing from the Neolithic period. He stated that Especially in the 20th century, rapid population growth and industrialization caused the global scale increase in greenhouse gases in the atmosphere and climate change [1]. Global warming is the cause of many problems or problems depending upon these problems due to climate change. The increase in the greenhouse gases gases such as atmospheric carbon dioxide (CO_2), methane (CH_4), nitrogen peroxide (N_2O_5), ozone (O_3) and chlorofluorocarbon (CFC_5) leads to global warming. Sipahioglu, Yıldız and Yilmaz (2008) stated that the main cause of global warming and the greenhouse effect of the atmosphere are the greenhouse gases in the atmosphere due to the large part of short-wave radiation, long-wave radiation reflected from a large portion of the retention [2]. The greenhouse effect in the climatological issues of Physical Geography is the most remarkable subject among global warming and global climate change in Geography and Geography education. Therefore, "greenhouse effect " has been the subject of the research.

It has been noticed the qualitative and quantitative research about the literature review on students' perceptions of environmental problems. Studies on global warming and the greenhouse effect [3-22] are examples. It was put forward in the research "Students' perceptions about the greenhouse effect" that focused on primary and secondary levels that students confused the similar concepts.

The Purpose of the Research: "The main purpose of this study, is to determine whether prospective Geography teachers candidates' opinions differed significantly according to gender and class level by putting forward the teachers candidates' views on greenhouse effect. For this purpose, sub-problems were obtained as follow:

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- What are the geography teacher candidates' opinions of towards "the greenhouse effect"?
- Is there a significant difference in Geography teacher candidates' views towards the "greenhouse effect" according to gender variable?,
- Is there a significant difference in Geography teacher candidates' views towards the "greenhouse effect" according to class level variable?

Method: The research was carried out at general survey model. General survey models, the arrangements made on to reach a conclusion about the overall purpose with all or a group to be taken from a group, a sample or a large number of elements in the area of study [23].

Universe and Sample: The area of study is the teacher candidates, studying geography at Geography Programs at Education Faculties in Turkey; the sample of study is the Geography teacher candidates studying geography in 2010-2011 academic year, fall semester, at Gazi University faculty of Education. The distributions Geography teacher candidates according to gender and grades in the study are shown in Table 1.

As shown in Table 1, a total of 161 teachers candidates of Geography in the research. 79 prospective teachers (49.1%) were female and 82 (50.9%) were male.

Data Gathering Tool: The survey questionnaire used to determine the views of Geography teacher candidates towards the "greenhouse effect" developed by Selvi and Yıldız (2009). Total 23 item questionnaire was shaped according to five rating scale as, "Absolutely True", "May Be True", "Do not know", "Could be wrong, " "definitely wrong". According to expert opinions (2 academicians in the field of geography education faculty member) the reliability of the survey was carried out and the survey internal reliability coefficient (Cronbach's alpha) was found. 70. Research data was gathered from a total of 161 people who were in the classroom on a voluntary basis in 2010-2011 academic year (September-October 2010).

The Analysis of the Data: To answer the first sub-problem of the study the table that reflects the distribution of opinions of geography teachers towards the "greenhouse effect" has been prepared. Views of teacher candidates for the geographical distribution of each item in the table *percentages* (%), *frequencies* (f) and the *arithmetic average* ($\bar{x}$) is given. The second sub-problem whether there is a significant difference at geography teachers' opinions about "greenhouse effect" based on the gender through *"independent samples t-test"*. Whether there is a significant difference in Geography teacher candidates' views towards the "greenhouse effect" according to class level variable was obtained through *"One-Way Variance Analysis"* In the third sub-problem.

Findings

Findings Towards the First Sub Problem: The distribution of geography teacher candidates' views towards "greenhouse effect" was given in Table 2.

In the application the answers of questions 1, 3, 7, 8, 9, 10, 11, 14, 15, 17, 21, 22 and 23 are true. When table 2 examined the vast majority of geography teachers "absolutely true" answers are correct. It was determined that the rest of the majority of teachers chose "may be true" option nearest to "absolutely true" choice were marked.

The correct answers of the application questions; 2, 4, 5, 6, 12, 13, 16, 18, 19 and 20 "absolutely wrong" choice. When Table 2 below examined, geography teachers reached the most accurate choice in the second question. Teacher candidates gave wrong answers in the questions 4, 5, 6, 13 and 20 with "absolutely true" choice.

3rd question has been prepared about the identification of the greenhouse effect. 4, 5 and 6th questions are for the reasons of the increase in the greenhouse effect. 13th question is about the results of the increase in the greenhouse effect and question 20 is towards the prevention of the increase of the greenhouse effect. The reason of Teacher candidates' wrong responses for these questions can be said because of the wrong perceptions. For example, in the question "holes in

Table 1: The Distribution of geography teacher candidates' according to gender and class levels

	BOYS	GIRLS	TOTAL	
CLASS	*f*	*f*	*f*	%
1st grade	23	12	35	21.7
2nd grade	18	18	36	22.4
3rd grade	15	16	31	19.3
4th grade f	13	16	29	18.0
5th grade	13	17	30	18.6
Total	82	79	161	100.0

Table 2: Geography teacher candidates' views towards "greenhouse effect

No	Statements Towards "Greenhouse Effect"	Definitely True		May Be True		Do Not Know		May Be False		Definitely False		Arithmetic Average
		f	%	f	%	f	%	f	%	f	%	¸
1	The greenhouse effect is necessary for life on earth.	47	29.2	39	24.2	26	16.1	19	11.8	30	18.6	3.33
2	The greenhouse effect is completely comprised of human activities.	34	21.1	39	24.2	13	8.1	20	12.4	55	34.2	2.85
3	Carbondioxide is the most common greenhouse gas in the atmosphere.	48	29.8	42	26.1	27	16.8	15	9.3	29	18.0	3.40
4	The holes in the Ozone Layer increase the greenhouse effect.	64	39.8	36	22.4	19	11.8	16	9.9	26	16.1	3.59
5	Acid rains increase the greenhouse effect.	59	36.6	46	28.6	29	18.0	12	7.5	15	9.3	3.75
6	Radioactive sewage caused by nuclear energy increase the greenhouse effect.	83	51.6	52	32.3	15	9.3	6	3.7	5	3.1	4.25
7	Gases Caused by artificial fertilizers, increase the greenhouse effect.	79	49.1	52	32.3	21	13.0	6	3.7	3	1.9	4.22
8	Large garbage depots, increase the greenhouse effect.	55	34.2	56	34.8	32	19.9	12	7.5	6	3.7	3.88
9	CFCs (chlorofluorocarbons) use, increase the greenhouse effect.	96	59.9	34	21.1	28	17.4	1	0.6	2	1.2	4.37
10	The use of fossil fuels, increases the greenhouse effect.	102	63.4	31	19.3	20	12.4	4	2.5	4	2.5	4.38
11	If the greenhouse effect Increases, the world's average temperature will incline.	113	70.2	27	16.8	16	9.9	3	1.9	2	1.2	4.52
12	If the greenhouse effect increases, there would be more rain.	28	17.4	32	19.9	45	28.0	28	17.4	28	17.4	3.02
13	If the greenhouse effect increases more people would suffer from skin cancer.	88	54.7	49	30.4	19	11.8	4	2.5	1	0.6	4.36
14	If the greenhouse effect increases there would be more deserted areas on earth.	84	52.2	47	29.2	20	12.4	5	3.1	5	3.1	4.24
15	If the greenhouse effect increases, the sea levels would be higher.	82	50.9	37	23.0	23	14.3	10	6.2	9	5.6	4.07
16	The greenhouse effect can be decreased with the use of unleaded petrol.	26	16.1	48	29.8	69	42.9	11	6.8	7	4.3	3.46
17	Using the Electricity from alternative energies (solar, etc.) may reduce the greenhouse effect.	92	57.1	43	26.7	17	10.6	5	3.1	4	2.5	4.32
18	Protecting endangered plants and animals, the greenhouse effect can be reduced.	16	9.9	50	31.1	55	34.2	23	14.3	17	10.6	3.15
19	Cessation of the use of pesticides, reduce the greenhouse effect.	19	11.8	34	21.1	103	64.0	4	2.5	1	0.6	3.40
20	Bury waste materials rather than burn, can reduce the greenhouse effect.	38	23.6	61	37.9	36	22.4	16	9.9	10	6.2	3.62
21	planting more trees, may reduce the greenhouse effect.	93	57.8	57	35.4	10	6.2	1	0.6	-	-	4.50
22	Papers providing more recycling, the greenhouse effect can be reduced.	80	49.7	62	38.7	14	8.7	3	1.9	2	1.2	4.33
23	By saving electricity, the greenhouse effect can be reduced.	69	42.9	52	32.3	24	14.9	13	8.1	3	1.9	4.06

Table 3: The comparison of geography teacher candidates' views towards the "greenhouse effect" according to gender variable

Group	N	X	SS	t	Sd	P
Girls	82	88,7927	8,77248	-,552	159	,582
Boys	79	89,6076	9,95428			

Table 4: ANOVA results of Geography teacher candidates' views towards the "greenhouse effect" according to class level variable

Source of the variance	KT	sd	KO	F	P
Intergroups	349,784	4	87,446	1,000	,409
Ingroups	13639,247	156	87,431		
Total	13989,031	160			

the ozone layer increase the greenhouse effect", geography teacher candidates mixed the properties of the greenhouse effect and ozone layer properties. The ozone layer penetrates harmful rays from the sun to the world whereas the greenhouse effect is caused by keeping the long-wave radiation reflected from earth via greenhouse gases.

Thus, it can be said that teacher candidates have established a connection between the greenhouse effect and ozone layer in this way indicating that they had some misunderstandings. However, in another answer of the question that the ozone layer and greenhouse effects were confused "if the greenhouse effect increases, more and more people will have skin cancer." Question, the teacher candidates did not know the relation between the greenhouse effect and ozone layer and had some conceptual misunderstandings about the issues.

It was seen that teacher candidates replied 12, 16, 18 and 19 questions, mostly as "I do not know". 12th question is for the results of increase of greenhouse effect and other questions, prevention of the increase of greenhouse effect. It was seen that Teacher candidates' could not answer tsome questions especially about the prevention of the increase in greenhouse effect.

Findings Towards the Second Sub Problem: In order to determine Whether there is a significant difference in Geography teacher candidates' views towards the "greenhouse effect" according to gender variable "independent samples t-test" was applied and the results are shown in Table 3.

When table 3 is examined, the geography teacher candidates participated in the research on the opinions of the greenhouse effect, did not show a significant difference according to the gender variable (t (159) =-, 552, p> 0.05). This finding, can be interpreted as the absence of a significant relationship between geography teacher candidates' views on the greenhouse effect and gender.

Findings Towards the Second Sub Problem: Whether there is a significant difference in Geography teacher candidates' views towards the "greenhouse effect" according to class level variable was obtained through "One-Way Variance Analysis" In the third sub-problem. The results were shown in Table 4.

When the results in table 4 "Single Factor Analysis of Variance (One-Way ANOVA)" examined, Geography teacher candidates' attitudes towards the greenhouse effect with a statistically significant difference was not found between level of education F (4.156) = 1.000, p>. 0.05]. This finding, can also be interpreted as the absence of a significant relationship between the class levels and. geography teacher candidates' views towards the greenhouse effect.

RESULT AND DISCUSSION

Geography teacher candidates were asked questions about the definition of the greenhouse effect (the first 3 questions), the causes of the increase in greenhouse effect (4-10. questions), results (11-15. questions) and on the precautions to be taken (16 to 23. questions) on the survey. In this survey, 13 the answer is "absolutely right", while the remaining 10, the answer is "absolutely wrong". The results of the teacher candidates' answers to the questions are:

- The majority of Geography teacher candidates "greenhouse effect " gave correct answers to all questions related to identifying the phrase.
- 4 of the 7 questions about the causes of the increase in greenhouse effect were answered correctly by the of teacher candidates. The majority correctly answered questions, gases arising from artificial fertilizers, waste tanks, chlorofluorocarbons (CFCs) and fossil fuel use. It can be said that teacher candidates have sufficient knowledge about gases resulting from artificial fertilizers, waste tanks chlorofluorocarbons (CFCs) and the use of fossil fuel.

The questions that could not be answered by the teacher candidates' were ozone layer, acid rain and waste resulting from nuclear energy. this case show that the teacher candidates have misunderstandings about "greenhouse effect" and "ozone layer", "acid rain" and "nuclear power".

- Geography teacher candidates were asked 5 questions about the results of the increase of the "greenhouse effect ". 3 of these questions were answered correctly and 2 of them incorrectly. Teacher candidates were mistaken with the idea that there would be more skin cancer and acid rain with the increase of "greenhouse effect "in the questions that they could not answer correctly.

Teacher candidates, could not relate the formation mechanism of rainfall with the "greenhouse effect ". In a similar study on the subject Dove (1996), states that hot air holds more moisture, so it forms less rainfall. Students will reflect the descriptions of misconceptions on the subject. they think with the melting of glaciers the amount of water will increase due to evaporation of rain and the temperature will rise. In fact, complex weather events got influenced from rainfall patterns. While it is difficult to predict future weather events, exactly according to the present rainfall patterns, some places will get more rainfall, some regions will be more arid [24].

The idea of the teacher candidates that skin cancer will increase by the "greenhouse effect " indicate that they confuse the properties of the ozone layer and the "greenhouse effect " and mistaken with these concepts. Similar results can be seen in [3, 4, 20, 25]'s studies.

- 8 questions related to the prevention of the increase in greenhouse effect were asked and the teacher candidates gave right answers to 4 of these questions; 3 questions as do not know and 1 question wrong. Teacher candidates thought in the right way towards the prevention of, "greenhouse effect " via alternative energy sources, increase forestation, re-use through recycling papers and power-saving as a precaution for the "greenhouse effect".

Geography teacher candidates, reported that they did not know if there is a relation with the use of unleaded petrol, the protection of endangered animals and plants, pesticide use and to stop the "greenhouse effect".

Teacher candidates, preference for burial rather than to burn waste materials was wrong because they thought it would be a precaution for the "greenhouse effect". this case resulted from, the teacher candidates' thinking

natural decay as a non-human origin event. In fact, they could not know that as a result of decomposition of organic matter buried in places methane and carbon dioxide gases are emerged. A similar situation was suggested in, [26 and 20]'s studies.

- It was not found a statistically significant difference between Geography teacher candidates' opinions about the greenhouse effect with gender.
- There is not a significant difference between Geography teacher education candidates' opinions about the greenhouse effect and their grade levels.

As a result, many studies have been reported in the above mentioned misconceptions [3, 4, 15, 20, 22, 24-28].

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