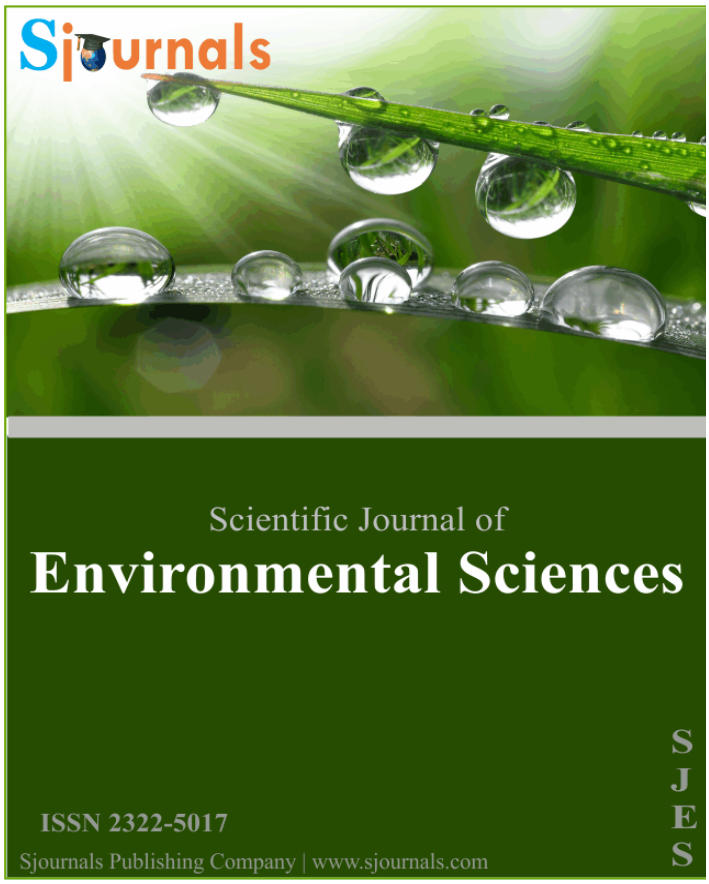

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Original article

Climate change education on promoting environmental literacy of high school teachers in Iran

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ABSTRACT

One of the most important things to solve environmental problems, increase knowledge and awareness is that this matter needs education. The aim of this study was to increase the level of environmental literacy teachers and school districts Ray first man to approach the effects of climate change. The current research method is descriptive and functional and experimental methodology and systematic random sampling from the first secondary school teachers of social studies lesson ninth base is used. To collect the required data using a questionnaire and the results of Cronbach's alpha (r=0.80) has shown that the questionnaire had high reliability. The results show a significant difference between promoting environmental literacy teachers before and after the training effects of climate change there. But significant differences between teachers in environmental protection, climate change effects, there is no before and after training. No significant difference before and after the intervention to reduce the consequences of climate change impact of climate change on the environment does not exist. No significant difference before and after the training effects of

climate change to provide appropriate recommendations to mitigate the effects of climate change does not exist on reducing the environmental consequences of climate change showed that there is no significant difference between mitigation and education and training to allay the consequences of climate change does not cause.

1. Introduction

Nowadays, environmental protection has become one of the most important issues in the international community, so that lack of maintenance, or violation of health protection standards that could threaten the entire world (Mohamadzade, 1389). One of the most important things to solve environmental problems, increase knowledge and awareness is that this matter needs education (Mirdamadi et al., 1389). Climate is atmospheric usual situation of area in a long time. Climate models predict that by 2100 global temperatures will increase by 1 to 3.5 degrees Celsius. This forecast reflects the fact that climate change during this century and the next century will be more than of changes over the past century (Grant and Gill, 2001). On December 12, 2015 in Paris, a historic agreement to fight climate change and opening nodes to act against climate change as well as investment in low-carbon economy, robust, flexible and sustainable were agreed by 195 countries. The main objective of this global agreement to prevent the global temperature rise in this century under 2 °C, as well as trying to limit temperature increase to below 1.5 °C compared to the level before industrialization. This 1.5 degrees Celsius will be higher safety during severe consequences of climate change. Undoubtedly one of the most important ways to protect the environment is the benefit of educational activities. First, the role of environmental education in students' learning is essential to improving teachers' knowledge to be examined. In this study, the effect of education on the impact of climate change knowledge, attitudes and skills of secondary teachers in lower secondary level in the first educational districts (Environmental Country pole and Sustainable Development) will be discussed.

2. Problem statement

In general, environmental education and the new ideological structure, which based on man can continue to live in harmony with nature. Such education does not merely seek to increase the volume of theoretical knowledge to his audience and more follow to empower them to identify and solve environmental issues and increase the power of their analysis (Lahyjanyan, 1390). Of the group of experts, environmental education is an active process in which knowledge and skills leading to improved understanding, commitment, informed decisions and constructive activities to manage all mixed components of environment (Lahyjanyan, 1390). Ministry of Education in terms of scope, most relevant to the people. Given that most of the training and education of personnel, therefore, the ministry can play an important role in intersectional collaboration. On the other hand textbooks in different periods can be a useful tool for transferring various contents. In other words, the Ministry of Education in the town and village holds the greatest tool for transmitting messages (Maroofi et al., 1378). High school formal education is one of the most sensitive and important steps and the importance of this period in dealing with the crisis of puberty, the need for the formation of specialized education per person per course and responsibility should be seen that supply the manpower needs of the community is aware of this stage of formal education (Nadimi, 1380).

Environmental country pole and Sustainable Development in Secondary Department of the Ministry of Education, Department of theoretical training in the summer of 1394 based on the Millennium Development Goals and Article 50 of the constitution to ease the burden on the environment and binding documents and programs for environmental education and education for sustainable development and effectiveness of education and research in community education with four general purpose: 1- Create and implement mechanisms to operationalize the provisions of the fundamental document education field, 2- Active participation in the implementation of

international obligations Ministry of Education, 3- To increase community involvement in promoting and deepening education and literacy, environmental ethics Country, 4- Increasing research and innovation in the field of environment and sustainable development in education community; was formed for students and teachers and the first center was established in the home of a student research Razi in Shahre Rey area to after reviewing the annual performance of permanent licenses to be issued and to be created in all provinces Environmental country pole and Sustainable Development centers (Javaheripour, 1394). Given that knowledge on the impact of climate change on habitat conservation and Iran has not begun yet fundamental studies. The aim of this study was to increase environmental literacy teachers in the junior high school education of Shahre Rey with an emphasis on the effects of climate change.

3. Research hypotheses

Training impact of climate change has effect on the level of environmental teachers in the junior high school education of Shahre Rey.

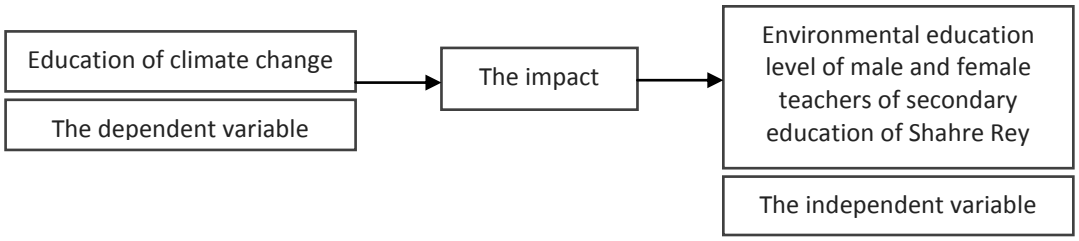
The effects of climate change education to the teachers in the junior high school of Shahre Rey are effective in protecting the environment.

The effects of climate change education to the teachers in the junior high school of Shahre Rey is to reduce the consequences of climate change on the environment.

The effects of climate change education to the teachers in the junior high school of Shahre Rey is to recommended appropriate to reduce the impact of climate change.

4. Research methodology

This study is an applied research and has an empirical methodology. The population is all of the male and female teachers in the junior high school of Shahre Rey and the statistical sample are the first secondary school teachers of social studies lesson ninth level, which selected randomly through systematic sampling. Tools are researcher made questionnaire. Initially The pretest questionnaire completed by teachers and after the workshops based on educational content using educational resources Climate Change Office of Climate Change Environmental Protection Agency teachers have been trained for 3 months. Then the posttest questionnaire completed by teachers again and proper test results analysis using statistical software such as chi-square and spss.



For the statistical analysis Chi-square test and for the observations the expected spss software were used to analyze the data. To analyze the results of both descriptive statistics (mean, median, standard deviation) and inferential statistics (Kolmogorov-Smirnov test, Wilcoxon test, goodness of fit and Spearman correlation) were used.

5. Results

In this study, a questionnaire required for the purposes of research and information have been set to test the research hypotheses. The initial validity of the survey instrument was used to determine the validity. Therefore, the questionnaire were in availability of Secretary, supervisors and advisors and then the ambiguity in question were removed, the final questionnaire was designed and prepared. Then, to determine the reliability of Cronbach's alpha all of the questions were used. Results Cronbach's alpha (r=0.80) showed that the questionnaire had high reliability.

Cronbach's alpha in all the questions is above 70 percent, which reflects the internal validation tool. The population is all of the male and female teachers in the junior high school of Shahre Rey and the statistical sample are the first secondary school teachers of social studies lesson ninth level, which selected randomly through systematic sampling. With this method, the 48 samples and using a questionnaire both before and after the training effects of climate change were collected and distributed (Fig. 1).

Results descriptive statistics have shown that 79.2% of women and 20.8% of the samples in this study were male. 81.2% were married and 18.85 are unmarried. The most frequent bachelor's degree with 60.4% and lowest frequencies of an associate degree of 1.2%. The most frequent age period 45-33 with 66.7%, and lowest frequencies of the age of 32-26 by 2.1%. The highest track record of over 20 years within 52.1% and the lowest amount of experience working range is 12.6 years, with 16.7%. The most frequent human sciences with 39.6% and lowest frequencies of natural sciences and agriculture was 2.1%.

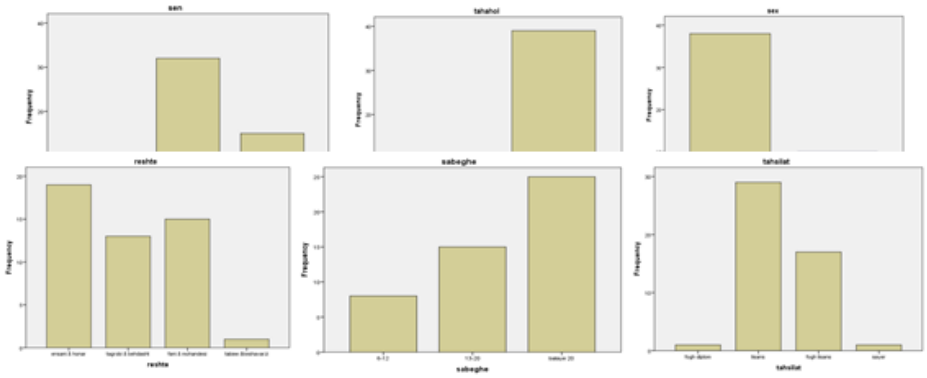


Fig. 1. Descriptive statistics of the variables before and after the training effects of climate change.

The highest average level of literacy teachers after training with 3.62 and the lowest was 1.75 before training on appropriate recommendations.

Table 1
Descriptive statistics of the variables examined.

Number of average	The standard deviation	Variance	Domain	Number	
3.15	0.46	0.68	3.62	48	Literacy levels after training
3.62	0.93	0.96	2.48	48	Literacy levels before training
2.80	0.57	0.75	2.30	48	Environmental protection after training
4.00	0.77	0.87	2.24	48	Environmental protection before training
8.71	1.85	1.36	2.58	48	Reducing the consequences of climate change after training
4.00	0.58	0.76	1.99	48	Reducing the consequences of climate change before training
4.00	0.82	0.90	1.87	48	Appropriate recommendations after training
4.00	0.75	0.87	1.75	48	Appropriate recommendations before training

Considering the literacy level Likert scale components after training was desirable and before teaching environmental literacy level was undesirable. Training impact of climate change has no impact on the environmental protection and to reduce the consequences of climate change and also appropriate recommendations.

5.1. Kolmogorov - Smirnov test for normality of data distribution

Data distribution is significant because the level is less than 0.05 before and after the training has not been normal.

Table 2
Kolmogorov - Smirnov to understand the normality or un-normality of the data.

The statistical components after training	The statistical components before training	
48	48	**Number**
1.56	1.71	**Kolmogorov-Smirnov Z**
0.049	0.043	**The significance level**

5.2. Statistical findings and results of the research hypotheses

First hypothesis: The training impact of climate change has effect on the level of environmental literacy Education of teachers of first district education Junior High School of Shahre Rey.

Table 3
Wilcoxon test for significant differences in the level of literacy in education climate effects.

Confidence interval 95%				Total ratings		Average of ratings		
Upper limit	Low limit	Sig	z	Negative	Positive	Negative	Positive	
000	000	000	-4.29	606.00	60.00	20.00	10.00	**The level of environmental literacy**

Table 4
Goodness of fit test for the fitness levels of literacy, before and after the training.

Confidence interval 95% 1-side			Confidence interval 95% 2-side						
Upper limit	Low limit	Sig	Upper limit	Low limit	Sig	Pmysa Sig	fd	Pearson Chi-Square	
0.46	0.44	0.45	0.84	0.83	0.84	0.58	564	559.44	**The level of environmental literacy of teachers**

Table 6
Spearman correlation coefficient for the relationship between the level of environmental literacy of teachers to learning the effects of climate change.

Learning the effects of climate change		
0.40	Spearman rank correlation	**The level of environmental literacy teachers**
0.03	The significance level (two-sided)	
48	Number	

So there is positive and significant relationship between the level of environmental literacy teachers before and after the training effects of climate change.

5.3. The second hypothesis: The training the effects of climate change to teachers of the junior high school education of first district education of Shahre Rey is effective in protecting the environment

Table 7
Wilcoxon test for significant differences in education, environmental protection, climate effects.

Confidence interval 95%				Total ratings		Average of ratings		
Upper limit	Low limit	Sig	z	Negative	Positive	Negative	Positive	
0.80	0.78	0.79	-0.26	313.00	282.00	17.39	17.63	**Environmental status**

Table 8
Goodness of fit test for environmental fitness before and after the training.

Confidence interval 95% 1-side			Confidence interval 95% 2-side						
Upper limit	Low limit	Sig	Upper limit	Low limit	Sig	Pmysa Sig	fd	Pearson Chi-Square	
0.25	0.23	0.24	0.50	0.48	0.49	0.41	143	145.82	**Environmental protection secretariat, before and after training**

Table 9
Spearman correlation coefficient for the relationship between the environmental protection education teachers with the effects of climate change.

Learning the effects of climate change		
0.44	Spearman rank correlation	**Environmental protection education teachers with the effects of climate change**
0.02	The significance level (two-sided)	
48	Number	

There is a significant positive relationship between the level of environmental protection education teachers with the effects of climate change.

5.4. The third hypothesis: The climate change education teachers in the junior high school education of first district education of Shahre Rey effects to reduce the consequences of climate change on the environment

Table 11
Wilcoxon test for significant differences in reducing the consequences of climate change on the environment.

Confidence interval 95%				Total ratings		Average of ratings		
Upper limit	Low limit	Sig	z	Negative	Positive	Negative	Positive	
0.006	0.003	0.08	-2.67	528.50	174.50	22.02	13.42	**Reducing the consequences of climate change on the environment**

Table 12
Goodness of fit test for fitness to reduce the consequences of climate change, before and after training.

Confidence interval 95% 1-side			Confidence interval 95% 2-side						
Upper limit	Low limit	Sig	Upper limit	Low limit	Sig	Pmysa Sig	fd	Pearson Chi-Square	
0.55	0.53	0.54	0.75	0.74	0.79	0.65	252	242.70	**Reducing the consequences of climate change**

Table 13
Spearman correlation coefficient for the relationship between the environmental protection education of teachers with the effects of climate change.

Learning the effects of climate change		
0.49	Spearman rank correlation	**Reducing the consequences of climate change impacts of climate change education**
0.04	The significance level (two-sided)	
48	Number	

5.5. Fourth hypothesis: The climate change education teachers in the junior high school education of first district education of Shahre Rey effects to proposals for reducing the impact of climate change

Table 14
Wilcoxon test for appropriate recommendations.

Confidence interval 95%				**Total ratings**		**Average of ratings**		
Upper limit	Low limit	Sig	z	Negative	Positive	Negative	Positive	
0.36	0.35	0.35	-0.93	332.50	228.50	15.83	19.04	**Appropriate recommendations**

Table 15
Goodness of fit test for fitness to reduce the consequences of climate change, before and after training.

Confidence interval 95% 1-side			**Confidence interval 95% 2-side**						
Upper limit	Low limit	Sig	Upper limit	Low limit	Sig	Pmysa Sig	fd	Pearson Chi-Square	
0.42	0.40	0.41	0.24	0.22	0.26	0.13	143	161.54	**Appropriate recommendations**

Table 16
Spearman correlation coefficient for the relationship between the environmental protection education of teachers with the effects of climate change.

Learning the effects of climate change		
0.33	Spearman rank correlation	**Appropriate recommendations with climate change education**
0.07	The significance level (two-sided)	
48	Number	

There is no significant correlation between appropriate recommendations effects of climate change, before and after training.

6. Conclusion

Results descriptive statistics about the components of research has shown that most of the variables related to average education level of teachers after learning the effects of climate change, with an average of 3.62 with a standard deviation of 0.68 And the lowest appropriate recommendations to the effects of climate change education were with an average of 1.75 with a standard deviation of 0.87. According to Likert scale used in statistical data assuming the equality of mean values will be studied with the average value of the whole five-point Likert which is 3. The null hypothesis reflects the smaller the mean of the number 3 means that the components were not satisfactory and the alternative hypothesis is the indicator variable which is evaluated. So literacy components was desirable after training and undesirable before environmental literacy training. Learning the

effects of climate change has no impact on the environment, to reduce the consequences of climate change and also appropriate recommendations.

Inferential statistics to test hypotheses for normal distribution of data, Kolmogorov-Smirnov test was used for variables. The results showed that the distribution is not normal before and after training, because the surface is significantly lower than 0.05 and non-parametric tests should be used. The Wilcoxon test was used to a significant difference before and after the training effects of climate change. In this test, only the level of literacy teachers showed a meaningful difference and other components did not show significant differences. This means that with education of the effects of climate change, teacher's environmental literacy will also promote. But the effects of climate change had no effect on environmental education, reducing the consequences of climate change and appropriate recommendations to mitigate the effects of climate change. Also Goodness of fit test for the fitness data showed that the data; fit is not significant in all components. As well as the Spearman correlation coefficient for the relationship between revealed that correlation intensity in all components is desirable has significant positive correlation with education of the effects of climate change.

6.1. The first research hypothesis

The average obtained from the environmental literacy level of teachers before and after the training showed that environmental literacy level is desirable after the training. Wilcoxon test used for significant differences and the impact of environmental literacy component before and after the training showed that z achieved at the error rate 0f 0.05 was 4.29 and is upper than the z in the Table, so we can say statistically that there is a difference with the confidence of 95%. Also obtained sig (000) from the test is smaller than 0.05, therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. Then there is a significant differences between the promote of the environmental literacy of the teachers before and after the training effects of climate change. This means that the training effects of climate change has a significant impact on environmental literacy levels of the teachers. Then the goodness of fit test was used to fit data and we found that according to citatpmysa sig that is more than 0.05 (0.58>0.05) so fitness of data is not meaningful and the reason is due to the small samples. After we found the fitness data is not meaningful Spearman correlation test was used that showed level of environmental literacy of teachers with the effects of climate change education (p=0.03) and (r=0.04) correlation rate (0.26<r<0.50) is favorable and because the surface is significantly smaller than 0.05, a significant positive relationship is between the level of environmental literacy of teachers, before and after the training effects of climate change. It means that by training effects of climate change, the level of environmental literacy of teachers will be increased and there is a significant positive relationship.

The results of this research is close to research of Teksoz et al. (2010) that studied the literacy rate, attitude, environmental behavior of 60 students in Department of Chemistry before and after the environmental training. The results showed that there is a significant differences in knowledge, attitudes and environmental behavior of students. Also Parastesh (1393) studied the environmental education and biodiversity of female students of the first grade of high school in Astane Ashrafie city and the results showed that environmental literacy, knowledge, attitudes and skills of different schools have significant difference with each other.

6.2. The second research hypothesis

The obtained average from the impact of the environment protection of teachers, before and after the training showed that it is undesirable. Wilcoxon test used for significant differences and impact factors of environmental protection, before and after the training showed that obtained z, in the error rate of 0.05 is -0.26 and lower than the z in the Table (0.39) so it could be said, statistically there is no difference with a 95% confidence. Also the obtained sig (0.79) from the test is greater than 0.05, then the null theory won't be rejected. So there is no significant difference between the environmental protection of teachers before and after the training. Which means the level of environmental protection have not been changed by learning the effects of climate change and it does not have any effect on environmental protection. Then the goodness of fit test was used to fit data and we found that according to citatpmysa sig that is more than 0.05 (0.41>0.05) so fitness of data is not meaningful and the reason is due to the small samples. Spearman correlation test was used that showed level of environmental literacy of teachers with the effects of climate change education (p=0.02) and (r=0.44) correlation rate (0.26<r<0.50) is favorable and because the surface is significantly smaller than 0.05, a significant positive relationship is between the level of environmental literacy of teachers, before and after the training

effects of climate change. It means that environmental protection is related to the training effects of climate change and it improved the environmental protection of the teachers.

The results of this work is in contrast with the results of Salehi and Ghaemi (1392) study. They discussed the relation between environmental training and environmental protection behaviors and found that environmental attitude has a positive effect on environmental protection but environmental training has no significant effect on environmental protection. Adhami (1395) in a study as checking the cultural factors affecting on environmental protection behaviors found that operating culture determines the individual behavior in environmental protection.

6.3. The third research hypothesis

The obtained average from the impact of the training effects of climate change on the reduction of consequences of climate change in environmental showed that after the training averagely resulted in the reduction of consequences of climate change among the teachers. After that Wilcoxon test used for significant differences and impact on factors reduction of consequences of climate change among the teachers showed that obtained z, in the error rate of 0.05 is -0.27 and lower than the z in the Table (0.003) so it could be said, statistically there is no difference with a 95% confidence. Also the obtained sig (0.008) from the test is greater than 0.05, then the null theory won't be rejected. So there is no significant difference between the environmental protection of teachers before and after the training to the reduction of consequences of climate change in environmental. Which means training effects of climate change has no effect on reduction of consequences of climate change. Then the goodness of fit test was used to fit data and we found that according to citatpmysa sig that is more than 0.05 (0.65>0.05) so fitness of data is not meaningful and the reason is due to the small samples. Spearman correlation test was used that showed level of environmental literacy of teachers with the effects of climate change education (p=0.04) and (r=0.49) correlation rate (0.26<r<0.50) is favorable and because the surface is significantly smaller than 0.05, a significant positive relationship is between the reduction of consequences of climate change and training effects of climate change and training should be done about it. And this training will reduce consequences of climate change among the teachers.

The results of this study is close to the results of the study of Monavari et al. they studied the environmental impact of the environment on project activities and found that the reduction of consequences of climate change is effective by observing the precautions in project and knows the education as measures to reduce the outcomes of environmental impact.

6.4. The fourth research hypothesis

The obtained average from the impact of the training effects of climate change to appropriate recommendations was undesirable which shows that appropriate recommendations are not carried out. After that Wilcoxon test used for significant differences and impact of education on appropriate recommendations. Results showed that obtained z, in the error rate of 0.05 is -0.93 and lower than the z in the Table (0.17) so it could be said, statistically there is no difference with a 95% confidence. Also the obtained sig (0.35) from the test is greater than 0.05, then the null theory won't be rejected. So there is no significant difference before and after the training of effects of climate change to carry out appropriate recommendations to reduce the effects of climate change. Then the goodness of fit test was used to fit data and we found that according to citatpmysa sig that is more than 0.05 (0.13>0.05) so fitness of data is not meaningful and the reason is due to the small samples. Spearman correlation test was used that showed appropriate recommendations with the effects of climate change education (p=0.07) and (r=0.33) correlation rate (0.26<r<0.50) is favorable and because the surface is significantly larger than 0.05, so there is no significant positive relationship between the appropriate recommendations and training of effects of climate change. Which means that appropriate recommendations for reducing the effect of climate change is related to training the effects of climate change. Whoever does not cause that the teachers carry out appropriate recommendations and there is no such relationship in this regard. Obtained results of this work are close to results of Karimi et al. (1394) which studied environmental knowledge of physicians and good manners of environmental education. They reached to this conclusion that environmental education take place to appropriate recommendations.

-The obtained results the effect of climate change effects on environmental protection showed that there is no significant difference between environmental protection and training and it has no impact on environmental protection, but these two variables have a correlation and environmental knowledge cause to environmental protection and a significant positive correlation was observed. So, according to these data to protect the

environment should strengthen the sense of belonging to an environment in which life is created and then environmental knowledge with proper teaching methods be promoted among teachers also culture in this case will help preserve the environment.

-The obtained results the effect of climate change effects on reducing environmental consequences of climate change showed that there is no significant difference between the reduction of consequences and training and it does not have impact on reduction of consequences caused by climate change but these tow variables have correlation which means that the reducing environmental consequences of climate change depends on teachers' knowledge and has a significant positive correlation with each other and according to these findings to reducing the consequences of climate change, the approach environmental issues among teachers should vary and then environmental challenges should be identify and to be discussed in training. As well as ways that can reduce the environmental impacts asked during training sessions and will discuss and debate.

-The obtained results about the impact of climate change effects education on appropriate recommendations showed that there is no significant difference and significant positive correlation between education of effects of climate change and appropriate recommendations. So, according to these findings, it seems that qualitative research has to be done and after education of effects of climate change interview and observation takes place so that through coding the interviews suitable proposals received. You can also contact you via open surveys and question like “If you have any suggestions provided here” suggestions were caused in this case. And at the end with a few suggestions:

It suggested that a study investigate the effects of education of climate change on the promotion of environmental literacy of the teachers in other schools and various educational levels.

It suggested that a study investigate the influencing factors on the increased level of environmental literacy of the teachers.

It suggested that a study investigate the influencing factors on the increased level of environmental protection of the teachers.

It suggested that a study investigate the influencing factors on the reducing the consequences of climate change effects.

It suggested that a study investigate the solutions and proposals for improving the teaching effects of climate change.

It suggested that a study investigate the pathology of the components of the impact of climate change to improve education and its impact on biology and social science teachers.

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