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Environmental Knowledge, Attitudes, and Behavior among Omani Post-Basic Education Students

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Abstract

This study examines environmental knowledge, attitudes, and behavior among a sample of 4512 Omani post-basic education students, including males and females from all 11 governorates. They were drawn from class 11 (n = 2136) students and class 12 (n = 2379) of post-basic education. Data was collected using three instruments: Environmental Knowledge Test (45 questions), Likert Attitudes Questionnaire (50 items), and Behavioral Scale (21 items). The results indicate that students had high environmental knowledge, very strong positive environmental attitudes, and fairly good environmental behavior. It also revealed differences between males and females, and between class 11 and 12.

Keywords: Environmental knowledge, attitudes, behavior, Oman, post-basic education

1. Introduction

1.1. Background

Sustaining the capacity of our planet to serve human life for the current and future generations requires enhancing current global and local efforts to protect it from irresponsible activities causing massive destruction of the ecosystem, due to pollution and over exploitation of non-renewable resources. UNESCO (2016) clearly explains that the severity of environmental issues continues to grow globally, and that the majority of these issues are caused by individuals' lifestyles and development activities, based on a lack of knowledge and appropriate attitudes concerning environmental impacts (Onur, Sahin, & Tekkaya, 2012). Such environmental issues have significant impacts on human health (Laborde et al., 2015), economics (Rafael & Elisa, 2017), climate change (United Nations, 2019), and the ability of the ecosystem to sustain human life (Milman, 2015).

Reducing environmental problems requires addressing the root cause of deficient comprehension and behavioral responsibility in human activities. This entails building responsible societies which recognize the significance of human contributions to reducing these problems, locally and globally. The most effective way to strength society involvement in solving these problems is through environmental education, to promote a sense of individual responsibility toward the preservation of local and global environments (Stevenson, 2007). Studies showed that environmental education effectively develops environmental knowledge and attitudes (Alam, 2017; Legault & Pelletier, 2000; Norris & Juliet, 2016); environmental imitative (Alam, 2012), willingness to take

action (Al-Rabaani & Mohammed, 2009); critical thinking and environmental attitudes (Serhat, 2012), and environmental awareness (Al-Rabaani & Al Amri, 2017; Al-Shuili & Al-Rabaani, 2010).

Enhancing students' sense of responsibility and changing their behavior is strongly influenced by amount of information they receive in their schools, or rather the effectiveness with which the information delivered informs their attitudes and consequent decisions and actions. Empirical studies clearly demonstrate that there is a relationship between students' environmental knowledge, attitudes, and behavior (Bradley, Waliczek, & Zajicek, 1999; Jensen, 2002; Liu, Yeh, Liang, Fang, & Tsai, 2015; Mark, 2011; Pe'er, Goldman, & Yavetz, 2007). Several studies showed that there a significant correction between students' environmental knowledge and their attitudes (Araghi, Kroesen, Molin, & Wee, 2014; Lu & Shon, 2012; Van Birgelen, Semeijn, & Behrens, 2011). Students with a high level of environmental knowledge and attitudes show more environmentally responsible behavior (Goldman, Yavetz, & Pe'er, 2014; Saribas, 2015).

During environmental education classes, students receive information and study case studies, including watching videos about environmental issues, reading about environmental projects, and learning about environmental crises and the human suffering they cause. A multimedia and multi-pronged approach can help impart such information and increase learners' environmental knowledge, attitudes, and behavior. Lu and Shon (2012) found that a ten-day environmental science education program resulted in higher levels of environmental knowledge, and optimistic and positive attitudes towards environmental perseveration. Raising environmental knowledge, attitudes, and behavior can take place from an early age (e.g., the primary school level) (Plakitsi et al., 2013; Roth, Goulart, & Plakitsi, 2011). Al-Rabaani and Al Amri (2017) found that the use of cartoons was very effective in creasing awareness of water issues among fourth grade students.

The literature shows that influence of environmental education on students varies according to gender (Al-Rabaani & Mohammed, 2009; Zelezny, Chua, & Alrich, 2000) and grade/ class level (Brécard, Hlaimi, Lucas, Perraudeau, & Salladarré, 2009; de Silva & Pownall, 2014; Meyer, 2015). Such differences might be related to several ancillary factors, such as physical characteristics, peer effects, and numerous differences in childrearing and cultural expectations among males and females. In Oman there are separate educational facilities for males and females, making gender differences more marked; for instance, pupils in female schools appear to work harder and have enhanced academic scores and achievement in general (Al-Rabaani & Al Amri, 2017).

Based on the above, the attention of the global drive to increase environmental education must acknowledge local particularities and characteristics, in order to design culturally appropriate programs to achieve the goals of increased environmental awareness and more responsible behavior. In Oman, environmental issues were a particular concern of the late Sultan Qaboos, who issued several laws and regulations for environment preservation, including the establishment of the Ministry of Environment and Climate Affairs. He also established the UNESCO Sultan Qaboos Prize for Environmental Conservation in 1989 (UNESCO, 2019). His attention to environment was reflected in government policy, strategic plans, and education. Thus, environmental education has received great attention in school curriculums for some years, and Oman is a leading country in this regard (certainly by regional standards). Environmentalism is integrated in many school subjects, including social studies, science, English, Arabic, Islamic Education, and life skills textbooks (Al-Hadramiah, 2011; Ambusaidi & Al-Rabaani, 2009).

Thus, there is a need to evaluate the effect of environmental education in Omani school students, to ensure the effectiveness of the current curriculum and other environmental sources, such as the media, social media, and different events in preparing Oman's youth to be aware of environment and have a sense of responsibility towards it. Consequently, this study explores Omani post-basic education students (OPBES) by asking the following research questions.

1.2. Research Questions

- What is the level of environmental knowledge of OPBES?
- What is the level of environmental attitudes of OPBES?
- What is the level of environmental behavior of OPBES?
- Is there a correlation between OPBES' environmental knowledge, attitudes and behavior?
- Is there a difference between male and female OPBES' environmental knowledge, attitudes and behavior?
- Is there a difference between class 11 and 12 OPBES' environmental knowledge, attitudes and behavior?

1.3. Research Objective

To evaluate the effect of environmental education in Oman's school textbooks on post-basic education students.

2. Methodology

2.1. Research Approach

This study used a descriptive approach to collect data by using an Environmental Knowledge Test, Attitudes Questionnaire, and Behavioral Scale. The use of this approach was due to its suitability to collect data from large sample, in line with the purpose of the study. Shiu et al. (2009, 62) stated that the descriptive approach "uses a set of scientific methods and procedures to collect raw data and create data structure that describes the existing characteristics of a defined target population".

2.2. Sample

The current study targeted OPBES in classes 11 and 12. Choosing the sample was not an easy task because of the large population. Cluster sampling was used to ensure having an equal number of students from class 11 and 12, and also to ensure coverage of all 11 of Oman's governorates. The study targeted 5000 students (2500 male and 2500 females). The three instruments (Environmental Knowledge Test, Attitudes Questionnaire, and Behavioral Scale) were distributed to 5000 students across Oman. The total number of returned forms was 4557, of which 42 were eliminated due to being incomplete. The final sample was thus 4515 students, representing 90.3% of targeted sample (a relatively high response rate and indeed a large sample size). Table 1 shows the distribution of the sample according to gender and class.

Table 1: Study sample distribution

	N	%	Total
Gender			
Males	2028	44.9	4515
Females	2487	55.1	
Classes			
Class 11	2136	47.3	4515
Class 12	2379	52.7	

2.3. Instruments

Data was gathered by three instruments: Environmental Knowledge Test, Attitudes Questionnaire and Behavioral Scale. The Environmental Knowledge Test consisted of 45 true/false questions distributed into ten sections: ecosystem (4 questions), water sources and water pollution (6 questions), air and air pollution (4 questions), climate change (6 questions), energy (5 questions), forest (4 questions), desertification (4 questions), disasters (5 questions), wastes (4 questions), and sustainable development

and global environmental agreements (3 questions). This test was developed based on relative literature and analysis of the topics of Arabic, English, social studies, Islamic education, life skills, and science lessons (Al-Omari & Al Khawaldeh, 2013; Al-Rabani, 2002; Ambusaidi & Al-Rabaani, 2009; Harun, Hock, & Othman, 2011; He, Hong, Liu, & Tiefenbacher, 2011).

The second instrument was the Likert-type Attitudes Questionnaire, which consisted of 50 items distributed between ten sections: ecosystem (5 items), water sources and water pollution (5 items), air and air pollution (5 items), climate change (5 items), energy (5 items), forest (6 items), desertification (4 items), disasters (6 items), wastes (6 items), sustainable development and global environmental agreements (4 items). The Attitudes Questionnaire was developed based on previous studies (Al-Rabaani & Al Amri, 2017; Al-Rabaani & Mohammed, 2009; Al-Rabani, 2002; Al-Shuili & Al-Rabaani, 2010; Ozkan, 2013; Ozsoy 2012). A five-point Likert scale was used for its categories (strongly agree, agree, uncertain, disagree, strongly disagree).

The third instrument was the 21-item Behavioral Scale, with four alternative responses (most of time, some of the time, seldom, never). The scale was developed based on the literature (Al-Rabaani & Al Amri, 2017; Al-Rabaani & Mohammed, 2009; Al-Shuili & Al-Rabaani, 2010; Müderrisoğl & Altanlar, 2011).

2.4. Validity and Reliability

The validity of the three instruments was examined by a panel of judges from Sultan Qaboos University and social studies supervisors from the Ministry of Education. The reliability of the awareness test was also examined by applying it to a trial group which consisted of 30 students from different schools. The Cronbach's alpha results were (.76) for the Environmental Knowledge Test, (.93) for the Attitudes Questionnaire, and (.86) for the Behavioral Scale.

3. Results

3.1. What is the Level of Environmental Knowledge of OPBES?

The study revealed that the OPBES had a high level of environmental knowledge, with a mean score 36.56 (81.24%) out of a maximum of 55. They showed a very high level of knowledge about sustainable development and global environmental agreements (904.3%), and they had a high level of environmental knowledge about wastes, disasters, desertification, forest, energy, air pollution and ecosystem issues, with mean percentages ranging from 84.5% to 80.2%. It was also found that they had high average levels of knowledge about water sources and water pollution (75.5%) and climate change (76.3%) issues.

Table 2: Means and standard deviations for environmental knowledge scores

	Maximum mark	Mean	SD	% of mean
Ecosystem	4	3.30	1.085	82.5%
Water sources and water pollution	6	4.53	1.321	75.5%
Air and air pollution	4	3.21	.753	80.2%
Climate change	6	4.58	1.629	76.3%
Energy	5	4.04	1.183	80.8%
Forest	4	3.37	1.212	84.2%
Desertification	4	3.21	.990	80.2%
Disasters	5	4.13	1.175	82.6%
Wastes	4	3.38	1.257	84.5%
Sustainable development and global environmental agreements	3	2.83	1.141	94.3%
Total	**45**	**36.56**	**5.734**	**81.2%**

3.2. What is the Level of Environmental Attitudes of OPBES?

The overall attitudes of OPBES toward the environment were strongly positive, with a mean score of 4.42 from the five-point Likert scale. The results showed that the students hold strong positive attitudes towards ecosystem, wastes, sustainable development, air and air pollution, and water resources and water pollution.

Table 3: Means and standard deviations for environmental attitudes scores

Sections	Mean	SD
Ecosystem	4.60	.536
Water sources and water pollution	4.34	.555
Air and air pollution	4.47	.503
Climate change	4.40	.661
Energy	4.40	.671
Forest	4.41	.544
Desertification	4.44	.547
Disasters	4.39	.578
Wastes	4.49	.558
Sustainable development and global environmental agreements	4.48	.550
Average	4.42	.446

3.3. What is the Level of Environmental Behavior of OPBES?

Participants displayed fairly good pro-environmental behavior, with mean score of 2.91 from a four-point scale. Such results, considered with their environmental knowledge and attitudes, reflect that there may be other factors influencing students' behavior, such as their priorities and daily habits, and family mentoring of children's environmental behavior.

Table 4: Means and standard deviations for environmental behavior scores

Section	Mean	SD
Environmental behavior	2.91	.247

3.4. Is there a Correlation between OPBES' Environmental Knowledge, Attitudes, and Behavior?

The findings showed the existence of a moderate correlation between OPBES' knowledge, attitudes, and behavior.

Table 5: Correlation between environmental knowledge, attitudes, and behavior

		Knowledge	Attitudes	Behavior
Knowledge	Pearson correlation	1	.284**	-.054**
	Sig. (2-tailed)		.000	.000
	N	4515	4506	4469
Attitudes	Pearson Correlation	.284**	1	.074**
	Sig. (2-tailed)	.000		.000
	N	4506	4506	4465
Behavior	Pearson correlation	-.054**	.074**	1
	Sig. (2-tailed)	.000	.000	
	N	4469	4465	4469

**. Correlation is significant at the 0.01 level (2-tailed).

3.5. Is there a Difference between Male and Female OPBES' Environmental Knowledge, Attitudes, and Behavior?

Females showed higher level of environmental knowledge and attitudes, while males showed higher pro-environmental behavior than females.

Table 6: 2 t-test of environmental knowledge, attitudes, and behavior according to gender

	Gender	Mean	SD	t	df	Sig.
Knowledge	Males	35.36	5.13	12.898	4513	.000
	Females	37.53	6.01	13.106	4503.635	
Attitudes	Males	4.32	.504	14.431	4504	.000
	Females	4.50	.373	14.005	3637.356	
Behavior	Males	2.93	.262	3.718	4467	.000
	Females	2.90	.232	3.672	4032.471	

3.6. Is there a Difference between Class 11 and 12 OPBES' Environmental Knowledge, Attitudes, and Behavior?

Class 12 students showed a higher level of environmental knowledge, but there were no significant differences in their environmental behavior.

Table 7: 2 t-test of environmental knowledge, attitudes, and behavior according to class level

	Class Level	Mean	SD	t	df	Sig.
Knowledge	Class 11	35.91	5.826	7.191	4513	.000
	Class 12	37.14	5.589	7.175	4414.704	
Attitudes	Class 11	4.40	.442	2.455	4504	.014
	Class 12	4.44	.449	2.457	4465.453	
Behavior	Class 11	2.91	.263	1.345	4467	.179
	Class 12	2.92	.231	1.335	4224.670	

3.7. Discussion

The results show that OPBES had a high level of environmental knowledge, strong positive environmental attitudes, and fairly good environmental behavior. These results shed light on the effectiveness of inclusion of environmental education in Omani's school curriculum Arabic, English, Islamic Education, social studies, and life skills (Al-Hadramiah, 2011; Ambusaidi & Al-Rabaani, 2009). This could also be attributable to the influence of several national school events and competitions, some of which strongly focus on environmental issues, such the Preservation of Cleanliness and Health in the School Environment Competition, which focuses on environmental topics and projects. Every year, winning schools are rewarded. Also, the Ministry of Education launched another competition for schools called "His Majesty Sultan Qaboos Award for Sustainable Development in School Environments". This award focuses on encouraging innovation, and imitative projects related to environmentally sustainable development correlated with societal needs and stakeholders (individuals and private institutions, and NGOs).

These results could also be affected by the influence of media, social media, social events and national events. These sources provide plenty of information about the environment and environmental problems from local and global perspectives. Culture heritage is another factor pertinent to participants' knowledge, attitudes, and behavior. In same contexts, the UNESCO Sultan Qaboos Prize for Environmental Conservation could also encourage students to be more concerned about the environment when they recognize the global concern of the late Sultan Qaboos, a revered and much-

loved figure in Oman and across the world, and his wish for people to be more aware of the environment at the local and global levels.

The results of this study support the findings of previous studies that showed a relationship between education and environmental knowledge, attitudes, and behavior (Al-Rabaani & Al Amri, 2017; Al-Rabaani & Mohammed, 2009; Liefländer & Bogner, 2018; Mark, 2011; Uğulu & Erkol, 2013; Varoglu, Temel, & Yilmaz, 2018; Zsóka, Szerényi, Széchy, & Kocsis, 2013). Also, the expected influence of media, social media, and other events could also have some level of influence in OPBES' environmental knowledge, attitudes, and behavior, as some previous studies reported that the media is the main source of knowledge on environmental topics for students and teachers (Ahmed & Ahmed, 2007; Ferlal, 2012).

The results also revealed a correlation between OPBES' environmental knowledge, attitudes, and behavior. Such results are in line with previous literature which demonstrated the existence of a relationship between environmental knowledge, attitudes, and behavior (Mark, 2011) on the other hand, the current results contradicted with results of Evans et al. (2007), which showed no correlation between environmental attitudes and behavior.

The findings also indicated the influence of students' gender in their environmental knowledge, attitudes, and behavior, supporting some previous studies (Al-Rabaani & Mohammed, 2009; Zelezny et al., 2000), and contradicting others, which showed no meaningful relationship with gender (Alp, Ertepinar, Tekkaya, & Yilmaz, 2006; Ozkan & Bulent, 2017). The findings affirm previous studies which showed that students' class (i.e. age) affected their environmental knowledge, attitudes, and behavior (Brécard et al., 2009; de Silva & Pownall, 2014; Meyer, 2015).

4. Conclusion

In conclusion, the study confirms the significant effect of current education on the environmental knowledge, attitudes, and behavior of OPBES. It showed that environmental education has a great influence on their knowledge and attitudes, and a fairly good impact on their environmental behavior. However, the results indicate the need to do more to bridge the gap between excellent environmental knowledge and lagging outcomes in environmental behavior in order to elevate their achievement in the latter, which ultimately operationalizes their knowledge to achieve the fundamental aim of environmental education (i.e. to enhance environmental preservation). Also, it was found that students' gender and class (age) influence their environmental knowledge, attitudes, and behavior.

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References

[1] Ahmed, O. & Ahmed, H. (2007). Factors affecting environmental knowledge and attitudes among Lebanese college students. *Applied Environmental Education & Communication*, *5*(2) 95-105.

[2] Alam, S. (2012). Crafting leaders for educational change: Head teacher's perspectives about a tailor-made professional development program. *International Journal of Social Science and Education*, *2*(1), 1-18.

[3] Alam, S. (2017). Environmental education: Role of physical environment in students' learning in Gilgit-Baltistan, Pakistan. *Journal of Education and Vocational Research*, *8*(2), 22-33.

[4] Al-Hadramiah, A. (2011). Degree of knowledge of Omani's social studies teachers about sustainable development dimensions and its indicators. Unpublished MA thesis, College of Education, Sultan Qaboos University.

[5] Al-Omari, A. A. & Al Khawaldeh, S. A. (2013). Environmental literacy among students of the Faculty of Education at Yarmouk University. *Journal of Educational and Psychological Studies*, *7*(2), 133-150.

[6] Alp, E., Ertepinar, H., Tekkaya, C., & Yilmaz, A. (2006). A study on children's environmental knowledge and attitudes: The effect of grade level and gender. *International Research in Geographical and Environmental Education*, *15*, 210-223.

[7] Al-Rabaani, A. & Mohammed, S (2009). Attitudes of Sultan Qaboos University Students towards Some Environmental Problems and their Willingness to Take Action to Reduce them, *Journal of Social Science*, 5(1), 9 – 15.

[8] Al-Rabaani, A. & Al Amri, E. (2017). The effect of using cartoons on developing Omani Grade 4 students' awareness of water issues and their attitudes towards using them in teaching social studies. *Journal of Social Studies Education Research*, *8*(1), 35-46.

[9] Al-Rabani, A. (2002). The environmental dimension of the geography curriculum at the secondary stage in the Sultanate of Oman and its effect on the development of students' attitudes towards some environmental problems. Unpublished PhD thesis, Leeds University.

[10] Al-Shuili, A. & Al-Rabaani, A. (2010). The climate changes awareness among science and social sciences student teachers at Sultan Qaboos University. *Jordan Journal of Educational Sciences*, *6*(4), 269-284.

[11] Ambusaidi, A. & Al-Rabaani, A. (2009). Environmental education in Oman: Taking sustainable development into account. In N. Taylor, M. Littledyke, C. Eames, & R. Coll (Eds.), *Environmental education in context* (pp. 39-51). Rotterdam, the Netherlands: Sense Publishers.

[12] Araghi, Y., Kroesen, M., Molin, E., & Wee, B. V. (2014). Do social norms regarding carbon offsetting affect individual preferences towards this policy? Results from a stated choice experiment. *Transportation Research*, *D*(26), 42-46.

[13] Bradley, J. C., Waliczek, T. M., & Zajicek, J. M. (1999). Relationship between environmental knowledge and environmental attitude of high school students. *Journal of Environmental Education*, *30*(3), 17-21.

[14] Brécard, D., Hlaimi, B., Lucas, S., Perraudeau, Y., & Salladarré, F. (2009). Determinants of demand for green products: An application to eco-label demand for fish in Europe. *Ecological Economics*, *69*(1), 115-125.

[15] de Silva, D. G. & Pownall, R. A. (2014). Going green: Does it depend on education, gender or income? *Applied Economics*, *46*(5), 573-586.

[16] Evans, G. W., Brauchle, G., Haq, A., Stecker, R., Wong, K., & Shapiro, E. (2007). Young children's environmental attitudes and behaviors. *Environment and Behavior*, *39*(5), 635-658.

[17] Ferlal, O. (2012). Environmental education and the role of media in environmental education in Turkey. *Procedia - Social and Behavioral Sciences*, *46*, 1339-1342.

[18] Goldman, D., Yavetz, B., & Pe'er, S. (2006). Environmental literacy in teacher training in Israel: Environmental behaviour of new students. *Journal of Environmental Education*, *38*(1), 3-22. https://doi.org/10.3200/JOEE.38.1.3-22

[19] Harun, R., Hock, L. K., & Othman, F. (2011). Environmental knowledge and attitude among students in Sabah. *World Applied Sciences Journal*, *14*, 83-87.

[20] He, X. E., Hong, T., Liu, L., & Tiefenbacher, J. (2011). A comparative study of environmental knowledge, attitudes and behaviors among university students in China, *International Research in Geographical and Environmental Education*, *20*(2), 91-104.

[21] Jensen, B. (2002). Knowledge, action and pro-environmental behaviour. *Environmental Education Research*, *8*(3), 325-334.

[22] Laborde, A., Tomasina, F., Bianchi, F., Bruné, M.-N., Buka, I., Comba, P., … Landrigan, P. J. (2015). Children's health in Latin America: The influence of environmental exposures. *Environmental Health Perspectives*, *123*(3), 201-209.

[23] Legault, L. & Pelletier, L. G. (2000). Impact of an environmental education program on students' and parents' attitudes, motivation and behaviours, *Canadian Journal of Behavioural Science*, *32*(4), 243-250.

[24] Liefländer, A. K. & Bogner, F. X. (2018). Educational impact on the relationship of environmental knowledge and attitudes. *Environmental Education Research*, *24*(4), 611-624.

[25] Liu, S., Yeh, S., Liang, S., Fang, W., & Tsai. H. (2015). A national investigation of teachers' environmental literacy as a reference for promoting environmental education in Taiwan. *Journal of Environmental Education*, *46*(2), 114-132. https://doi.org/10.1080/00958964.2014.999742

[26] Lu, J. L., Shon, Z. Y. (2012). Exploring airline passengers' willingness to pay for carbon offsets. *Transportation Research*, D(17), 124-128.

[27] Mark, M. (2011). An investigation on the environmental knowledge, attitudes and behavior of Maltese youth. *US-China Education Review*, *B*(3), 413-422.

[28] Meyer, A. (2015). Does education increase pro-environmental behavior? Evidence from Europe. *Ecological Economics*, *116*, 108-121.

[29] Milman, O. (2015, January 15). Rate of environmental degradation puts life on earth at risk, say scientists. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2015/jan/15/rate-of-environmental-degradation-puts-life-on-earth-at-risk-say-scientists

[30] Müderrisoğl, H. & Altanlar, A. (2011). Attitudes and behaviors of undergraduate students toward environmental issues. *International Journal of Environmental Science and Technology*, *8*(1), 159-168.

[31] Norris, E. & Juliet, D. (2016). Impact of environmental education on the knowledge and attitudes of students towards the environment. *International Journal of Environmental & Science Education*, *11*(12), 5367-5375.

[32] Onur, A., Sahin, E., & Tekkaya, C. (2012). An investigation on value orientations, attitudes and concern towards the environment: The case of Turkish elementary school students. *Environmental Education Research*, *18*(2), 271- 297.

[33] Ozkan, A. & Bulent, A. (2017). A study on environment-oriented knowledge, attitude and behavior level of teacher candidates. *Journal of Education and Practice*, *8*(7), 229-245.

[34] Ozkan, R. (2013). Indicating the attitudes of high school students to environment. *Educational Research and Reviews*, *8*(4), 154-163.

[35] Ozsoy, S. (2012). A survey of Turkish pre-service science teachers' attitudes toward the environment. *Eurasian Journal of Educational Research*, *12*, 121-140.

[36] Pe'er, S., Goldman, D., & Yavetz, B. (2007). Environmental literacy in teacher training: Attitudes, knowledge, and environmental behavior of beginning students. *Journal of Environmental Education*, *39*, 45-60. https://doi.org/10.3200/JOEE.39.1.45-59

[37] Plakitsi, K., Spyrtou, A., Klonari, K., Kalogiannaki, M., Malandrakis, G., Papadopoulou, P., … Kolios, N. (2011). New Greek Science Curriculum (NGSC) for primary education: Promoting educational innovation under hard conditions. In J. Dillon & A. Redfors (Eds.), *Science curriculum and educational policy: Proceedings of 9th ESERA Conference* (pp. 1751-1757). Lyon, France: ESERA.

[38] Rafael, A. & Elisa, T. (2017). Environmental degradation and economic growth evidence for a developing country. *Environmental Development and Sustainability*, *19*, 1205-1218.

[39] Roth, W. M., Goulart, M. I., & Plakitsi, K. (2013). Darkness/light. In W. -M. Roth, M. I. M. Goulart, & K. Plakitsi (Eds.), *Science education during preschool years: A cultural-historical approach* (pp. 111-138). Dordrecht, the Netherlands: Springer.

[40] Saribas, D. (2015). Investigating the relationship between preservice teachers' scientific literacy, environmental literacy and life-long learning tendency. *Science Education International*, *26*(1), 80-100.

[41] Serhat, A. (2012). The influence of environment education on critical thinking and environmental attitude. *International Conference on New Horizons in Education*, *55*, 902-909.

[42] Shiu, Eric., Hair, Joseph., Bush, Robert., & Ortinau, David. (2009). *Marketing Research. First edition. Berkshire*: McGraw- Hill Education.

[43] Stevenson, R. (2007). Schooling and environmental education: Contradictions in purpose and practice. *Environmental Education Research*, *13*(2), 139-153.

[44] Uğulu, İ. & Erkol, S. (2013). Biyoloji Öğretmen Adaylarının Çevreye Yönelik Tutumları ve Çeşitli Değişkenler Açısından İncelenmesi [Title in English]. *NWSA: Education Sciences*, *8*(1), 79-89.

[45] UNESCO (2016). *Education for people and planet: Creating sustainable future for all, final report*. Paris, France: UNESCO.

[46] UNESCO (2019). UNESCO Sultan Qaboos Prize for Environmental Conservation. Retrieved from https://en.unesco.org/mab/awards/sultan-qaboos/about

[47] United Nations (2019). *Climate change reports*, Retrieved from https://www.un.org/en/climatechange/reports.shtml

[48] Van Birgelen, M., Semeijn, J., Behrens, P. (2011): Explaining pro-environment consumer behavior in air travel. *Journal of Air Transport Management*, *17*, 125-128.

[49] Varoglu, L., Temel, S., & Yilmaz, A. (2017). Knowledge, atttitudes and behaviour towards the environmental issues: Case of Northern Cyprus. *EURASIA Journal of Mathematics, Science and Technology Education*, *14*(3), 997-1004.

[50] Zelezny, L., Chua, P., & Alrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues*, *56*(3), 443-457.

[51] Zsóka, Á., Szerényi, Z. M., Széchy, A., & Kocsis, T. (2013). Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students. *Journal of Cleaner Production*, *48*, 126-138.