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The Determination of Environmental Literacy Levels of Elementary Teacher Candidates·

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ABSTRACT

This study aims to determine elementary teacher candidates' environmental literacy levels. The study was conducted by using survey method with participation of 83 elementary teacher candidates. In order to collect data, the environmental literacy questionnaire with four factors including the knowledge about environment, attitude towards environment, environmental use, and interest towards environmental problems factors was administered to the participants. In order to quantitative analyze the data, percentages, frequencies, mean scores, and standard deviation values were calculated. The results revealed that the participants had insufficient knowledge about environment. Specifically, they reported a high rate of positive opinions about biodiversity, ecosystem, and the importance of living beings other than humans. However, they had a lower rate of correct answers for the items related to the balance of nature. In terms of environmental problems, the candidates reported high interest towards poor quality drinking water, water scarcity, and water pollution. Overall, the elementary teacher candidates participated in this study had low level of environmental literacy. Different studies can be conducted to increase the environmental literacy of prospective teachers to high levels.

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Sınıf Öğretmeni Adaylarının Çevre Okuryazarlık Düzeylerinin Belirlenmesi

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ÖZ

Bu çalışma, sınıf öğretmeni adaylarının çevre okuryazarlık düzeylerini belirlemeyi amaçlamaktadır. Araştırma 83 sınıf öğretmeni adayının katılımıyla anket yöntemi kullanılarak gerçekleştirilmiştir. Verilerin toplanması için katılımcılara çevre bilgisi, çevreye yönelik tutum, çevresel kullanım ve çevre sorunlarına ilgi faktörlerini içeren dört faktörlü çevre okuryazarlığı anketi uygulanmıştır. Verilerin analizi için yüzde, frekans, ortalama puanlar ve standart sapma değerleri hesaplanmıştır. Sonuçlar, katılımcıların çevre hakkında yeterli bilgiye sahip olmadığını ortaya koymuştur. Özellikle, biyoçeşitlilik, ekosistem ve insanlar dışındaki canlıların önemi hakkında yüksek oranda olumlu görüş bildirmişlerdir. Bununla beraber, doğa dengesi ile ilgili maddelerde doğru cevap oranları daha düşüktür. Çevre sorunları açısından adaylar, kalitesiz içme suyu, su kıtlığı ve su kirliliğine yüksek ilgi göstermişlerdir. Genel olarak, bu çalışmaya katılan sınıf öğretmeni adaylarının çevre okuryazarlığı düşük düzeydedir. Öğretmen adaylarının çevre okuryazarlığını üst seviyelere çıkarmak için farklı çalışmalar yapılabilir.

Anahtar Kelimeler: Çevre Eğitimi, çevre okuryazarlığı, sınıf öğretmeni adayı

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Introduction

Environment is defined as the setting consisting of living and non-living things, where human beings and other living things can meet all their needs to survive (Yücel & Morgil, 1998) and it includes human beings' relationships with other living things as well as the relationships among human beings (Karatekin & Aksoy, 2012). Nowadays, the importance given to the environment has increased due to various environmental problems including global warming, desertification, and decreasing biodiversity (Timur, Yılmaz and Timur, 2013). Since people's consumption behaviour is one of the most important reasons for the environmental problems, there is a need for people to gain environmental sensitivity (Kışoğlu, Yıldırım, Salman and Sülün, 2016).

After realization of the increase in environmental problems and their threats to life, international meetings and conferences were organized and possible solutions were discussed (Artun, Uzunöz and Akbaş, 2013). In these meetings, environmental education has been emphasized in solving environmental problems and increasing environmental awareness (Genç and Genç, 2016). In 1977, the initial declaration published at an international conference held in Tbilisi, Georgia, is a critical milestone for environmental education (Gönençgil, 2011). In this declaration, it was stated that environmental education should be provided to students of all age groups in a formal or informal ways rather than just an addition to existing curricula (Zayimoğlu Öztürk, Öztürk and Şahin, 2015) and the main purpose of this education should be to raise environmentally literate individuals (Akıllı and Genç, 2015). Also, it is stated that the reduction of environmental problems can only be achieved by increasing the environmental literacy levels of individuals who are irresponsible to the environment, display negative attitudes and are lack of knowledge about environment (Balkan Kıyıcı, Atabek Yiğit and Darçın, 2014). The concept of environmental literacy was first introduced by Roth (1992) and refers to transformation of efforts to understand and interpret the environment and to behavior (Fettahlıoğlu, 2018; Uyar and Temiz, 2019). Environmental literacy has four aspects – knowledge, skills, behavior, and emotion – and it covers three levels including low, functional, and operational (Karatekin and Aksoy, 2012). Therefore, environmental literacy is a process that starts with increasing awareness of environmental problems and involves anxiety about environmental problems and having knowledge about the solutions of these problems (Uyar and Temiz, 2019). People with low level of environmental literacy may know some environmental concepts and develop attitude and awareness towards the environment, but they cannot fully explain the relationship between humans and nature (Roth, 1992; Fettahlıoğlu, 2018). While people with functional level may have the skills to evaluate environmental issues from their own perspective, people with operational level of environmental literacy have in-depth environmental knowledge for sustainable awareness towards environment (Roth, 1992; Güler, 2013).

Eroğlu (2009) and Derman and Hacıeminoğlu (2017) state that the way of raising environmentally literate individuals is through environmentally literate teachers and universities have a critical role on raising environmentally literate teachers. In the literature, there exist various studies that examine teachers', teacher candidates', and students'

environmental literacy levels from different grade levels and branches Deniş and Genç, 2007; Teksöz, Şahin, and Ertepınar, 2010; Karatekin & Aksoy, 2012; Güler, 2013; Fettahlıoğlu, 2018; Kidman and Casinader , 2019; Goulgouti, Plakitsi and Stylos, 2019). Specifically, Deniş and Genç (2007) compared elementary teacher candidates' environmental literacy levels in terms of their status to take the Environmental Science course through a knowledge test. They found that although teacher candidates who took the course had higher scores comparing with the other candidates who did not take the course, there was no significant difference between the groups in terms of their attitudes towards the environment. In another study in which eight grade students' environmental literacy levels were examined, Güler (2013) found that their participants had moderate level knowledge about environment and low level of cognitive skills. In this study, the main goal is to examine junior and senior elementary teacher candidates' environmental literacy levels.

Method

In this study, quantitative design-survey method was employed (Johnson 2001; Johnson and Onwuegbuzie, 2004). The survey method is an approach based on explaining current and past situations as they exist and comparing the associations among variables while collecting data in a certain period of time (Karasar, 2000). Surveys are significant studies in education because they can provide quantitative definitions of the behaviors, characteristics, and attitudes of teachers, students and other communities (Walston, Redford and Bhatt, 2017).

Participants

The participants of the study consisted of 83 elementary teacher candidates (37 male and 46 female) at a university located in the eastern part of Turkey in the 2015-2016 school year. While 38 teacher candidates were 3th grade, 45 were 4th grade.

Data Collection Tool

In this study, data was collected through a questionnaire consisting of two sections: the demographic information form and the Environmental Literacy Survey. The first section included questions developed by the researchers to determine participants' demographic information including gender and grade level. In the second section, the Environmental Literacy Questionnaire (ELQ) was used to measure participants' environmental literacy levels. The questionnaire was originally developed by Michigan State University between 2001 and 2006, translated into Turkish and adapted to Turkey by Teksöz, Şahin, and Ertepınar (2010). ELQ included four factors: knowledge about environment (eleven items), attitude towards environment (ten items), environmental use (nineteen items), and interest towards environmental problems (nine items). While items in the first two factors were in five-point Likert type ranged between strongly disagree to strongly agree, the items in the interest towards environmental problems factor were five-point Likert type ranged between not interested in at all to totally interested in. The KMO value was calculated as .88. In addition, the Cronbach's alpha values for the factors were .81, .70, .81, and .81, respectively.

Data analysis

In order to determine elementary teacher candidates' environmental literacy levels based on knowledge about environment, attitude towards environment, environmental use and interest towards environmental problems in the questionnaire, percentages, frequencies, mean scores, and standard deviation values were calculated by using SPPS 21.0 statistical packet program.

Findings

Table 1. *Results related to knowledge about environment factor*

	f	%
1. There are a wide variety of plant and animal species and they live in very different environments. Which word is used to describe this information?		
Diversity	5	6,0
Biological diversity	77	92,8
Socio-economic	-	-
Evolution	-	-
I do not know	1	1,2
2. This is a major pollutant generating carbon monoxide pollution in Turkey. Which of the following is the most important source of carbon monoxide?		
Factories and workplaces	67	80,7
People breating	-	-
Motor vehicles	13	15,7
Trees	-	-
I do not know	1	1,2
3. How is generally the electricity produced in Turkey?		
Burning oil, coal, and wood	15	18,1
With nuclear power plants	4	4,8
With solar energy	1	1,2
With hydroelectric power station	62	74,7
I do not know	1	1,2
4. What is the main reason for pollution of rivers and sea in Turkey?	71	85,5
Untreated household, industrial, and agricultural wastewater	2	2,4
Flowing water from gardens and streets	1	1,2
Garbage from beaches	8	9,6
City waste disposal	1	1,2
I do not know		

5. Which of the following is a renewable resource?		
☐ Oil	1	1,2
☐ Iron mine	2	3,6
☐ **Trees**	74	89,2
☐ Coal	1	1,2
☐ I do not know	4	4,8
6. Ozone forms a protective layer in the upper layers of the atmosphere. What does ozone protect us from?		
☐ Acid rains	12	14,5
☐ Global warming	7	8,4
☐ Sudden changes in temperature	1	1,2
☐ **Harmful, cancer-causing sunlight**	61	73,5
☐ I do not know	1	2,4
7. Where is a large part of the garbage thrown away in Turkey?		
☐ Sees	8	9,6
☐ Garbage incinerator	19	22,9
☐ Recycling centers	6	7,2
☐ **Garbage storage areas**	44	53,0
☐ I do not know	6	7,2
8. What is the name of the official institution making decisions to protect the environment in Turkey?		
☐ **Ministry of Environment and Urban Planning**	47	56,6
☐ TEMA	15	18,1
☐ Nature Protection Foundation	2	2,4
☐ Turkey Environment Education Foundation	6	7,2
☐ I do not know	13	15,7
9. Which of the following household waste can be called as hazardous waste?	10	12,0
☐ Plastic packages	4	4,8
☐ Glass	56	67,5
☐ **Batteries**	4	4,8
☐ Food leftovers	9	10,8
☐ I do not know		
10. What is the most common reason for the extinction of animal species?	2	4,8
☐ Pesticides cause animals to die.	65	78,3
☐ **Animals' living spaces are destroyed by people.**	3	7,2
☐ Hunting has increased a lot.	4	8,4
☐ Climate changes affect animals.	1	1,2
☐ I do not know.		

11. Scientists have not yet come to a conclusion in their studies on the storage of nuclear waste. What is the most common method for the storage of nuclear waste in the World?		
Used as nuclear fuel	18	21,7
Sold to other countries	11	13,3
Stored in garbage storage areas	7	8,4
Stored and kept under control	17	20,5
I do not know	30	36,1

According to the results related to the knowledge about environment factor, the following correct answers were critical: biological diversity (92.8%), motor vehicles (15.7%), and stored and kept under control (20.5%).

Table 2. *Elementary teacher candidates' level in terms of knowledge about environment*

Correct answer	Percentage of score	n	Acceptable/Non-acceptable
10 or more	% 90-% 100	6 (% 7,2)	Acceptable
9	% 80-% 89	15 (% 18,1)	Acceptable
8	% 70-% 79	14 (% 16,9)	Acceptable
7	% 60-% 69	18 (% 21,7)	Non-acceptable
6 and less	% 59- and less	30 (% 36,1)	Non-acceptable

According to the results, only six teacher candidates provided correct answers to ten or more questions, 15 of them provided nine correct answers, and 14 of them provided eight correct answers. On the other hand, 48 teacher candidates were at non-acceptable range. Specifically, 18 of them had only seven correct answers and 30 of them had six or less correct answers.

Item no	Item	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %	*X*	*sd*
1	Special areas should be reserved for endangered species.	3,6	1,2	7,2	36,1	51,8	4,31	,936
2	Laws on water quality should be more enforceable.	6,0	10,8	16,9	37,3	28,9	3,72	1,17

3	Wild animals, through which human meat needs are met, are the most important species to be protected.	9,6	15,7	21,7	20,5	32,5	3,50	1,34
4	Poisonous snakes and insects must be killed because they pose a threat to humans.	6,0	12,0	14,5	28,9	38,6	3,81	1,24
5	Landowners should be allowed to use their wetlands for agricultural and industrial purposes.	44,6	30,1	9,6	6,0	9,6	2,06	1,29
6	It is very important for everyone to be aware of environmental problems.	31,3	19,3	6,0	16,9	26,5	2,87	1,64
7	Individuals should be free to use their land as they wish.	34,9	19,3	13,3	20,5	12,0	2,55	1,45
8	I think I have personal responsibilities in solving environmental problems.	4,8	4,8	9,6	41,0	39,8	4,07	1,07
9	The government should supervise the use of private property areas to protect wildlife.	4,8	-	6,0	51,8	37,3	4,18	,93
10	People should be held responsible for any damage they give to the environment.	4,8	2,4	4,8	34,9	53,0	4,30	1,03
11	All plants and animals play an important role in the environment.	4,8	1,2	6,0	34,9	53,0	4,31	1,01
12	Technological changes have damages for the environment as well as benefits.	4,8	2,4	4,8	32,5	55,6	4,32	1,03
13	The government should announce and implement laws to ensure that recycling is mandatory.	24,1	13,3	21,7	9,6	31,4	3,12	1,58
14	Laws on air pollution are strict enough.	26,5	18,1	20,5	20,5	14,5	2,78	1,41

15	Science and technology are very important in solving environmental problems.	6,0	14,5	16,9	36,1	26,5	3,63	1,21
16	Cultural differences are very important in solving environmental problems.	3,6	9,6	20,5	31,3	34,9	3,85	1,13
17	Changing people's value judgments will play a role in solving environmental problems.	3,6	3,6	24,1	44,6	24,1	3,83	,98
18	Collective actions take an important place in solving environmental problems.	2,4	8,4	15,7	49,4	24,1	3,85	,98
19	Changes in habits (such as consumption) will play an important role in solving environmental problems.	3,6	4,8	9,6	42,2	39,6	4,10	1,02

Table 3. *Results related to the environmental use factor*

Teacher candidates agreed on “Special areas should be reserved for endangered species” (87.9%), “People should be held responsible for any damage they give to the environment” (87.9%), “All plants and animals play an important role in the environment” (87.9%), and “The government should supervise the use of private property areas to protect wildlife” (89.1%).

Table 4. *Results related to the attitude towards environment factor*

Item no	**Items**	Strongly disagree **%**	Disagree **%**	Neutral **%**	Agree **%**	Strongly agree **%**	*X*	*sd*
1	We are about to fill the World's capacity to support human	8,4	9,6	25,3	31,3	25,3	3,55	1,2

	life.							
2	People's interventions in nature often result in disasters.	4,8	6,0	13,3	41,0	34,9	3,95	1,08
3	There are enough natural resources in the world for everyone; the problem is to learn how to take advantage of these resources.	8,4	6,0	9,6	31,3	44,6	3,97	1,24
4	Plants and animals have the right to live as much as humans.	7,2	-	7,2	28,9	56,6	4,27	1,10
5	The balance of nature is strong enough to compete with the effects of modern industrialized societies.	8,4	24,1	25,3	26,5	15,7	3,16	1,20
6	Despite our special abilities that make us superior to other creatures, we still struggle with the laws of nature.	7,2	12,0	14,5	34,9	31,3	3,71	1,23
7	Ecological crisis that people face is overrated.	4,8	7,2	15,2	45,8	26,5	3,81	1,06
8	Being human requires dominating the rest of the nature.	8,4	7,2	12,0	34,9	37,3	3,85	1,24
9	People will eventually learn that understanding nature is necessary to control it.	9,6	4,8	9,6	42,2	33,7	3,85	1,22
10	If everything continues as it is today, we will soon encounter a major	8,4	1,2	6,0	25,3	59,0	4,25	1,18

ecological disaster.

According to the results, the participants agreed on “Plants and animals have the right to live as much as humans” (85.5%), “People's interventions in nature often result in disasters” (75.9%), “There are enough natural resources in the world for everyone; the problem is to learn how to take advantage of these resources” (75.9%) and and “People will eventually learn that understanding nature is necessary to control it” (75.9%).

Table 5. *Results related to the interest towards environmental problems factor*

Interests towards environmental problems	Not interested %	Little bit interested %	Neutral %	Little bit interested %	Totally interested %	*X*	*sd*
Air pollution	1,2	9,6	6,0	49,4	33,7	4,04	,948
Water pollution	-	15,7	2,4	36,1	45,8	4,12	1,05
Gases from automobile exhausts	8,4	16,9	12,0	39,8	22,9	3,51	1,25
Industrial pollution	8,4	16,9	8,4	42,2	24,1	3,56	1,26
Toxic waste	7,2	12,0	14,5	37,3	28,9	3,68	1,21
Poor quality drinking water	4,8	4,8	3,6	36,1	50,6	4,22	1,06
Water scarcity	3,6	6,0	4,8	30,1	55,4	4,27	1,05
Depletion of the ozone layer	7,2	10,6	9,6	38,6	33,7	3,80	1,22
Climate changes	3,6	7,2	8,4	43,4	37,3	4,03	1,04

The results revealed that the teacher candidates had high interest in air pollution, water pollution, water scarcity, and climate changes.

Conclusion and Implications

In terms of the knowledge about environment factor, only 15.7% of the elementary teacher candidates provided the correct answer to the question “This is a major pollutant generating carbon monoxide pollution in Turkey. Which of the following is the most important source of carbon monoxide?”. Similarly, the percentage of the correct answer for

the question “Scientists have not yet come to a conclusion in their studies on the storage of nuclear waste. What is the most common method for the storage of nuclear waste in the World?” was also low (20.5%). In addition, 53% of the candidates provided the correct answer for the question “Where is a large part of the garbage thrown away in Turkey?”. Also, while only 56.6% of the candidates knew that the Ministry of Environment and Urban Planning is the official institution that make the decisions to protect the environment in Turkey, 67.5% of them considered batteries as harmful waste. According to the results related to the knowledge about environment factor, the rate of correct answers given to the other questions was found to be over 70%. However, among eleven items in the factor, 48 teacher candidates (57.8%) had an unacceptable level of knowledge and their average number of correct answers was 7.07, which proves that the environmental knowledge levels of teacher candidates were insufficient. Both Fettahlıoğlu (2018) and Teksöz, Şahin, and Ertepınar (2010) conducted studies with teacher candidates and found that their knowledge about environment is also at unacceptable level. Teksöz, Şahin, and Ertepınar (2010) explained this through inadequate environmental education in the teacher education programs. Considering the two-hour Environmental Education course, the findings of the current study also support this explanation. Specifically, in their study, Zayimoğlu Öztürk, Öztürk, and Şahin (2015) found that although teacher candidates who took the Environmental Education course had higher scores in terms of knowledge about environment, there was no significant difference between the candidates who took the course and who did not. Therefore, it is critical to consider revisions in the content and format of the Environmental Education course in the elementary education programs in order to advance teacher candidates’ knowledge about environment.

For the items "Special areas should be reserved for endangered species", “People should be held responsible for any damage they give to the environment” and “All plants and animals play an important role in the environment”, 87.2%, 87.9%, and 87.9% of the participants reported positive opinions, respectively. In addition, the participants agreed on the items “The government should supervise the use of private property areas to protect wildlife” (89.1%), “Technological changes have damages for the environment as well as benefits” (88.1%), “Landowners should be allowed to use their wetlands for agricultural and industrial purposes” (74.7%), “Poisonous snakes and insects must be killed because they pose a threat to humans” (67.5%), and “Science and technology are very important in solving environmental problems” (62.7%). According to the results, it is concluded that the teacher candidates are aware of the importance of biodiversity and ecosystem and of the role that technology plays on life and environment. Fettahlıoğlu (2018) conducted a similar study with science teacher candidates. He found that the teacher candidates agreed on the items “All plants and animals play an important role in the environment” (76%), “Laws on air pollution are strict enough” (44.6%), “The government should announce and implement laws to ensure that recycling is mandatory” (41%), “Landowners should be allowed to use their wetlands for agricultural and industrial purposes” (54.2%). The results revealed that the science teacher candidates had insufficient knowledge about environment (Fettahlıoğlu, 2018). In addition, the teacher candidates agreed on the items “Landowners should be allowed to use their wetlands for

agricultural and industrial purposes" (74.7%). On the other hand, in a similar study, Teksöz, Şahin, and Ertepınar (2010) found that teacher candidates from different fields had sufficient awareness of the relationship between human beings and environment.

According to the results related to the attitudes towards environment factor, the teacher candidates reported that they had awareness towards plants and animals (85.5%) and possible ecological disaster that may be encounter if everything continues as it is today (84.3%). However, for the item "The balance of nature is strong enough to compete with the effects of modern industrialized societies", they were expected to respond to the item at a higher level (42.2%). In their study with teacher candidates from different majors, Aksoy and Karatekin (2011) found that their participants had high affective tendencies towards environment. While a similar result was found in another study conducted by Teksöz, Şahin and Ertepınar (2010), a moderate level of attitudes towards environment was found by Başaran Uğur, Bektaş and Güneri (2019).

In terms of teacher candidates' interests towards environmental problems, more than 45% of the teacher candidates reported that they were very interested in poor quality drinking water, water pollution, and water scarcity. Water-related issues in Turkey as well as in the World might be a reason for the participants to show high interest on them. A similar result was found in another study conducted by Teksöz, Şahin, and Ertepınar (2010). In addition, according to the participants' responses, it was observed that they were interested in air pollution and climate changes as environmental problems. On the other hand, the teacher candidates were less interested in gases from automobile exhausts, industrial pollution, toxic waste, and ozone depletion, which are among the main causes of environmental disasters. This may prove that despite their interest in climate change, air pollution, and water pollution, the teacher candidates were not aware that exhaust gases, industrial pollution, toxic wastes, and ozone depletion are among the main causes of those problems and had insufficient knowledge about their relationships. In their study with social studies teacher candidates, Artun, Uzunöz, and Akbaş (2013) found that global warming and air pollution were environmental phenomena that teacher candidates consider as important. In another study, Uyanık (2016) found that elementary teacher candidates were sensitive about the causes of air pollution and substances that pollute and clean the air. Goulgouti, Plakitsi, and Stylos (2019) also found that although pre-school teachers' environmental knowledge was at moderate level and they had a positive attitude towards the environment, their participation in environmental actions was limited. Similar results were found in another study with elementary teacher candidates conducted by Gheith (2019). In addition, he found a positive relationship between teacher candidates' attitudes towards the environment and their behaviors. Kroufek and Latova (2014) conducted a study with elementary teacher candidates and found a positive correlation between their knowledge and attitudes towards environmental issues and their consumption behaviors. Magulod (2018) also found that teacher candidates had high level of knowledge about environment, attitude towards environment, and environmental literacy which is a sub-dimension of use of environment.

Suggestions

1. In order to have more information about elementary teacher candidates' environmental literacy levels, studies with a large sample group should be conducted.

2. Further studies must consider diversifying data collection tools in order to obtain more precise information about teacher candidates' environmental literacy levels.

3. Practical studies must be conducted to increase the environmental literacy level of elementary teacher candidates.

4. Comparative studies must be conducted with pre-service teachers from different majors.

5. Studies must be conducted to evaluate the Environmental Education course in the elementary education undergraduate programs.

REFERENCES

Akıllı, M., Genc, M. (2015). Ortaokul öğrencilerinin çevre okuryazarlığı alt boyutlarının çeşitli değişkenler açısından incelenmesi. *Sakarya University Journal of Education, 5*(2): 81-97.

Aksoy, B., & Karatekin, K. (2011). Farklı programlardaki lisans öğrencilerinin çevreye yönelik duyuşsal eğilimleri. *Türkiye Sosyal Araştırmalar Dergisi*, *15*(3): 23- 36.

Artun, H., Uzunöz, A. & Akbaş, Y. (2013). Sosyal bilgiler öğretmen adaylarının çevre okur-yazarlık düzeylerine etki eden faktörlerin değerlendirilmesi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, *34*: 1-14.

Balkan Kıyıcı, F, Yiğit, E. A., & Darçın, E. S. (2014). Doğa eğitimi ile öğretmen adaylarının çevre okuryazarlık düzeylerindeki değişimin ve görüşlerinin incelenmesi. *Trakya Üniversitesi Eğitim Fakültesi Dergisi*, *4*(1): 17-27.

Başaran Uğur, A.R., Bektaş, O., & Güneri, E., (2019). Sınıf ve fen bilgisi öğretmen adaylarının sürdürülebilir çevre tutum düzeyleri. *Uluslararası Sosyal Araştırmalar Dergisi. 12*(63): 775-788.

Deniş, H., & Genç, H. (2007). Çevre bilimi dersi alan ve almayan sınıf öğretmenliği öğrencilerinin çevreye ilişkin tutumları ve çevre bilimi dersindeki başarılarının karşılaştırılması. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 8*(13): 20-26.

Derman, A., & Hacıeminoğlu, E., (2017). Sürdürülebilir gelişme için eğitim bağlamında sınıf öğretmenlerinin çevre okuryazarlığı düzeylerinin belirlenmesi. *OMÜ Eğitim Fakültesi Dergisi, 36*(2): 81-103.

Eroğlu, B. (2009). *Fen bilgisi öğretmen adaylarının küresel ısınma hakkındaki bilgi düzeylerinin belirlenmesi* (Yüksek Lisans Tezi). Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

Fettahlıoğlu, P. (2018). Algılanan çevresel sorunların çevre okuryazarlık düzeyine göre analizi. *Mersin University Journal of the Faculty of Education,14*(1): 404-425.

Genç, M., & Genç, T. (2016). Sınıf öğretmenliği öğrencilerinin çevreye yönelik tutumlarının belirlenmesi. *Asya Öğretim Dergisi, 9-19*.

Gheith, E. (2019). Environmental literacy among prospective classroom teachers in Jordan. *International Journal of Learning, Teaching and Educational Research 18*(12): 258-279.

Gönençgil, B. (2011). *Uluslararası süreçler çerçevesinde çevre eğitimi raporu*. Türkiye Çevre Eğitim Vakfı (TÜRÇEV).

Goulgouti, A., Plakitsi, K., & Stylos, G. (2019). Environmental literacy: evaluating knowledge, affect, and behavior of pre-service teachers in Greece. *Interdisciplinary Journal of Environmental and Science Education, 15*(1): 1-9.

Güler, E. (2013). *İlköğretim 8. sınıf öğrencilerinin çevre okuryazarlığı düzeylerinin belirlenmesi ve öğrencilerin okuryazarlığı düzeylerinin çeşitli değişkenler açısından incelenmesi* (Yüksek lisans tezi). Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana.

Johnson, B. (2001). "Toward a new classification of nonexperimental quantitative research. *Educational Researcher, 30*(2): 3–13.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7): 14-26.

Karasar, N. (2000). *Bilimsel araştırma yöntemi*. Nobel Yayın Dağıtım, Ankara.

Karatekin, K., & Aksoy, B., (2012). Sosyal bilgiler öğretmen adaylarının çevre okuryazarlık düzeylerinin çeşitli değişkenler açısından incelenmesi. *Electronic Turkish Studies*, *7*(1): 1423-1438.

Kışoğlu, M., Yıldırım, T., Salman, M. & Sülün, A. (2016). İlkokul ve ortaokullarda çevre eğitimi verecek olan öğretmen adaylarında çevre sorunlarına yönelik davranışların araştırılması. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi 18*(1): 299-318.

Kidman, G., & Casinader, N., (2019). Developing teachers' environmental literacy through ınquiry based practices. EURASIA *Journal of Mathematics, Science and Technology Education*, *15*(6): 1-9.

Kroufek, R. & Latova, M. (2014). The Environmental literacy of pre-service teachers of primary school in the Czech Republic. *Conference: 7th International Conference of Education,* Research and Innovation Seville, Spain, 3931-3937.

Magulod, G.C. (2018). Environmental literacy and epistemological beliefs of Filipino pre-service teachers: A search for congruency. *Journal of Biodiversity and Environmental Sciences (Online)*, *12*(5): 197-205.

MSU-WATER (2001-2006). Social assessment: stakeholder attitudes, beliefs, and uses of water resources, co-PI M. Kaplowitz and S. Witter Vice President of Finance and Operations, Michigan State University.

Roth, C. E. (1992). Environmental literacy: its roots, evolution and directions in the 1990s.

Teksoz, G., Sahin, E., & Ertepinar, H. (2010). Environmental literacy, pre-service teachers, and a sustainable future. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi (H. U. Journal of Education), 39:* 3.

Timur, S., Yılmaz, Ş., & Timur, B. (2013). Öğretmen adaylarının çevreye yönelik davranışlarının incelenmesi. *YYÜ Eğitim Fakültesi Dergisi, 10*(1): 125-141.

Uyanık, G. (2016). Farklı lisans programlarındaki öğretmen adaylarının hava kirliliğine ilişkin algılarının ve duyarlılıklarının incelenmesi. *Kastamonu Eğitim Dergisi, 24*(4): 1571-1588.

Uyar, A. & Temiz, A., (2019). Sınıf öğretmenlerinin çevre okuryazarlık düzeylerinin belirlenmesi ve bazı değişkenler açısından incelenmesi. *Uluslararası Sosyal Araştırmalar Dergisi, 12* (6): 954-961.

Yücel, S. A., & Morgil F. İ. (1998). Yüksek öğretimde çevre olgusunun araştırılması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 14*: 84-91.

Walston, J., Redford, J., & Bhatt, M. P. (2017). Workshop on Survey Methods in Education Research: Facilitator's guide and resources (REL 2017–214). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. Retrieved from http://ies.ed.gov/ncee/edlabs.

Zayimoğlu, Öztürk, F., Öztürk, T., & Şahin, A. (2015). Sınıf öğretmeni adaylarının çevre eğitimi özyeterlik algılarının incelenmesi. *Amasya Üniversitesi Eğitim Fakültesi Dergisi 4*(2): 293-311.

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