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Determining Primary School Candidate Teachers' Levels of Environmental Literacy

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ABSTRACT The core of environmental literacy is to answer questions related to our world and our relationship with it, to search and to find answers to these questions, and the way we use these answers. Environmental literacy can be defined as obtaining information related to environment, educating yourself in subjects related to environment, and directing yourself to act on this issue. An individual's attitude, affective disposition, cognitive skills towards environment and information about environment represents his environmental literacy. The aim of this study is to determine the environmental literacy levels of primary education candidate teachers who study at different grades. This study which uses a surveillance model includes 419 candidate teacher participants who study in the fall semester of 2012-2013 academic years. In this study, "Environmental Literacy Survey" which is prepared by Karatekin (2011) is used as data collection tool. This survey contains tests for affective disposition towards environment, environment behavior, environment knowledge, and environment cognitive skills. The results show that environmental literacy level of candidate teachers is moderate. It is found that candidate teachers' affective disposition towards environment is high, information about environment, attitudes towards environment and environment cognitive skills are moderate. It is found that environmental literacy levels of candidate teachers are significantly different based on their department and whether they took a course related to environment or not. Environmental literacy levels do not change significantly based on gender of candidate teachers and education levels of their parents. In addition, it is found that environmental literacy of candidate teacher's increase as levels of their curiosity about news and information about the environment increases. At the end of the study, in light of the obtained results, some suggestions are made for this study, researchers, and for future studies.

INTRODUCTION

There are various definitions of the concept of environment; however, environment can be defined as the place in which a living organism continue any type of social, biological, or cultural activities and meets its food, reproduction and accommodation needs. Environment is an umbrella term that includes all living and non-living things, and any physical, chemical, and biological factors that may affect those (Yildiz et al. 2008). The importance attached to the concept of environment has risen due to the environmental problems caused by especially Industrial Revolution, human-nature life affected, and the adverse effects of technology on environment. The adverse effects on natural life reaching a level that threatens human life have led societies to raise concerns about the environment, take some universal precautions, deliver declarations, and organize conferences. With the adverse effects observed not only locally but globally, Stockholm Conference was held in 1975, which was led by the United Nations. In this conference, the concept of environmental education emerged, and it was stressed that a special structure for environmental education, knowledge, skills, attitudes, behavior, and motivation were needed against the existing or likely environment problems (Venkataraman 2008; Yang 1993). One of the fundamental goals of environmental education is to raise individuals as environmentally literate.

Literacy can be defined as the ability to read and write at a level in which communication can be ensured through written or printed symbols.

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The term, Environmental literacy was first suggested by Charles Roth in 1968 (Altinoz 2010; Morrone et al. 2001). Roth revised the term, environmental literacy may times through addressing to its different aspects, and Roth (2002) redefined it as environmental literacy was all the perception, knowledge, skills and attitudes that improve individuals' behavior related to their own environment, Environmental literacy is composed of the combination of individuals' knowledge, attitudes and behavior (Roth 1992; Hsu and Roth 1998; Morrone et al. 2001; Goldman et al. 2006; Pe'er et al 2007; Erdogan et al. 2011). Environmental literacy is based on the environment and providing answers to the questions related to it, searching and findings answers, and using the answers that we have found effectively (Roth 2002). Individuals with advanced environmental literacy have awareness, knowledge and sensitivity related to how natural systems work and how human activities affect these systems (Teksoz et al. 2010; Roth 2002). Individuals with environmental literacy can easily understand the processes and events related to both social environment and natural environment (Morrone et al. 2001; Goldman et al. 2006; Pe'er et al. 2007).

The Goals of Environmental Literacy

There are several goals of environmental literacy as suggested by Archie (2003). These goals are to:

- improve individuals' investigating, questioning, and analyzing skills,
- obtain knowledge required for environmental development and human system improvement,
- improve skills for environmental awareness to be increased and comprehended
- and to raise individuals for environmental decisions and increase the common responsibility.

(as quoted in Altinoz 2010).

The teaching curriculum, renewed through the definitions and goals of environmental literacy that are determined, have been included in the primary, secondary and higher education programs under the title of environmental education composed of attainments related to environment and environmental literacy. Teacher education institutions play particularly an important role in this issue, and courses are offered in the related programs on environmental education. One of the other goals of environmental education is to increase individuals' environmental knowledge, and encourage them to have active roles in findings solutions to environmental problems (Abdullah et al. 2011).

One of the key factors that should be given priority in raising individuals with environmental literacy is the components of environmental literacy. The components of environmental literacy indicate the factors that need to be taken into consideration while raising individuals with environmental literacy.

The components of environmental literacy were first proposed by Roth (1982); these components were stated as knowledge, attitude/value, behavior and skills towards environment (Roth 1992). These components:

Knowledge: It is the knowledge of environmental concepts as well as ecological knowledge. It includes knowing environmental events and their relationships with the natural systems. Environmental knowledge can be defined as individuals' knowledge of how environmental events work, human-nature interaction, how environmental problems arise, and how to overcome these problems (Abdullah et al. 2011).

Attitudes and Values: It includes the individuals' sensitivity to environment and environmental problems and their considering moral and ethical values of the society while they make decisions about environment and conduct responsible environmental behavior.

Skill: It is individuals' use of environmental knowledge and attitudes towards environment in finding solutions to environmental problems. These skills, namely psychomotor, communication, and high level of thinking, are the skills that an individual with environmental literacy should have.

Behavior: It is the sign of individuals' environmental knowledge, and environmental attitudes and skills, and active participation in solving environmental problems (Kisoglu 2009). Environmental education aims to improve individuals' attitudes and behavior towards environment while at the same time it provides them with knowledge about environment (Timur and Yilmaz 2011).

When the literature on environmental literacy is considered, it is seen that few studies were conducted on this issue. Karatekin and Aksoy (2012), in their study conducted through survey

methods on environmental literacy, determined social sciences candidate teachers' (n=1587) levels of environmental literacy and interpreted these levels through various variables. They administered the survey of environmental literacy with the components of "knowledge, affective disposition, behavior, and cognitive skill" to 1587 candidate teachers enrolled at the program of Social Sciences Education in Faculties of Education of six different universities in Turkey. Gayford (2002) provided a program developed by the researcher to the second grade teachers of primary school in order to provide environmental literacy through the components of environmental education, namely, knowledge, attitude and behavior towards environment based on his own hierarchical structure. Pe'er et al. (2007), in their survey studies, examined and interpreted the environmental literacy levels (knowledge, attitude, and behavior) of the freshmen (n=765) enrolled at a faculty of education at a university in Israel through various variables. In a similar vein, Pe'er et al. (2007) examined the environmental literacy levels of candidate teachers (n= 765) enrolled at faculties of education of three different universities in Israel in terms of their behavior towards environment. Yavetz et al. (2009) in their longitudinal study examined whether there was any change in the environmental literacy levels of the candidate teachers during their education by administering an environmental literacy test to these candidate teachers when they first entered the university and when they graduated. Cutter and Smith (2001), in their qualitative study, looked into the environmental literacy levels of primary school teachers in Australia through open-ended questions.

The aim of the study is to determine the environmental literacy levels of primary school candidate teachers and interpret these levels according to different variables.

MATERIAL AND METHODS

Model

Descriptive survey model was used in the study. While Karasar (2010) defines survey model as the study that aims to reveal a situation that existed in the past or still exists, Buyukozturk et al. (2009) view it as the studies conducted to reveal participants' views or characteristics such as interest, skills, and attitude.

Participants

The population of the study includes the candidate teachers that enrolled at Elementary education department in the fall semester of 2012-2013 academic years. The sample, on the other hand, consists of 419 candidate teachers enrolled at elementary education department, faculty of education, Canakkale Onsekiz Mart University in the fall semester of 2012-2013 academic years.

As indicated in Table 1, the candidate teachers mostly enrolled in Science and Technology education (n= 178), while the fewest were in Social Sciences education (n=38).

Table 1: The descriptive data on the sample of the study

Program	*n*	*%*
Science and Technology Education (STE)	178	42.5
Classroom Teacher Education (CTE)	120	28.6
Preschool Education (PE)	83	19.8
Social Sciences Education (SSE)	38	9.1
Total	419	100.0

Data Collection Tool

As a data collection instrument, this study used the "Environmental Literacy survey", which was adapted by Karatekin (2011) to Turkish and developed by the same researcher through reviewing the related literature. The survey included the tests of affective disposition towards environment, environmental behavior, environmental knowledge, and environmental cognitive skills.

The Scale of Affective Disposition towards Environment

The scale of affective disposition towards environment was adapted to Turkish by Karatekin (2011) using the "High School Environmental Survey" scale that was published in Wisconsin Center for Environmental Education The number of the items in the scale were decreased from 30 to 27 following expert views and pilot study. The Cronbach Alpha reliability coefficient was determined as α=0.78 for the scale. The items of the scale were coded as "Strongly Agree,

Agree, Neither Agree nor Disagree, Disagree, and Strongly Disagree".

The Scale of Environmental Behavior

The scale of affective disposition towards environment was adapted to Turkish by Karatekin (2011) using the "High School Environmental Survey" scale that was published in Wisconsin Center for Environmental Education In addition to the adaptation of the scale, 7 items were added to the scale by the same researcher, and the scale was finalized with 19 items after piloting, validity and reliability analysis. The Cronbach Alpha reliability coefficient was determined as α=0.85 for the scale. The items of the scale were coded as "Always, Often, Sometimes, Rarely, Never". The scale is composed of 3 sub-dimensions. These are, namely, Physical Protection Behavior, Personal and Public Persuasion, Politic and Legal Behavior.

Environmental Knowledge Test

Some sections of the Environmental knowledge test were adapted to Turkish by Karatekin (2011) using the "High School Environmental Survey" scale that was published in Wisconsin Center for Environmental Education In addition to the adaptation of the scale, the same researcher, reviewing the related literature, added some new questions to the scale. Following the pilot study, reliability and validity analysis, the finalized scale included 21 items, and KR-20 reliability coefficient was determined as 0.71.

The Test of Environmental Cognitive Skills

The Test of cognitive skills was developed by Karatekin (2011) to investigate to what extent candidate teachers follow scientific research processes.

Data Analysis

The data collected through the scales used in the study were analyzed using statistical analysis software, SPSS 20.0. Arithmetical mean, standard deviation, independent t-test, one way and two way analyses of variance were used to analyze the data collected, and the sections where they were used were provided while providing the related findings.

FINDINGS

The Findings of the Primary School Candidate Teachers' Levels of Environmental Knowledge, Affective Disposition, Behavior, and Environmental Literacy

The scales of affective disposition and environmental behavior and the tests of environmental knowledge and environmental cognitive skills were used to determine primary school candidate teachers' levels of environmental literacy. First of all, the arithmetic means of the scores that the candidate teachers obtained in these four sub scales were calculated, and their levels were determined. Later, through the method developed by McBeth et al. (2008), the candidate teachers' levels of environmental literacy were revealed. As indicated in this method, a standardized maximum score (60) was determined for candidate teachers in all the scales. Afterwards, the multipliers required to the maximum scores to be obtained from each scale and sub dimensions were determined according to this standardized score.

The multiplication values to be used in determining primary school candidate teachers' levels of environmental literacy are provided in Table 2. As can be seen in Table 2, to make the maximum score to be obtained in each scale "60", the multiplication value was determined as "2.857" for the test of environmental knowledge, "0.444" for the scale of affective disposition, "0.631" for the scale of behavior, and "8.571" for the test of cognitive skills. According to the standardized score, the highest level of environmental literacy was determined as 240 points, and the lowest was as 24 points. Later, the level of environmental literacy was divided into three categories, namely, low, intermediate, high to be between the lowest and the highest scores. According to this categorization, the score 24-96 indicates low, the score 97-168 shows intermediate, and the score 169-240 indicates high level of environmental literacy.

The model developed by Mcbeth et al. (2008) was used to determine primary school candidate teachers' levels of environmental literacy. According to this mode, the level of environmental literacy was divided into three categories, namely, low, intermediate, and high. Based on this model, the levels of primary school candidate teachers' levels of environmental literacy are provided in Table 3.

Table 2: The multiplication values used in determining primary school teachers' levels of environmental literacy and the maximum scores that can be obtained in each scale

The components of environmental literacy	*Specific conceptual dimension*	*Number of questions*	*Range*	*Multiplier*	*The maximum score*
Knowledge		21	0-21	2.857	60
Affective Disposition		27	27-135	0.444	60
Behavior	Physical Protection	7	7-35	0.631	22
	Individual Social Persuasion	6	6-30	0.631	19
	Politic and Legal	6	6-30	0.631	19
					Total=60
Cognitive Skill		7	0-7	8.571	60
Total Score		74	46-258		240

Table 3: Determining candidate teachers' environmental literacy levels

The sub components of environmental literacy		*Low*	*Intermediate*	*High*	*X*	*S*
	Range	0-20	21-40	41-60	35.79	8.39
Knowledge	F	19	296	104		
	%	4.54	70.64	24.82		
Affective Disposition	Range	12-28	29-44	45-60		4.05
	F	-	189	230	45.70	
	%	-	45.10	54.90		
Behavior	Range	12-28	29-44	45-60		6.79
	F	73	314	32	35.00	
	%	17.42	74.95	7.63		
Cognitive Skill	Range	0-20	21-40	41-60		17.18
	F	235	88	96	23.13	
	%	56.09	21.00	22.91		
Total	Range	24-96	97-168	169-240		23.70
	F	13	354	52	139.65	
	%	3.10	84.48	12.42		

As indicated in Table 3, the score 0-20 points was determined as low, 21-40 as intermediate, and 41-60 as high. Based on this categorization, the ratio of the Candidate Teachers whose scores are 0-20 points is 4.54% (n=19), and the ratio of the Candidate Teachers whose scores are 21-40 points is 70.64% (n=296). The ratio of the Candidate Teachers whose scores are 41-60 points is 24.82% (n=104). The average of the candidate teachers' score in the test of environmental knowledge is (X= 35.79). Considering these values, it can be stated that candidate teachers' levels of environmental knowledge is intermediate.

In the scale of affective disposition, the score 12-28 points was determined as low, 29-44 as intermediate, and 45-60 as high. Based on this categorization, there are not any candidate teachers whose scores are 12-28. The ratio of the Candidate Teachers whose scores are 29-44 points is 45.10 % (n=189), and the ratio of the Candidate Teachers whose scores are 45-60 points is 54.90% (n=230). The average of the candidates teachers' score in the scale of affective disposition is (X=45.70). Considering this value, it can be argued that the candidate teachers' affective disposition towards environment is high.

In the scale of behavior, the score 12-28 points was determined as low, 29-44 as intermediate, and 45-60 as high. Based on this categorization, the ratio of the candidate teachers whose scores are 12-28 points is 17.42% (n=73), the ratio of the candidate teachers whose scores are 29-44 points is 74.95% (n=314), and the ratio of the candidate teachers whose scores are 45-60 is 7.63% (n=32). The average of the candidates teachers' score in the scale of behavior is (X=35.00). Considering this value, it can be argued that the candidate teachers' environmental behavior is high.

In the scale of affective disposition, the score between 0-20 points was determined as low, 21-40 as intermediate, and 41-60 as high. Based on

this categorization, the ratio of the candidate teachers whose scores are 0-20 points is 56.09% (n=235), the ratio of the candidate teachers whose scores are 21-40 points is 21% (n=88), and the ratio of the candidate teachers whose scores are 41-60 is 22.91% (n=96). The average of the candidate teachers' score in the test of cognitive skills is (X=23.13). Considering these values, it can be suggested that candidate teachers' cognitive skills are at the intermediate level, but close to the low level.

The scales of affective disposition and environmental behavior and the tests of environmental knowledge and environmental cognitive skills were used to determine primary school candidate teachers' levels of environmental literacy. The means of the total scores obtained by candidate teachers from these sub components of the environmental literacy, standard deviations and their levels were calculated separately. The maximum score that the candidate teachers can obtain from these four scales is 240. Based on the standardized score, the score between 24-96 points was determined as low, 97-168 as intermediate, and 169-240 as high. According to this categorization, the ratio of the candidate teachers whose scores are 24-96 points is 3.10% (n=13), the ratio of the candidate teachers whose scores are 97-168 points is 84.48% (n=354), and the ratio of the candidate teachers whose scores are 169-240 is 12.42% (n=52). The mean of the total scores obtained by candidate teachers in the four separate components of environmental literacy was calculated as (X= 139.65). Considering these values, it can be stated that candidate teachers' levels of environmental literacy is intermediate.

The Findings on Primary School Candidate Teachers' Levels of Environmental Literacy According to Their Genders

In order to determine whether primary school candidate teachers' levels of environmental literacy change according to gender, the independent samples t-test was conducted.

As indicated in Table 4, there is not any statistically significance difference between the primary school candidate teachers' levels of environmental literacy and their genders. Considering this finding it can be stated that candidate teachers' levels of environmental literacy do not change according to their genders.

The Findings on the Candidate Teachers' Levels of Environmental Literacy According to the Programs That They Are Enrolled At

As indicated in Table 5, the candidate teachers mostly enrolled in Science Education (n= 178), while the fewest were in Social Sciences education (n=38). The candidate teachers enrolled at Classroom education obtained the highest levels of environmental literacy (X=143.60).

Table 5: The descriptive data based on the candidate teachers' levels of environmental literacy according to the programs they are enrolled at

	Program	*n*	*X*	*SD*
Environmental Literacy	Science education	178	142.05	23.67
	Classroom teacher education	120	143.60	20.95
	Preschool education	83	128.55	26.68
	Social sciences Education	38	140.16	18.01
	Total	419	139.65	23.70

As indicated in Table 6, one-way variance analysis was conducted to determine whether there was a statistically significance between the candidate teachers' scores in the scale of environmental literacy and the programs that they were enrolled at.

There is a statistically significant difference between the candidate teachers' score in the scale of environmental literacy and the programs that they were enrolled at [$F_{(3-415)}$=8.19, p<.05]. Con-

Table 4: The results of the t-test on primary school candidate teachers' levels of environmental literacy according to their genders

	Gender	*N*	*X*	*SD*	*df*	*t*	*p*
Environmental Literacy	Male	107	137.90	23.12	417	.88	.37
	Female	312	140.25	23.91			

*p>.05

Table 6: The ANOVA results of the scores obtained by the teacher candidates in the scale of environmental literacy scale according to the programs they are enrolled at

		Sum of squares	*Sd*	*Sum of squares*	*F*	*p*	*Sig.*
Environmental Literacy	Between groups	13137.52	3	47.99	8.19	.000*	STE-PE
	Within groups	221842.43	415	211.77			CTE-P
	General	234979.95	418				ESSE-PE

*p<.05

Table 7: The descriptive data based on the candidate teachers' levels of environmental literacy according to their parents' education level

		n	*X*	*SD*
Environmental Literacy	*Mother's Education Level*			
	Illiterate	41	141.18	22.48
	Primary school graduate	216	141.05	23.44
	Middle school graduate	60	137.66	24.59
	High school graduate	79	135.00	23.77
	University graduate	23	144.94	24.97
	Total	419	139.65	23.70
	Father's Education Level			
	Illiterate	28	143.48	24.21
	Primary school graduate	137	142.36	22.87
	Middle school graduate	70	135.47	23.33
	High school graduate	119	137.60	22.27
	University graduate	65	140.52	27.58
	Total	419	139.65	23.70

Table 8: ANOVA results of the scores in environmental literacy according to parents' education levels

	Sum of squares	*df*	*Sum of squares*	*F*	*p*
Mother education	1061.16	4	265.29	.47	.75
Father education	1806.474	4	451.61	.80	.52
MxF	7802.88	13	600.22	1.07	.38
Error	221959.61	397	559.09		
Total	234979.95	418			

sidering this finding, it can be stated that candidate teachers' levels of environmental literacy do not change according to the programs that they are enrolled at. According to LSD test, which was conducted to determine in which groups were different from each other, it can be stated that the candidate teachers enrolled at Science Education, Classroom Teacher Education and Social Sciences Education are more environmentally literate than those enrolled at Primary School Education.

The Findings on the Candidate Teachers' Levels of Environmental Literacy According to Parents' Education Levels

Two-way variance analysis was conducted to determine whether candidate teachers' levels of environmental literacy would change according to their parents' educational level.

As can be seen in Table 7, the candidate teachers whose parents are graduates of primary school outnumber the others (n=216, n=137). The candidate teachers whose mothers are university graduates (X=144.94) and the candidate teachers whose fathers are illiterate have the highest means (X= 143.48)

As indicated in Table 8, the common effect of parents' educational level on candidate teachers' levels of environmental literacy was not found statistically significant ($F_{(13-397)}$=.38, p>01].) In the same vein, parents' educational level did not affect the candidate teachers' levels of environmental literacy [$F_{(4-397)}$=.75, .52, p>01].

The Findings on the Candidate Teachers' Levels of Environmental Literacy According to Their Curiosity Level about News and Knowledge Related to Environment

As indicated in Table 9, the number of the candidate teachers who are not curious about the news or knowledge related to environment is the lowest (n=16), while the mean scores of those who are very curious are the highest (X=152.63).

Table 9: The descriptive statistics on the candidate teachers' levels of environmental literacy according to their curiosity level about news and knowledge related to environment

	Level of curiosity	*n*	*X*	*SD*
Environmental Literacy	I am not curious (NC)	16	137.75	26.44
	I am a little curious (LC)	98	133.52	21.77
	I am curious at an intermediate level (IC)	274	140.48	23.56
	I am very curious (VC)	31	152.63	24.28
	Total	419	139.65	23.70

As indicated in Table 10, one-way variance analysis was conducted to determine whether there was a statistically significance between the candidate teachers' scores in the scale of environmental literacy and their levels of curiosity about the news and knowledge related to environment.

There is a statistically significant difference between the candidate teachers' mean scores in the scale of environmental literacy and their levels of curiosity about the news and knowledge related to environment [$F_{(3-415)}$=5.60, p<.05]. According to LSD test, which was conducted to determine in which groups were different from each other, the environmental literacy levels of the candidate teachers with a high level of curiosity about the news and knowledge on environment appear to be higher than those of the candidate teachers that are a little curious, curious at an intermediate level, or not curious at all. In the same way, the candidate teachers with an intermediate level of curiosity seem to have a higher level of environmental literacy than those with a low level of curiosity. As this finding suggests, the more curious the candidate teachers are about the news and knowledge on environment, the higher their levels of environmental literacy are.

The Findings on Primary School Candidate Teachers' Levels of Environmental Literacy According To any previously-taken course in Environment

In order to determine whether primary school candidate teachers' levels of environmental literacy change according to any previously-taken course in environment, the independent samples t-test was conducted.

As indicated in Table 11, there is a statistically significance difference between the primary school candidate teachers' levels of environ-

Table 10: The ANOVA results of the candidate teachers' scores in the scale of environmental literacy according to their curiosity level about news and knowledge related to environment

		Sum of squares	*Sd*	*Sum of squares*	*F*	*p*	*Sig.*
Environmental Literacy	Between groups	9149.09	34	3049.69	5.60	.001*	IC-LC
	Within groups	225830.86	15	544.17			VC-NC
	General	234979.95	418				LC, IC

* p<.05

Table 11: The results of the t-test on primary school candidate teachers' levels of environmental literacy according to their genders

	Course in environment	*N*	*X*	*SD*	*df*	*t*	*p*
Environmental Literacy	Take a course	220	142.12	23.31	417	2.25	.025*
	Not take a course	199	136.92	23.90			

*p<.05

mental literacy and any course-previously taken in environment ($t(417)=2.25$, $p<.05$). As this finding indicates, the environmental literacy levels of the candidate teachers that have taken a course in environment ($X=142.12$) is higher than those of the candidate teachers that have not taken any course in environment ($X=136.92$)

DISCUSSION

In this study primary school teacher candidates' environmental knowledge levels and environmental behavior were found intermediate, while their levels of affective disposition towards environment were high. In addition, candidates'' levels of environmental cognitive skills were found intermediate, but are found to be close to low. Also, environmental literacy levels, including these four components, were intermediate. Karatekin (2011) also determined that social sciences candidate teachers' levels of environmental knowledge, behavior, and environmental literacy were intermediate. Karatekin (2011) also revealed that candidate teachers' levels of cognitive skills were low. Timur (2011) indicated that the science education candidate teachers' levels of knowledge and behavior were intermediate, while their affective dispositions (attitudes) were high and their levels of environmental literacy were intermediate. Altinoz (2010) confirmed that science education candidate teachers' affective dispositions (attitudes) were at high levels, while their levels of environmental literacy were intermediate. However, Altinoz (2010) determined candidate teachers' levels of environmental knowledge and behavior as low. Cutter and Smith (2001) found that primary school teachers' levels of environmental literacy were low. Erdogan (2009), in the study conducted with fifth-grade students of primary school, revealed that the students' levels of environmental literacy were intermediate.

Other finding of this study was primary school candidate teachers' environmental literacy levels do not change according to their genders. This might be attributed to the fact that equal opportunity is provided in classroom without any gender discrimination Chu et al. (2007) compared the levels of environmental literacy of the primary school students aged between 8 and 9 and found a statically significant difference in all the components of environmental literacy in favor of the female students. Varisli (2009), in the study conducted on the 8th grade students, found that environmental literacy changed significantly according to gender, and the difference was in favor of the female students.

Science, classroom and social sciences teacher candidates appear to be more environmentally literate compared to those enrolled at pre-school education. It is seen that there are courses offered entitled "Environmental Education" and "Environmental Science" at the undergraduate level in Science education and classroom teacher education. However, there is not a course in environment at an undergraduate level in pre-school education. It can be stated that the pre-school education candidate teachers' low levels of environmental literacy compared to other programs can be attributed to the fact that they do not take any course in environment. Moreover, this result is in alignment with another result indicating that candidate teachers that take a course in environment seem to be more environmentally literate than those that do not take a course.

In this study it is found that candidate teachers' levels of environmental literacy do not change according to their mothers' and fathers' education level. Varisli (2009), in the study conducted on 8th grade students, found that there was a statistically significant difference in environmental literacy based on parents' educational level.

As candidate teachers' environment-related news and information curiosity level increase, environmental literacy levels increase. Erdogan (2009) found that the increase in 5th grade primary school students' levels of curiosity on the news and knowledge about environment also lead to an increase in their responsible behavior towards environment. Karatekin (2011) also reached the conclusion that the increase in the social sciences candidate teachers' levels of curiosity on the news and knowledge about environment lead to a rise in their environmental knowledge, affective disposition, and environmental behavior.

The other finding of this study is environmental literacy levels of the candidate teachers' change according taking a course in environment. The level of environmental literacy of teacher candidates that taken any course in environment is higher than those of the candidate teachers that have not taken. Also Ek et al. (2009) came to the conclusion that the candidate teach-

ers that have taken a course in environment adopted more positive attitudes and sensitivity towards environmental problems than those that have not taken any course in environment. Kahyaoglu et al. (2008) compared the attitudes of primary school candidate teachers (Science, Mathematics, Social Sciences, and Classroom teacher education) with the effect of taking any previous course in environment. The candidate teachers' attitudes that have taken a course in environment are higher than those of the candidate teachers that have not taken any course in environment. As can be seen, the levels of environmental literacy and the sub components of environmental literacy rise with the effect of taking any previous course in environment.

CONCLUSION

The aim of the study is to determine the environmental literacy levels of primary school candidate teachers and compare these levels according to different variables. Based on the findings of the study, the following conclusions have been reached:

The primary school candidate teachers' levels of environmental knowledge and environmental behavior are intermediate, while their levels of affective disposition towards environment are high. Moreover, their levels of environmental cognitive skills are intermediate, but are found to be close to low. On the other hand, their levels of environmental literacy, including these four components, are intermediate.

Primary school candidate teachers' levels of environmental literacy do not change according to their genders.

The candidate teachers enrolled at science, classroom teacher, and social sciences teacher education appear to be more environmentally literate compared to those enrolled at pre-school education.

The candidate teachers' levels of environmental literacy do not change according to their parents' education level.

The more curious the candidate teachers are about the news and knowledge on environment, the higher their levels of literacy are.

The environmental literacy levels of the candidate teachers that have taken a course in environment are higher than those of the candidate teachers that have not taken any course in environment.

RECOMMENDATIONS

Considering the results of the current study, the following suggestions can be put forward:

The number of the courses in environment should be increased in order to increase primary school candidate teachers' levels of environmental literacy.

The levels of environmental knowledge and behavior of the candidate teachers that will raise the individuals of the future are crucial to a more livable environment and an endurable life. Therefore, a course or courses in environment should be integrated into the undergraduate curriculum of pre-school education.

In order to increase candidate teachers' levels of curiosity on the news and knowledge about environment, nature excursions or tours should be organized so that candidate teachers are given the opportunity to see natural places in person

Candidate teachers should be encouraged to participate in the projects in environment that are organized and supported by The Scientific and Technological Research Council of Turkey for candidate teachers, and the number of such projects should be increased.

The number of the scientific books available on environment in the libraries should be increased so that candidate teachers can have a fast and easy access to knowledge about environment. Websites that include up-to-date and educational materials and knowledge should be created.

Further research can be conducted in other programs to compare the levels of environmental literacy in addition to primary schools.

Through interviewing teachers and candidate teachers, their views of environment can be revealed.

It should be ensured that courses in environment should be integrated in the undergraduate programs in teacher education while the curricula of these programs are developed.

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