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The relationship between environmental literacy and self-efficacy beliefs toward environmental education

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Abstract

This study examines the level of preservice elementary teachers' literacy and self-efficacy beliefs and investigates the relationship between their environmental literacy and self-efficacy beliefs. The sample for the study comprises 61 2nd year students in the Elementary Education Department of a private university in Turkey. The results of the study show that the participants did not have sufficient environmental knowledge or self-efficacy beliefs related to environmental education, although their environmental attitude, concern, and perception of environmental issues were relatively high. The results also indicate a significant correlation between their self-efficacy beliefs and their concern for the environment. The authors conclude that the quality of environmental education in teacher education programs in Turkey needs to be improved.

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1. Introduction

We are now faced with serious environmental problems, including global warming, ozone depletion (Kılınc, 2010), and the extinction of species, all of which threaten the sustainability of life. Our most valuable defense against such threats is education. Since environmental problems may have overwhelming consequences for our future, we must attend to the goal of education as clearly stated in the Belgrade Charter:

The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (UNESCO-UNEP, 1976)

In recent years, environmental literacy has been considered to be the most important component of environmental education. Disinger & Roth (1992, cited in Tuncer et al., 2009) defined environmental literacy as "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems" (p. 2). Tuncer and colleagues identified four components of environmental

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literacy: environmental knowledge, environmental attitudes, perception of environmental behavior, and environmental concern. Using an instrument to assess 684 preservice teachers' environmental literacy, they examined the relationship between participants' environmental knowledge, attitude, and concerns. They found that environmental knowledge was correlated with environmental concerns and perceptions of environmental behavior. Their results also showed a high correlation between environmental attitudes and perceptions of environmental behavior. Additionally, they found small, but significant relationships between attitudes and concerns and between concerns and perceptions of behavior.

Another study (Alp, Ertepinar, Tekkaya, & Yilmaz, 2008) showed that elementary students' environmental behaviors were independent of their knowledge of environmental issues. Affective variables seemed to have greater influence on their behaviors, emotional bonding, for example, and sensitivity toward nature, traits that may have influenced their environmental literacy.

Since self-efficacy has been shown to be related to various types of behavior, there may be a correlation between students' self-efficacy beliefs and environmental literacy. "Self-efficacy is people's judgments of their capabilities to organize and execute courses of action required to attain types of performances" (Bandura, 1986, p. 391). Self-efficacy beliefs affect individuals' choice of tasks, their effort, and their persistence. Self-efficacious individuals are likely to work harder on a task and persist for longer periods of time than less self-efficacious individuals. In related research, Pintrich and Schunk (2002) have shown that teachers who do not have confidence in their ability to improve student learning tend to focus on the negative features of their classrooms and are less likely to teach successfully. Thus, it is reasoned, if teachers enhance their self-efficacy beliefs toward environmental education, their effectiveness as teachers will also increase (Ozdemir, Aydin, & Akar-Vural, 2009).

Aforementioned literature in science education emphasizes the importance of students' self-efficacy beliefs and environmental literacy. Consequently, teachers are expected to have high self-efficacy beliefs and to be literate about environmental issues.

2. Methodology

2.1. Purpose

This study examines preservice teachers' environmental literacy and self-efficacy beliefs toward environmental education and investigates possible relationships between their literacy and their beliefs. In pursuit of this dual purpose, the study addresses the following research questions:

1. What is the preservice elementary teachers' environmental literacy level?
2. What is the level of preservice elementary teachers' self-efficacy beliefs related to environmental literacy components (knowledge, attitude, behavior, and concern)?
3. Is there any significant relationship between environmental literacy and self-efficacy beliefs toward environmental education?

2.2. Sample

The sample for the study comprises sixty-one preservice elementary teachers enrolled in the course "Environmental Education" in the Department of Elementary Education at a private university in Turkey during the fall semester of 2011-2012. Since these students were not in training to become science teachers, they had taken no previous science education or environmental education courses. Furthermore, they enrolled Elementary Education Department based on their scores they get from the items in the sections of mathematics, Turkish language and social sciences on the university entrance exam. The students who study in Elementary Education Department in Turkey do not need to answer the questions related to science topics. Therefore, these students often had little or no science education backgrounds and had not received any previous environmental education.

2.3. Instruments

2.3.1. The Scale of Self-Efficacy Belief Toward Environmental Education (SSEBTEE)

This scale was developed by Ozdemir et al. (2009) and consisted of 15 items assessing students' self-efficacy beliefs related to environmental education. It is a 5-point Likert-type scale and includes four dimensions: academic competency perception (6 items), responsibility perception (3 items), instructive competence perception (3 items), and guidance perception (3 items). The scale ranges from 1 (strongly disagree) to 5 (strongly agree). The coding of the items containing a negative statement is reversed, i.e., 1 (strongly agree) to 5 (strongly disagree). The reliability coefficient of the scale is 0.76.

2.3.2. The Scale of environmental literacy (SEL)

This instrument, developed by Kaplowitz and Levine (2005, cited in Tuncer et al., 2009), was translated into Turkish and adapted for use in Turkey by Tuncer et al. (2009). The survey questionnaire consists of 45 items and in four dimensions: environmental knowledge (11 items), environmental attitudes (7 items), perception of environmental behavior (19 items), and environmental concern (8 items).

The dimension of environmental knowledge is composed of multiple-choice items and each correct response receives a score of 1 while each incorrect response receives 0. Possible scores for this dimension range from 0 (no correct responses) to 11 (all correct responses). The rest of the instrument consists of survey items based on a 5-point Likert-type scale: 5 for "strongly agree," 4 for "agree," 3 for "undecided," 2 for "disagree," and 1 for "strongly disagree." The coding of the items containing a negative statement is reversed: 5 for "strongly disagree" and 1 for "strongly agree."

2.4. Procedure

Participants completed both scales at the beginning of the semester. A Pearson coefficient of correlation was used to analyze the data. The Statistical Package for Social Sciences was used to analyze data to the 95% confidence interval.

3. Results and discussion

Table 1 shows mean scores and standard deviations of the variables. The maximum possible score for the SSEBTEE was 75 and the maximum for the environmental knowledge level of the SEL was 11. The participants' self-efficacy beliefs related to environmental education and environmental knowledge are both in the moderate range. However, their levels of environmental attitude, behavior, and concern are quite high.

Table 1. Descriptive statistics

	Mean	SD	N
Self-efficacy	49.57	7.48	61
Knowledge	6.34	1.49	61
Attitude	38.52	4.31	61
Behavior	74.28	7.28	61
Concern	34.62	7.18	61

A deeper analysis of participants' responses showed that a majority of the participants knew the definition of biodiversity (74%); that industrial discharges are a major source of surface water pollution (85%); that the primary governmental agency for environmental protection in Turkey is the Ministry of Environment and Forestry (71%). Moreover, more than half of the respondents seem to have understood that most garbage in Turkey ends up in solid

waste storage areas (67%); that trees are renewable resources (66%); that the ozone layer serves as protection from cancer-causing sunlight (62%); that batteries are hazardous household wastes (59%); and that most electricity is generated in Turkey by hydroelectric power plants (56%). Although these percentages are lower than those recorded by Tuncer et al. (2009), our results are generally consistent with theirs. The most interesting point of this analysis is that a minority (13%) correctly responded to an item stating that motor vehicles are the greatest producers of carbon monoxide and to an item about the method for storing nuclear waste (18%). Tuncer et al. (2009) also recorded few correct responses to the item about cars and air pollution. However, they received more correct responses to the nuclear waste item (41%) than we did. This difference might have arisen from the different backgrounds of the participants. The preservice teachers in our study were all in Elementary Education and had little or no background in science, whereas those who participated the Tuncer study were more diverse, majoring in Secondary Science and Mathematics Education, Foreign Language Education, and Computer Education / Instructional Technology as well as Elementary Education.

The Pearson correlation indicated a slight but significant relationship between the participants' self-efficacy beliefs related to environmental education and their environmental concern. This finding is not surprising; the more the preservice teachers are concerned about environmental problems the stronger their belief that they can teach students about the problems. No significant correlation was found between their self-efficacy beliefs and environmental knowledge, attitude, or behavior (Table 2). This result might be due to the preservice elementary teachers' relatively low environmental knowledge and self-efficacy beliefs. Since they do not have much environmental knowledge and do not have strong self-efficacy beliefs, other sources such as the media may have influenced their attitudes and perceptions of environmental behavior.

Table 2. Correlations

	Correlation	Self-efficacy	Knowledge	Attitude	Use	Concern
Self-efficacy	Pearson correlation	1	0.003	0.122	-0.006	0.294*
	Sig. (2-tailed)		0.982	0.350	0.961	0.021

* $p < 0.05$

4. Conclusion

The findings of this study show that the participating preservice elementary teachers do not have sufficient environmental knowledge and self-efficacy beliefs related environmental education. Their knowledge is especially weak concerning the issues of nuclear waste and the contribution of motor vehicles to air pollution. Elementary education programs should provide information about technology, energy resources, the use of resources, the effects of industrialization, and the causes and proposed solutions of major environmental problems. Findings also show, however, that the participants' environmental attitudes, perception of behavior, and concern for the environment seem to be stronger than their knowledge and self-efficacy beliefs. Media, Internet, and environmental organizations may have influenced these affective components of environmental literacy.

The results also reveal a significant relationship between the preservice teachers' self-efficacy beliefs related to environmental education and their concern for the environment. One can conclude that their self-efficacy beliefs can be enhanced in conjunction with their concern, thus contributing to their effectiveness as teachers.

Elementary teachers have a crucial role in creating an environmentally literate society. Elementary teacher education programs in Turkey need to be improved. The findings of this study support the argument for better environmental education and may stimulate change. Studies that compare preservice teachers' scientific literacy and/or self-efficacy beliefs before and after experimental treatment may guide the change.

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