A Statistical Analysis of Turkish Student Teachers' Perceptions on Teaching Environmental Issues

The aims of the current study were to examine student teachers' attitudes toward the environment and the relevance of science teaching with environmental education (EE), self-efficacy beliefs on teaching EE, and their intentions on teaching EE, and to determine the impact of grade level and Teacher Education Program on student teachers' attitudes toward the environment and the relevance of science teaching with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE. The subjects of the study were constituted of 405 elementary science (ESE), and 164 early childhood education (ECE) student teachers enrolled in an undergraduate program at two different randomly selected public universities in Ankara, Turkey. Environmental Attitude Scale and The Questionnaire of Teachers' Perceptions of Teaching Environmental Issues were administered. Two-way Multivariate Analysis of Variance results indicated that grade level has a positive impact on the student teachers' attitude toward EE, the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions to teach EE. Although a high positive relationship could not be reported, these environment related variable were significantly associated with each other.

Introduction

In line with setting up standards to achieve environmental, economic, and social development, many developing countries have experienced several environmental handicaps such as water pollution, solid waste management, soil degradation, haphazard urbanization, and a rapid flow of population to the large cities. Environmental deterioration and ecological crisis have reached a dimension endangering the life of human beings and other living things. If individuals are supposed to confront such issues and make informed decisions, then they must be equipped with the core knowledge of environmental concepts and processes. Uninformed environmental decisions and actions could be very costly at the ecological, economic, and social levels. In this aspect, teaching society on the preservation and improvement of natural resources has become increasingly important across the globe (Ko & Lee, 2003).

Some research studies investigating children's environmental knowledge and attitudes showed that they seemed willing to make sacrifices and take precautions to protect the environment, but lacked necessary knowledge to make informed decisions (Alp, E. *et al*., 2006; Makki, Boujaoude & Abd-el-Khalick, 2003). Among the various subjects taught in elementary schools, science is emphasized as the most significant contributor to provide every person with opportunities to acquire the knowledge on environmental issues. In line with this, elementary education curriculum developers tend to teach environmental education (EE) through science. EE programs integrated with science teaching are designed to prepare environmentally literate future citizens who would take an active role in confronting environmental problems through making vital decisions and fostering behaviors toward environmentally responsible actions (Makki, *et al*., 2003).

Integration of environmental education into Turkish elementary education curriculum has become crucially needed since one-fourth of the population of Turkey is comprised of children at elementary school age. In 2005, The Ministry of Turkish National Education planned a strategy to incorporate environmental education into formal science education curriculum in order to guarantee the conservation and improvement of the environment (Ministry of Turkish National Education [MNE], 2005b). Some environmental subjects such as recycling, water pollution, deforestation, and endangered

species are included in the newly developed school curriculum which will be implemented in the following years. It is intended to stimulate the development of environmentally informed individuals that would actively involve in resolution of environmental problems. At this point, the process of EE strategy has created a need for effective teachers who would play an important role in implementation of formal school curriculum. Conducting some researches that judge student teachers' perception of teaching on environmental education and their self-efficacy is one of the ways to evaluate teacher effectiveness.

The following research questions guided the present study:

1. What are the student teachers' attitudes toward the environment and the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE?

2. Is there a significant effect of grade level on the mean scores of student teachers for attitudes toward the environment and the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE?

3. Is there a significant effect of Teacher Education Program on the mean scores of student teachers for attitudes toward the environment and the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE?

4. Are there any significant relationships between student teachers' attitudes toward the environment and the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE?

Method

Sample

The participants of the study were a total of 569 freshman, sophomore, junior, and senior student elementary science (ESE), and early childhood education (ECE) teachers enrolled in an undergraduate program at two different randomly selected public universities in Ankara, Turkey. Of the participants 429 (76.3%) were females, while 133 (23.7%) were males. Due to different quota of the departments, the number of student teachers from the department of elementary science education (405) was greater than those attending early childhood education program (164). Concerning the grade level of participants, the sample consisted of 146 (25.7%) freshman, 145 (25.5%) sophomore, 148 (26.0%) junior, and 130 (22.8%) senior student teachers.

Instruments

The data were collected by the administration of Environmental Attitude Scale prepared by Berberoglu & Tosunoglu (1995) and The Questionnaire of Teachers' Perceptions of Teaching Environmental Issues developed by Ko & Lee (2003). Environmental Attitude Scale consisted of 18 five-point Likert-type items (strongly agree, agree, undecided, disagree, strongly disagree) measuring participants' emotional reflections toward preservation of nature. These items were loaded in four factors namely, attitudes toward population growth (5 items), attitudes toward the importance of environmental problems (5 items), attitudes toward the use of nuclear energy (4 items), and attitudes toward energy conservation (4 items).

The Questionnaire of Teachers' Perceptions of Teaching Environmental Issues comprised 20 five-point Likert-type items (strongly agree, agree, undecided, disagree, strongly disagree). The items were sampled systematically from three factors: attitude toward the relevance of science with EE (4 items), self-efficacy beliefs on teaching EE (8 items), and intentions on teaching environmental knowledge, attitude and skills (8 items).

Data Analysis

To assess student elementary science, and classroom teachers' attitudes toward the environment (AE) and the relevance of science with EE (RSE), self-efficacy beliefs on teaching EE (SE), and their intentions to teach EE (ITE), means and standard deviations were determined through descriptive statistics. Two-way Multivariate Analysis of Variance (MANOVA) was conducted to evaluate the effects of grade level and attended departments on student teachers' attitudes toward the environment and the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions to teach EE. Bivariate Correlational Analysis was carried out to examine the associations between these environment related variables. Statistical analyses were conducted at the 0.05 significance level.

Results

Student Teachers' Attitudes, Self-Efficacy, and Intentions on Teaching EE

Table 1 presents the descriptive statistics on AE, RSE, SE, and ITE with respect to grade level and attended departments. Regarding total scores for all participants, the mean scores of AE (M=75.1, S.D=8.2) and RSE (M=72.7, S.D=12.6) reflected that student teachers had favorable attitudes toward the environment and the relevance of science with EE. On the other hand, the mean score on SE (M=67.6, S.D=13.7) and ITE (M=66.4, S.D=15.7) indicated that student teachers had low self-efficacy beliefs on teaching EE and they did not believe that the students would acquire the necessary knowledge, attitudes, and skills by their teaching.

With respect to attended teacher education programs, student teachers attending ECE (M=89.2, S.D=11.8; M=66.2, S.D=16.0) and ESE (M=88.6, S.D=10.4; M=66.5, S.D=15.6) had almost equal mean scores on RSE and ITE, respectively. Student teachers attending ESE (M=68.3, S.D=13.5) had higher mean score on SE than those attending ECE (M=66.0, S.D=14.0), whereas ESE student teachers (M=74.8, S.D=8.4) had lower mean score on AE than ECE student teachers (M=76.0, S.D=7.5).

Considering the grade level of the participants, the findings showed that the student teachers had higher mean scores on AE, SE, and ITE as the grade level increases. On the other hand, sophomore, junior, and senior student teachers had approximately equal mean scores on RSE, and these mean scores were quite higher than that of freshman student teachers.

Table 1. Descriptive Statistics with respect to Grade Level and Attended Teacher Education Programs (TEP)

Independent Variables	AE		RSE		SE		ITE	
	M	**S.D.**	**M**	**S.D.**	**M**	**S.D.**	**M**	**S.D.**
TEP								
ESE	74.8	8.4	88.6	10.4	68.3	13.5	66.5	15.6
ECE	76.0	7.5	89.2	11.8	66.0	14.0	66.2	16.0
Grade Level								
Freshman	73.8	7.7	85.3	11.2	64.6	12.8	62.1	15.9
Sophomore	74.9	8.7	90.8	9.9	64.3	12.6	65.5	14.3
Junior	75.1	8.1	89.7	10.7	67.7	13.3	68.9	16.1
Senior	76.8	7.8	89.2	10.8	74.7	13.7	69.5	15.3
Total	75.1	8.2	72.7	12.6	67.6	13.7	66.4	15.7

The Effects of Grade Level and Attended Teacher Education Programs on Attitudes, Self-Efficacy, and Intentions on Teaching EE

To investigate the effects of grade level and attended departments on AE, RSE, SE, and ITE, two-way multivariate analysis of variance (two-way MANOVA) was used. Levene's Test of Equality of Error Variances indicated that there was no violation in the homogeneity of variances assumption on AE, RSE, SE, and ITE. Nonsignificant Box's Test of Equality of Covariance Matrices reflected no violation in the homogeneity of covariance assumption. Furthermore, nonsignificant correlations between dependent variables showed that there is no multicollinearity.

Regarding the grade level, the significant Wilk's Lambda ($p=.000$) showed that there was a significant mean difference across the scores on a combination of AE, RSE, SE, and ITE, but with a small effect size (Partial $\eta^2=.034$). The small effect size indicated that only 3.4% of variance of student teachers' attitudes, beliefs, and intentions can be explained by grade level. It was found that there was a significant mean difference across RSE scores with respect to grade level ($F(3,561)=6.156$, $p=.000$). A follow-up test, Tukey, was conducted in order to evaluate pairwise differences among the grade levels. The results showed that there was no significant mean difference on RSE scores of sophomore, junior, and senior student teachers whereas these mean scores were significantly higher than that of freshman student teachers. A significant mean difference across SE scores with respect to grade level ($F(3,561)=10.903$, $p=.000$) was found. The results of Tukey test indicated that only senior student teachers had significantly higher mean scores on SE than those of freshman, sophomore, and juniors. The findings also showed a significant mean difference on ITE scores of student teachers ($F(3,561)=3.793$, $p=.010$). Pairwise comparisons reflected that both junior and senior student teachers had significantly higher mean scores on ITE than freshman student teachers had. On the other hand, there was no significant mean difference across student teachers' attitudes toward the environment with respect to grade level ($F(3,561)=1.092$, $p=.352$).

Regarding the attended teacher education programs, the nonsignificant Wilk's Lambda ($p=.424$) showed that there was no significant mean difference across the scores on a combination of AE, RSE, SE, and ITE.

Relationships between Environmentally Associated Variables

Bivariate correlational analysis was used to explore the relationships between AE, RSE, SE, and ITE. Pearson correlation coefficients were computed among these variables. The results were presented in Table 2.

Table 2. Pearson Correlation Coeeficients

	RSE	SE	ITE
AE	.41*	.10*	.14*
RSE	____	.13*	.22*
SE		____	.23*

Results showed that; student teachers' attitudes toward the environment, the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE are all positively and significantly correlated with each other.

There was medium correlation between student teachers' attitudes toward the environment and the relevance of science with EE ($r=.41$). On the other hand, small relationships among other environment related variables were found.

Discussion

In the present study, student teachers on attitudes toward the environment and the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions on teaching EE with respect to grade level and attended departments in faculty of education were investigated.

Teachers' attitudes toward the environment could influence children's and elementary students' attitudes toward the environment; therefore student teachers' attitudes toward the environment and self efficacy beliefs on teaching EE play an important role on students' future attitude and skills. Although, self-efficacy of student teachers in different areas has been widely investigated, there is not many research about self efficacy beliefs on teaching EE (Moseley, Reinke, & Bookout, 2002).

The findings revealed that student teachers' attitudes toward the environment and the relevance of science with EE were favorable. Some clubs on protection of the environment in Turkish universities can influence the student teachers' attitude toward the environment. On the other hand, student teachers showed low self efficacy beliefs on teaching EE. In other words, their perceived confidence in teaching EE was insufficient. These findings might be attributed to lack of compulsory environmental education programs in faculty of education in Turkey. Student teachers are provided some elective courses on EE, but the quota of these courses are not enough to supply same opportunities for all student teachers. These elective courses were designed to provide some knowledge base on environmental issues, and enhance their sensitiveness, attitudes, and awareness toward environmental problems. Student teachers could not practice their teaching on environmental issues. In order to enhance their self-efficacy beliefs on teaching EE, specially designed EE programs should be implemented.

The results also indicated that there was no significant difference between teacher education programs in terms of attitude toward the environment, the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions to teach EE. However, in terms of mean difference, student teachers in Elementary Science Education had higher self-efficacy than those in Early Childhood Education, whereas Elementary Science Education student teachers had lower attitudes toward the environment than Early Childhood Education student teachers. That Elementary Science Education student teachers had some science courses concerned with environment, such as ecology, biology may affect these mean difference. Thus; elective courses should be revised for different departments independently.

In terms of grade level it was observed that as the grade level increases, the student teachers' attitude toward the environment, the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions to teach EE also increases. At this point, it should be noted that only junior and senior student teachers can be able to take these elective courses about environmental education. Therefore, student teachers might get aware of environmental education with the increased grade level. Recently, in Turkey the study of science curriculum revision including the integration of science and environment education may affect the student teachers' thought of the relevance of science with EE.

Backgrounds of elementary student teachers are different from each other and not focused on science. According to Mossaley and collogues 'A new teacher with a background in general science would not be expected to teach physic, but elementary teachers are often expected to approach EE with a similar limited background.' (Mossaley, *et.al*, 2002, p.14). Teachers' attitude toward the process of environmental education affects the influences of environmental education (Mossaley, *et.al*, 2002). In university programs, the new elective courses about environmental education should be implemented in each grade level. Instructors should not be restricted by program. Out of the courses they make student teachers organize some environment project. In this way student teachers' attitude toward the environment, the relevance of science with EE, self-efficacy beliefs on teaching EE, and their intentions to teach EE can be affected positively.

The present study provides the baseline on student teachers' attitudes toward the environment and the relevance of science with Environmental Education (EE), self-efficacy beliefs on teaching EE, and their intentions on teaching EE, and discuss how these variables can be improved. Since, on this subject few studies have been conducted.

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