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Teacher Candidates' Perception Level of Environmental Pollutant and Their Risk Factors

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It is generally accepted that the environmental education deals with a wide range of environmental experiences, methods and processes. Teaching the subject of the environment should not be considered as an easy task. It should not only cover pure ecology education; but also include the citizenship responsibilities and the problems that are sourced from other interdisciplinary factors. Therefore teachers should have the responsibility to facilitate environmental issues. Hitherto no researcher has undertaken a comprehensive study that focuses on environmental education in teacher training programs. This study aims to detect basic environmental knowledge of Turkish teacher candidate at the onset of their studies. This study has been conducted during in the fall of 2007 with a heterogeneous group of 248 teacher candidates from Education Faculty in Turkey, 82 students chosen from randomly from biology, science and 84 students from classroom teacher departments. To detect respondents' basic knowledge about environmental pollutants we administrated the questionnaire during the 1st month of their last academic year. The results found in this research have shown that teacher candidates possess less pro environmental knowledge. An interpretation of these results is that the teacher candidates do not fully comprehend the underlying ecological and environmental concepts related to environmental issues. Therefore, the design of pre service programs should take into account the characteristic of the student population which are the outcome of their social, cultural, and physical environments, and include all the necessary components for adequately preparing future educators to effectively address the environmental education of their future students. This may reflect into pupils' attitudes during teaching process in primary and secondary schools.

Key Words: environmental education, pollutants, teacher training

Introduction

Traditional education has a role of transmitting existing knowledge of society to individuals and also has to promote young people's competencies for critically analyzing and reflecting the environment awareness. The individuals should learn the causes of these problems and how to avoid them (Hirsch, 1995). There are plenty of research activities in environmental education. The findings of these activities are able to shift individual's thinking and acting.

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The results suggest that environmental education has to be reshaped within the social process of sustainable development and educational policy (Kyburz-Graber & Robottom, 2006). It is well known that environmental education is a complex issue that is mostly depending on individuals' previous experiences, their environment and social culture. The interesting thing is how teachers and learners implement their previously gained individual environmental knowledge into present educational approaches which are considered vital issues in environmental education. Based on the assumption there is a relationship between pedagogical approach and environmental action (Eulefeld, Boolscho, Rode, Rost & Seybold, 1993) hence on the base of case study a socio-ecological approach was applied into school practice. At this point, a range from familiar issues such as pollution, loss of biodiversity and waste management are experienced worldwide and environmental education seems to be the key response to these problems (UNESCO, 2005).

It is well known that environmental education growth does not always affect environmental attitudes in positive direction**.** It is generally accepted that complex issues of basic knowledge do not necessarily have effect on the individuals' growing responsible attitudes towards environment (Hungerford & Volk, 1990). In order to convert individually obtained knowledge and experiences from family and school into positive individual attitudes, individuals should grow into enough maturity. At this point individual maturity, self control mechanism and their behaviors seem to be important. It is accepted that an environmentally responsible individual should have basic knowledge of ecological principles, capability of applying these principles into life, and they should have a responsible behavior and attitudes towards environment. Individual responsibility includes feeling responsible himself against environmental issues such as using recycled materials, avoiding from environmental and air pollutions. At this point, it is important to develop positive individual behaviors towards environmental issues and converting these attitudes into self control mechanisms (Hungerford & Volk, 1990; Peyton & Miller, 1980). It is generally accepted that the environmental education deals with a wide range of environmental experiences**,** methods and processes. For this teaching environmental subject not should be considered as an easy task**.** It should not only cover pure ecology education; it should also cover citizenship responsibilities and the problems that sourced from other interdisciplinary subjects. Therefore teachers should have responsibility of facilitating environmental issues. So, it could be interesting to dig out deep view of students. What environmental attitude and background they have, in this content it could also be very beneficial to learn how students may reflect their gains against the environment as a teacher candidate.

In order to measure individual attitudes against environment, some environmental measuring scales (Dunlap, Van Liere, Mertig & Jones, 2000; La Trobe & Acott, 2000) that aimed researching different dimensions of human-environment relationships are developed. How does anthropocentric approach effect the human sourced ecologic development environment is meant to be the research point. Environmental studies performed on the bases of these general principles may help detecting individuals' attitudes towards environment, reflection of economic and social changes on the environmental values and their positive or negative effects on environmental values. Also, it may help developing individuals' responsible attitudes against environment. For this, the capacity of teachers has to be enhanced to enable them to implement environmental learning in an outcome-based manner, to help learners to address environmental problems through active learning, critical thinking and active involvement (Roux & Ferreira, 2005). Despite recognizing the need of effective environmental edition or teacher candidate only a few research activities are addressing questions relevant to the preparation of teachers. Up to now no researcher has undertaken a comprehensive study that focused on environmental education in teacher training programs.

This study aimed to detect basic environmental knowledge of Turkish teacher candidate at the onset of their studies. In order to achieve a better understanding of how teacher candidates obtained their previous knowledge and how students reflect environmental issues, on socio-ecological questions. Another objective of study has been designed to find out how teacher training programs were useful for environment-supportive values and attitudes for environmental education. The expectation of this study was that the findings may help to improve teacher candidates' environmental values learning efforts positively. This may reflect into pupils' attitudes during teaching process in primary and secondary schools.

Methods

Participants

We conducted our study during in the fall of 2007 with a heterogeneous group of 248 teacher candidates from Education Faculty in Turkey. The Education Faculty has a 4-year and 5 year programs from which students graduate with Baccalaureate Degree in education and teaching. 82 students from each department such as biology, science and 84 students from classroom teacher departments were randomly chosen. It is well known that primary and secondary school environmental subject mostly take place in science and biology textbooks. The basic environmental attitudes and behaviors education is taught in primary school by primary school teachers. That is why primary school teacher candidates were subject of this research activity besides the science and biology teacher candidates.

Instrument

Researcher should adapt instruments for measuring environmental knowledge to the target population in terms of age, socioeconomic background, institutional framework, and the national environmental priorities as reflected in environmental issues to which the media exposes the public, and the environmental subjects integrated into the education curriculum (Schindler, 1999). The lack of suitable research tools to use with our target population required us to develop a questionnaire to investigate basic environmental knowledge of students in teacher-training faculties in Turkey. In order to obtain the respondents' basic knowledge, we administrated a questionnaire modified on the basis of related literature (Erten, 2002, 2005, Beyhun et al, 2007) during the 1st month of their last academic year. The questionnaire had two sections. In the first section are twelve open-ended (12 questions) and 2 Likert-type questions that included a scale ranging from 1 (not at all) to 5 (very much). Background questionnaires' included questions about the students' age, gender, education, income level of their parents, their attitudes against environmental meetings and symposiums and main causes they took during their educations. In the second part of research a set of questions has been used to detect risk factors of environmental pollutants.

Results, Discussion and Implications

Background Data

The age of incoming students 23. 0 ± 1. 0 (≤ 24 years 88%, ± 24 was 12%) years, and the 58% of students were girls, and 42% of boy (Table 1). It has shown that the parents of these students had similar levels of education levels, 58 % of fathers and 68 % of mothers had graduated a primary school or less; 42 % of the fathers and 32 % of the mothers had a bachelor's de-

gree or secondary school education. We thought that the education level of both parents may be effective on students' responses. We also believe that this affects the student's choice of environment-related fields at university education. Also, income level of students' families may be important in developing of their environmental attitudes. 57 % of the students' parents were of low income level, ≤ 1000 YTL (approximately $ 800), and only 9 % of students' parents had high income level. We found a correlation between the students' income level and their chosen environmental based courses in the university. Only 30% of the students had chosen environmental based courses in their university education. It seems that students' environmental knowledge was affected by their parents' education level but still most of the students were unaware of environmental matters. Our results also demonstrated a positive trend between students' attitudes and the extent of their mothers' education. Less than 50 percent of parents came from low education level. Of course, the education level of parents does not also cover their environmental education. But somehow less education may affect their environmental attitudes.

Table 2 shows that most of teacher candidates did not participate in any scientific activities so far (n=168, 68%). Also there is not any desire to attend in the scientific meetings and activities. Only 24 % (n= 59) of them showed an intent to take place in scientific meetings and 8 % of students had participated in symposiums and environmental meetings during their university education. The rate of willingness in attendance among the students is not encouraging.

Table 1. The socio-demographic properties teacher candidates and their parents' education levels

Criteria	n	%
Gender		
Male	103	42
Female	145	58
Age		
≤24	220	88
>24	28	12
Education levels of mothers		
Primary school or below	169	68
High school or above	79	32
Education levels of fathers		
Primary school or below	104	58
High school or above	144	42
Mean incomes of families (each year as $)		
800 or less	141	57
1000-1500	84	34
1501-higher	23	9

Table 2. Contribution of teacher candidate into scientific meetings

Taking place in scientific meetings	n	%
Never	168	68
I desired but, I could not	59	24
Yes I took place	21	8

Basic Knowledge of Teacher Candidate on Environmental Pollutants

Table 3 has shown that global warming (n= 164, 66 %) was the main issues of environmental problems. Climate changing (n=159, 64%) was another issue that teacher candidates have been considered. They have taken this problem as one of the most important subject of environmental issues. Demographic effects (n=74, 30%), green house effect (n=71, 29%), shanty housing (n=72, 29%) and urban sprawl (n=64, 26%) were other important environmental issues. This may consider a reflection of positive effects of audiovisual press on teacher candidates about environmental issues.

Table 3. List of main environmental issues taken as a treat by teacher candidates and their % distributions

Environmental issues	No risk or low level of risk		Medium level risk factors		High level risk factor	
	n	%	n	%	n	%
Global warming	37	15	47	19	164	66
Climate changes	38	15	51	20	159	64
Demographic effects	48	19	126	51	74	30
Greenhouse effects	117	47	60	24	71	29
Shanty housing	100	40	76	31	72	29
Urban sprawl	38	15	146	59	64	26

Table 4 shows teacher candidates' perception level about environmental pollutants' effects and their risk factors. The results have shown that not all but a considerable amount of students were aware of main environmental pollutants and their risk factors in advanced or most advanced levels (perception levels) such as deforestations *(n=195, 79 %),* diminish of drinking water sources *(n=179, 73%),* water pollution *(n=178, 72 %),* soil pollution (n=149, 60%), air pollution (n=134, 54%) as well as acid rains (n=134, 54%). It has been notified that teacher candidates were less aware of the decrease in biodiversity (n=83, 33%), and noise pollution (n=37, 15%).

Table 5 shows that according to teacher candidate chemicals (n=154, 62%) were important pollutants of environment, also no recyclable products (n=104, 42%) were another consi-

derable pollutants. Electromagnetic pollutants such as mobile phones, computers, microwave ovens (n=84, 34%), fertilizers (n=78, 31%), solid waste pollutant (n=69, 28%), waste batteries (n=64, 26%), cans (n=58, 23%), medical sewages (n=44, 18%), and ineffective usage of public transport vehicles were other sources of environmental pollutions.

Table 4. List of environmental pollutants' effects in to environment and their % distributions according to teacher candidates

Environmental pollutants' effects	No risk or low level of risk		Medium level risk factors		High level risk factor	
	n	%	n	%	n	%
Deforestations	13	5	40	16	195	79
Diminish of drinking water	27	11	42	17	179	73
Water pollution	25	10	45	18	178	72
Soil pollution	32	13	67	27	149	60
Air pollution	43	17	71	29	134	54
Acid rains	18	7	96	39	134	54
Decrease of plant and animal species (biodiversity)	67	27	98	40	83	33
Smell pollution	112	45	88	35	48	19
Noise pollution	144	58	67	27	37	15

Table 5. List of environmental pollutants taken as a treat and their % distribution

Environmental pollutants	No risk or low level of risk		Medium level risk factors		High level risk factor	
	n	%	n	%	n	%
Chemicals	37	15	57	23	154	62
No recyclables products	15	6	129	52	104	42
Electromagnetic pollution (mobile phones, computers, microwaves, ovens and etc.)	60	24	104	42	84	34
Fertilizer	68	27	102	41	78	31
Solid waste pollutant	54	22	125	50	69	28
Waste batteries	112	45	72	29	64	26
Unconscious energy consumption	53	21	133	54	62	25
Cans	110	44	80	32	58	23
Medical sewages	104	42	100	40	44	18
Plastic products	166	67	42	17	40	16
Ineffective usage of public transport vehicle	120	48	100	40	28	11

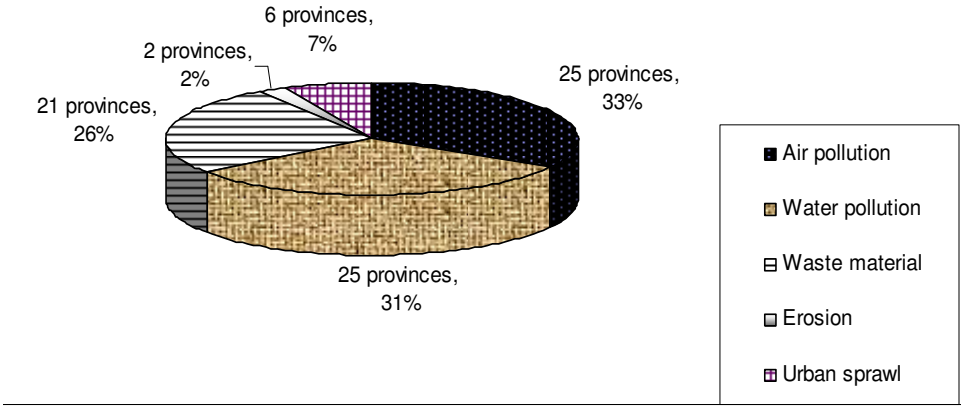

Figure 1. The environmental problems of provinces in Turkey
(Environmental and Forestry Minister, 2006)

The findings of this research have shown that most of teacher candidates were unaware of some pollutants. For instance, plastics usually accepted as dangerous pollutants for the environment since recycling of this material takes very long time. However, some teacher candidates did not consider that plastics are serious threat to the environment. It is well known that higher sound (noise pollution) may cause some psychological, physiologic and social problems such as deafness; however, most of teacher candidates did not accepted sound pollution as a risk factor.

A map developed by Environmental and Forestry Ministry for Turkey (2006) has shown that there is serious threat of air pollution in 25 provinces (33 %) of Turkey; water pollution for 25 (31%) provinces, waste material problem for 21 provinces (26%), urban sprawl for 6 provinces (7%) and erosion for 2 provinces (2%) (Figure 1). According to Environmental and Forestry Ministry's criteria most of teacher candidates were unaware of main environmental pollutants and their risk factors.

In most of the developed countries, well organized environmental societies mostly have been performing some practical and educational missions for public that these may accept a measure of environmental knowledge level of societies. The findings of this research have shown that enormous amount of teacher candidates (68 %) has not attended in any environmental meeting**,** symposium or other activities.

Özmen et al. (2005) have shown that most of university students were not a member of any environmental society (96.8%), also an important part of them did not take parts any environmental activities. In another research performed among 352 university students has shown that only 4.5% of students took place in environmental activities (Erten, 2005). Also a different study has shown that only 20 % of students used the means of media about environmental issues, only 36.6 % of them mostly were improving their environmental knowledge by reading newspapers.

At this point data sources of teacher candidates seem to be important for commenting on our findings. In this study, the knowledge sources of teacher candidates about environmental risk factors and trust level into their source given at Figure 2 and 3. According to findings, the main information sources of teacher candidates were radio and television 40 %, newspaper-

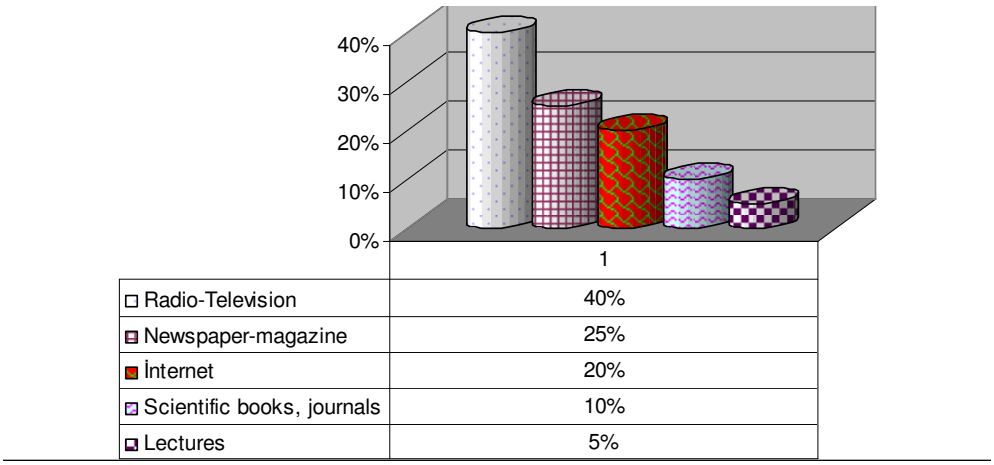

Figure 2. The information sources of teacher candidate about environmental issues

magazines 25 %, internet 20%, scientific books 10 %, and lectures 5 %. Also the research showed how much they trusted the means of communication. The rates of trust are as follows**;** 10 % to television, 6 % to newspaper and magazine, 21 % to internet, 34 % to scientific books, and 32 % to lectures.

Figure 2 shows that radio and television (40 %) were a major source of information on the environmental education. In contrast, the scientific books and journals were not good resources of environmental education. Also, it seems that the lectures which were organized to render scientific knowledge about environmental subjects were not presented in attractive conference rooms. But this not only our problem also other researchers from different countries found similar results for their school children (Blum, 1985) and teachers (Aini et al., 2003). Surprisingly, most of teacher candidates highly trusted in their scientific books-journals and lectures.

So far, the studies have shown that increasing individual' environmental knowledge may results in more positive attitudes and more responsible environmental behaviors. According to Hines (Hines et al., 1986), responsible environmental behaviors are learned actions including understanding the ecological principles and processes. This may include interrelationship between social and natural systems. Also responsible environmental attitudes included strategies of environmental action (Hines, Hungerford & Tomera, 1986). Therefore, environmental behaviors of individuals' mostly reflect their environmental knowledge that this means responsible environmental behaviors (Roth, 1992, Wilke, 1995). The purpose of developing environmental knowledge is to empower individuals with a belied in their ability to contribute to environmental solutions through personal behavior, either as an individual or part of groups. Therefore, the integration of environmental subjects in the teacher candidate curriculum may contribute to increasing awareness of temporary and permanent environmental issues. If students' pro environment attitudes stem from increased exposure to environmental issues, we would expect a reasonable level of basic knowledge to accompany the attitudes (Pe'er et al., 2007).

The results found in this research shown that teacher candidates possess less pro environment knowledge. It is possible to speculate that teacher training programs have less environment-supportive values and attitudes. An interpretation of these results is that the teacher candidates do not fully comprehend the underlying ecological and environmental concepts related

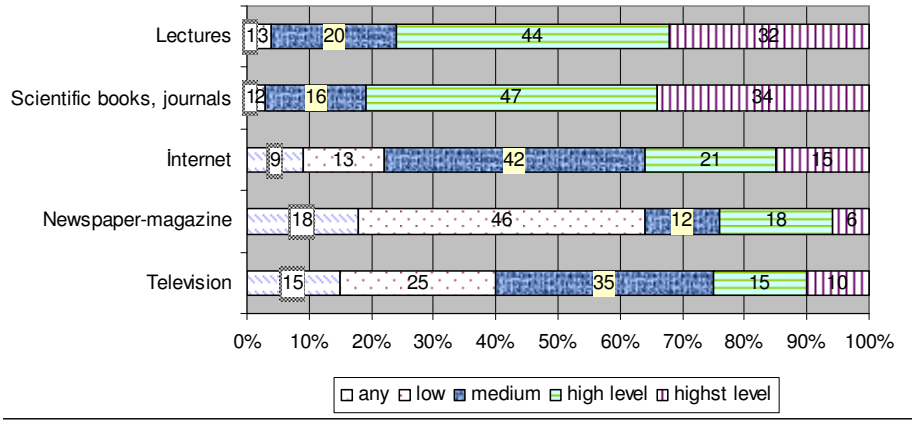

Figure 3. Teacher candidates' confidential level of basic information sources about environmental issues.

to environmental issues. This disconnection has implications for developing responsible environmental behavior which is the ultimate goal of environmental education.

Although until a long time ago, Turkish editors have incorporated environmental contents into the formal educational curriculum in primary and secondary school programs, as well as teacher training programs. Also teacher training programs of education faculties have been modified according to currently environmental issues. Less sensitivity of students against the environmental subjects may be sourced by two interrelated situations. First, existing curriculum may not be effectively teaching environmental education (Cutter & Smith, 2001; Mckeown-Ice, 2000; Spork, 1992). Second, despite the increased popularity of environmental content in schools, environmental studies are not mandatory in universities and secondary school curriculum. Therefore, the majority of pupils are not receiving the long-term, continuous, methodical exposure to the subject that is necessary for developing substantial environmental literacy (Goldman et al., 2003).

Turkey is a country which has the high rate of population growth that is typical of characteristic of developing countries and lifestyles. The consumption pattern, economic and industrial development is characteristic that make environmental education especially critical as a tool for achieving sustainable development. Instilling environmental knowledge in future generation requires educators who are equipped, skill, and commitment. The results of our study emphasize the gap between the environmental challenges and teacher training curriculum. Narrowing this gap is one of the toughest challenges in the training programs. The design of pre service programs should take into account the characteristic of the student population which are the outcome of their social, cultural, and physical environments, and include all the necessary components for adequately preparing future educators to effectively address the environmental education of their future students.

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