The Influence of Environment Education on Critical Thinking and Environmental Attitude

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Abstract

The purpose of this study is to investigate the influence of environmental education on students’ critical thinking and environmental attitudes. The sample of the study included 8th grade students from five schools which were randomly selected from different districts of Sakarya. Survey research method was employed in the study. The Critical Thinking Test in Environmental Education (CTTEE) was used in order to measure critical thinking skills of the students in environmental education. The test is comprised of three lower dimensions titled as “Conclusions, Inferences and Identifying Bias”. The environmental attitude scale, which was also used in the study. In this study, it was attempted to determine the variability in the outcome variable and to question whether critical thinking is attributable to gender, socio-economic status and school type. The results of the study suggested that the subjects in the sample have an average critical thinking skills level in environmental education. Ancova and t-test results also showed a meaningful statistical significance in the students’ critical thinking skills and attitudes towards the environment in terms of gender, socio-cultural level and school type. Moreover, in accordance with the results obtained from the study, it could be stated that The Critical Thinking Test in Environmental Education (CTTEE) may be used to identify critical skills of primary school students and the Environmental Attitude Scale may be employed as a useful measurement tool to determine the attitudes of the primary school students toward the environment.

Keywords: Environmental Education, Critical Thinking, Environmental Attitude

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1. Introduction

Developments about economics, society, science and technology have affected our life styles to a great degree. Especially the effects of scientific and technological developments in our lives and environment can be seen in present day more than it was the case in the past (Kaushik & Kaushik, 2010). New dimensions which the notion of the environment (Bary, 2007) carry have exposed that the environment should be examined not only at the national level but at the international level with new approaches.

Environmental problems (Bonnett, 2007; Mert, 2006), have reached to the important points in 21st century and continue to grow rapidly. Global warming, deterioration of the natural life, perforation of the ozon layer, conservatory effect, rise in the solid waste, nuclear pollution, decrease in green areas, extinction of some kind of animals and plants can be showed as some environmental problems. Moreover, parallel to the rise in the population of the World, increase in the necessities of the people and their consuming of the natural sources unconsiously, and again uncousious works in order to save the nature can be seen as reasons of the enviromental problems (Symth, 2004). In 1972 Stockholm Conference which was orinised by the UN the enviromental problems were put forward for the first time and from that time onward te enviromental problems have become one of the most important topics which preoccupies the world agenda (Young, 2009).

The most effective way in order to solve the enviromental problems (Pooley & O’Connor, 2000; Stevenson, 2007) is the education of the societies. Education about enviroment has become an individual and social necessity which was caused by the enviromental problems that have been at the top on the world agenda all the time. As the problems about enviroment grow and as the sensitivity about the enviroment increases, the importance of the enviromental education also becomes more important. (Alim, 2006; Dunlap & Liere, 1978). The education about enviroment aims not only an increase in the educational knowledge of the individuals but also turning the positive attitudes about the enviroment into behavior.

While the education about the enviroment gets more importance in the changed world, as a natural consequence of it, enviromental education gets higher attention in the educational curriculums of the countries (Jensen&Schnack, 1997). However, it is impossible to say that the point we have reached is enough.

It can be seen that (Palmer, 1998; Shapiro, 2005) both in the world and in Turkey there have been an important developmencty about the enviromental consciousness about the understanding, preveting and solving of the enviromental problems in last years. At last we know that in the origin of the enviromental problems, there are social, economic and cultural factors and they will not be able to be solved by using technology solely. So, the basic tenet for the enviromental education is to continue to educate people about their values, attitudes and behaviors which they hold towards the enviroment (Rempel, 2009; Wilson, 2004).

When the new educational programs about the enviroment is examined, it can be seen that in Turkey the education about the enviroment takes an important place in programs. In primary school educational program, the enviromental education starts with the grade 4 and it aims to make the students gain the very consciousness and knowledge of the enviroment.

In the new education programs about the gainings of the enviromental education are the representing the enviroment in physical, social and biological sense as a whole. Moreover, finding the factors that affect the natural enviroment, the negative results of the having damaged enviroment on people and societies, teaching the bad results of the wasteful behaviors and preventing them are the main targets.

Furthermore, critical thinking which has an important place in the programs of the primary schools is a subject that has been worked on for a long time in Turkey. Critical thinking (NAS, 1996) is an ability that is among the abilities studied in the primary school programs. By changing the educational programs,
teaching approaches that increase the critical thinking are given importance. With renewed primary school programs, growing critical, creative, searcher, inquiring, entrepreneurial individuals are targeted.

Among these basic abilities (Bailin, 2002 & Phan, 2010) critical thinking provides people looking at the subjects with suspicion, making interpretation about them, deciding and teaching the learning effectively. When the relationship between the place and importance of the critical thinking in education is described clearly (Nolan, 1997) the necessity of the critical thinking in education shows up itself naturally.

2. Research Method

The sample of the study was composed of 346 students of eight grade secondary schools in Sakarya, Turkey. A sample of classes of five middle school representing five demographically different schools were included in the study. The schools included in the study ranged from low socio-economic status to high socio-economic status. 173 male and 173 female subjects took part in the study.

The Critical Thinking Test in Environmental Education (CTTEE) was used in order to measure critical thinking skills of the students in environmental education. CTTEE was developed by Chiek (1999). CTTEE was adapted in Turkish by the researcher. The test was comprised of three lower dimensions titled as “Conclusions, Inferences and Identifying Bias”. The CTTEE covered three of many broad areas of critical thinking skills and abilities in the domain of environmental education. Section one measured students’ critical thinking ability in the area of conclusions. Section two measured students’ critical thinking related the area of inference making. Section three measured students’ abilities to identify the bias. The length of time for taking CTTEE was set at 45 minutes to fit into a course.

Before conducting the research necessary permissions were taken from the institutions in charge. The field test of the CTTEE was conducted during one class period at each of the respective schools. The field test of the CTTEE was conducted during one class period at each of the respective schools where the sample was formed by random sampling. Specific directions were given to the eighth grade teacher for administration of the test to ensure that the testing environment and procedure was identical for all participants. Participants were informed of the purpose of the study and understood that any data collected had no bearing on their course grade and would be kept confidential by the researcher. Respective teachers were unaware of any individual participant's score on the CTTEE or other data collected on the subject. Data collected via the test which could damage the reliability and validity of the research were eliminated and were not used for analysis.

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This research attempted to address the effects of specific published environmental education curriculum guides on secondary school students’ (eighth grades) critical thinking skills. Two paired sample t test and ANOVA was used to compare the differences in variables in question which are gender,socio-economic status and school type. Effect size was also calculated for differences between independent and depended variables and the significance level of the research questions was set at .005. Before the statistical analyses were conducted, distributions of the data were examined for underlying assumptions and it was concluded that distribution of data met the assumptions of normality and linearity. These analyses were carried out via SPSS 13.0
3. Results

An item analysis of the CTTEE was accomplished using a point-biserial correlations on each item, determination of the difficulty level of each item and descriptive statistics. This involves a process of reviewing each individual test item as a way of informing the contribution of that item to the quality of the test as a whole. Data were gathered to determine the difficulty level of each item. The difficulty level should range between .25 and .75 for the purpose of norm-referencing the test. The difficulty level refers to the proportion of subjects who respond correctly to an item. The point-biserial is a special case of the Pearson r, with one variable a quantitative variable measured on an interval scale (score on the CTTEE). Descriptive statistics were calculated to give a measure of the high and low score, the range of scores on the test, the mean and the standard deviation for primary school.

<table>
<thead>
<tr>
<th>Item</th>
<th>P</th>
<th>r_jx</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.70</td>
<td>.65</td>
</tr>
<tr>
<td>2</td>
<td>.55</td>
<td>.50</td>
</tr>
<tr>
<td>3</td>
<td>.88</td>
<td>.51</td>
</tr>
<tr>
<td>4</td>
<td>.77</td>
<td>.40</td>
</tr>
<tr>
<td>5</td>
<td>.82</td>
<td>.47</td>
</tr>
<tr>
<td>6</td>
<td>.38</td>
<td>.40</td>
</tr>
<tr>
<td>7</td>
<td>.78</td>
<td>.39</td>
</tr>
<tr>
<td>8</td>
<td>.59</td>
<td>.50</td>
</tr>
<tr>
<td>9</td>
<td>.38</td>
<td>.40</td>
</tr>
<tr>
<td>10</td>
<td>.74</td>
<td>.42</td>
</tr>
<tr>
<td>11</td>
<td>.55</td>
<td>.54</td>
</tr>
<tr>
<td>12</td>
<td>.73</td>
<td>.57</td>
</tr>
<tr>
<td>13</td>
<td>.88</td>
<td>.51</td>
</tr>
<tr>
<td>14</td>
<td>.67</td>
<td>.38</td>
</tr>
<tr>
<td>15</td>
<td>.74</td>
<td>.45</td>
</tr>
</tbody>
</table>

When hardness indexes and differentiations of the items were examined, none of the items were put out of the test. If the value of the differentiation of an item is above 30, it shows that the item differentiates the students who know and who do not know.

A measure of reliability is important information to gather on a test to determine the quality of the internal consistency. In this sense, reliability is a measure of the extent to which the CTTEE measures one underlying ability. Acceptable reliability estimates on critical thinking tests range from .65 to .75 and tend to increase with the level of sophistication of the examinees. The Cronbach’s alpha was used to determine the reliability of the CTTEE for primary school.

<table>
<thead>
<tr>
<th>N</th>
<th>X</th>
<th>S</th>
<th>P</th>
<th>Realibility</th>
<th>Differentiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>10.15</td>
<td>3.03</td>
<td>.67</td>
<td>.73</td>
<td>.63</td>
</tr>
</tbody>
</table>

When the Table 2 is examined, the analysing results of the test according to 73 students can be seen. The arithmetical average of the test is ( )=10.15, Standard deviation is (s)=3.03. The average value of the hardness of the questions in the test is (p)= .67 the level of the hardness in the test shows that the questions are hard in the medium level, that is they are neither difficult nor easy for the students. Generally the average value the hardness of the item is wanted to be .50 in the tests that measure the
success, this very value is highly suitable for the students that have been tested. The reliability of the results is .73. that means the test is highly reliable. In the studies it is expected that the value of the differentiation of the test is .40. The analysing reports has showed that value of the differentiation of the test is .63. with this value it can be said that the differentiation value of the test which differentiates the students who know and who do not know is quite well.

The research also investigated the extent to which middle school students’ critical thinking was influenced by students’ gender, socio-economic status and school type. An analysis of variance was used to test assumption that the variances of mean scores between groups were different. To investigate whether the CTTEE test scores of students differ according to gender, a t-test for an independent sample was applied to the data and the results are shown in table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>School type</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Sd</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTTEE test score</td>
<td>Female</td>
<td>173</td>
<td>10.5</td>
<td>3.12</td>
<td>1.48</td>
<td>344</td>
<td>.000*</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>173</td>
<td>8.3</td>
<td>3.38</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p<.05 *

The results of t-tests indicated that, the mean values of importance were different when average scores of female participants were taken into consideration. A significant and meaningful difference was found in female students’ average scores of critical thinking skills in environmental education. For the girls, a independent sample t test revealed a significant difference.(t (344)=0,00, p < .05). The mean scores of critical thinking skills in environmental education of the girls was 10.5, whereas the mean scores of male students’ skills of critical thinking in environmental education was 8.3.

The results of ANOVA indicated that there was a significant difference between groups according to students socio-economic variable as measured by the scores on the CTTEE. Levenes’s test of homogeneity of variance test was conducted and it was concluded that variance of dependent variable was equal across groups when controlled for the effects of the test scores.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum sq</th>
<th>df</th>
<th>Mean sq</th>
<th>F</th>
<th>Sig.(p)</th>
<th>Tukey HSD(Sig.Dif.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>254,299</td>
<td>4</td>
<td>431,735</td>
<td>6.33</td>
<td>.000</td>
<td>L.I.-M.I. L.I-M.I. H.I</td>
</tr>
<tr>
<td>Within groups</td>
<td>3421,458</td>
<td>341</td>
<td>115,964</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3675,757</td>
<td>344</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L.I .low income, M.I. Medium income, H.I High income, p<.05 *

The results of ANOVA indicated that there was a significant difference between groups as measured by the test scores on the CTTEE (F(4,341)=6.33; p < .05).At the end of the analysis conducted by using Tukey HSD test to determine the direction of this meaningful difference, it was concluded that the Ctte test score of high income level students ($x=10.2$) were significantly higher than the medium income level students ($x=7.6$). Ctte test score of medium income level students were significantly higher than low income students ($x=5.4$).

To investigate whether the CTTEE test scores of students differ according to school type, a t-test for an independent sample was applied to the data and the results are shown in table 5.
The results of t-tests indicated that, the mean values of importance were different when average scores of private school were taken into consideration. As seen in Table 5, private school students’ have a mean CTTEE test score of 10.3 and state school students’ have a mean CTTEE test score of 7.6. A significant and meaningful difference was found in private schools’ students average scores of critical thinking skills in environmental education (t(344)=0.00, p < .05)

4. Conclusion

The purpose of this study is to investigate the influence of environmental education on students’ critical thinking. The findings of the research are extremely significant for educators and elementary school students. A significant difference was found between students’ socio-demographic variables and their critical thinking skills in environmental education. Socio-economic level of the individual with the rise of the social environment was effective in this result. The extent and range of facilities provided by the families make it easier for the individuals to have the opportunities that they desire. The socio-economic levels of students (Buntod, Singseevo & Sukrsringam, 2010; Cheung, Rudowic, Kwan, Lang, & Yue, 2001; Öztürk, 2006) affects critical thinking skills. There was a positive correlation between socioeconomic levels of students and their critical thinking skills in environmental education. In this case, the results revealed that there were differences between children belonging to upper socio-economic level and lower socio-economic level families in terms of opportunities they had. Thanks to the technological tools which give the opportunity to explore and ease access to information children can develop themselves, participate in educational activities, become more self-confident, have the ability to think critically and catch up with the latest advancements.

A meaningful difference was found between students’ gender and their average scores in critical thinking in environmental education test. It can be concluded due to some features of cultural and social constructs female students become much more attentive to the environment and the events happening around them when compared to the male students. Also it could be said that another impact of social and cultural constructs on female students is that, female students show a tendency to use critical thinking skills in dealing with the problems and situations related to environment. Several studies (Bartosh, 2009; Shepardson, 2005; Yildirim, 2009) examining the issue also revealed similar findings. Because social identity, once formed, after the detection of individual styles and forms of motivation, attitude and behavior patterns can lead to differences in terms gender. Approaching the issue from this perspective, it could be said that the social structure and social learning, may help girls grow up as individuals who have to deal with more problems when compared to men, become more attentive to details, have more confidence in themselves and their thinking processes and possess the abilities to think flexibly.

At the end of the analysis conducted, a meaningful difference was found between students school type and their average scores in CTEE test in terms of independent sample t test results. Besides the facilities provided by private schools and the endeavor to use existing resources for the benefit of students, the quality of teaching staff that private schools have could be said to have an effect on the difference in results obtained from two groups. It can also be concluded that facilities conducted to increase students awareness towards nature and environment and encouraging the students to participate in such kind of
activities improved students’ critical thinking abilities. Besides, success of a primary school program formed taking general aims of environmental education into consideration is directly related with undergraduate education and pedagogical formation that the teachers have received. It is of great importance the pre-service and in-service education that the teachers receive in order to help the students develop active critical thinking skills in environmental education at the utmost level. It could be said that teachers’ pedagogical formation on the subject, the extent they believe in its importance and the attitudes they hold towards it, are probably the most crucial features of the issue. In order to set students’ critical thinking skills in environmental education permanent, environmental education should be given in such a way to help the students recognize the environment and culture in which they are living, should be relevant to real life experiences and sequenced from concrete to abstract and should include techniques such as thinking big, thinking linking, thinking for decision making and analytic thinking.

The reasons for this kind of result can be showed as disapplication of the educational activities in the way of developing some abilities of the students like critical thinking, logical thinking, inquiring etc. The most important reason of this disapplication is the inefficiency of the teachers who were educated in traditional schools in traditional ways. Moreover, the study has showed clearly that the teachers who are the applicators of the educational programmes that target critical thinking and other important values in students must be having these very features for themselves. The results of the study also have showed that all lessons are responsible for teaching the critical thinking to the students but it has been emphasized wrongly that especially the lesson of science and technology is made responsible for the such kind of abilities.

5. Recommendations

In the light of this study, some suggestions can be offered for both education and future studies in this field.

Teaching programs written for environmental education should not just teach qualitative information but it should increase the awareness of the students towards nature and environment. Beginning from the preschool period, practical environmental education should be given more importance. In educational programs, beside introducing the environment to students, giving messages that makes students love the environment, especially the danger that environmental problems cause should be emphasized. In primary schools, again practical environmental education programs should be given importance, at the level of units practical education should be practiced.

In the education of environment, individual differences, needs, abilities, viewpoints of the students should be realised and teachers who apply these teaching programs should be having great task. Teachers should develop programs about the environmental education, they should be giving importance that these programs are increasing the awareness of students about the environment. The strategies that are suitable to the needs and abilities of the students should be selected. Democratic environment should be formed by supporting activation of the students and their solutions developed about the environmental problems.

Furthermore, voluntary establishments should be take a part in this education. Various civilian establishments, associations, clubs, unions should arrange some activities in order to increase the awareness of the students towards the environment. By providing the active involvement of the individuals and taking attention of the public opinion, some applicable activities and competitions should be arranged. seminars, symposiums, open sessions, panels and likewise meetings should be organized and the public should be made conscious about the subject. By using the mass communicative instruments, environmental education should be extended and the big amount of the society can be reached especially through internet and media.
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