Traditional and Technological Methods for Raising Pre-school Children's Awareness of Environmental Pollution for Sustainability[1]

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Abstract

In the preschool period children develop rapidly in cognitive, social-emotional, physical, psycho-motor, language, and aesthetic areas. In this period, besides basic habits and skills, it is important for children to gain environmental awareness. Research shows that children are mostly affected by environmental problems. Yet, living in a clean and healthy world is a basic necessity for children. For this reason, it is possible that children can show a healthy development in all developmental areas and create a healthy future by establishing ecological balance through gaining environmental awareness during the preschool period for sustainability. Science and nature activities in the preschool education program play an important role in creating an environmental awareness of the children in this period as they include activities to acquire environmental awareness and provide important contributions to helping children gain environmental awareness for sustainability. The present study was conducted using a total of 80 students attending pre-school institutions in Konya province. The environmental pollution awareness scale was used as pre – test and post – test prepared by the researchers. The data was analyzed via the SPSS 18 program. As the post test scores of preschool students revealed, there was a significant difference for the experimental group with regard to environmental pollution awareness.

Keywords: environmental awareness, preschool, technology assisted instruction, traditional method, sustainability.

Introduction

According to Çepel, environment is the whole of the physical, chemical and biological factors that enable living things to survive and develop and keep them under their influence (Cited by Akçay, 2006). By this way it is necessary to define and protect the environment that directly affects the life of living beings. The formation and acquisition of environmental awareness in the children start from the young ages.

Acquiring the information about the environmental consciousness starts to form in the pre-school period for sustainability. Early-age environmental education allows students to demonstrate a positive attitude towards the environment in the later stages of their lives (Taşkın & Şahin, 2008).

Needless to say, sustainable environmental education leads to an increase in the value of the environment; and positive changes in the behaviors towards it. At this point, the main purpose is to raise environmental awareness, the development of sensitivity to the conservation and use of the natural environment for sustainability. The sustainability of individuals' attitudes and behaviors towards future environment depends on increasing their awareness in their early life (Buhan, 2006; Fedosejeva, et al., 2018).

People and institutions need to constantly renew and change themselves due to rapid developments in technology of any field. The most likely way to sustain and adapt to this change is attained through education. While the recent advancements in technology have become an indispensable part of the education, they offer alternative means of education-related activities for sustainability.

At this point, the issue of how we should offer sustainable environmental education to preschool children is a matter of question. More specifically, the period, in which they acquire attitudes and behaviors towards sustainable environmental education, has a great effect on their future life. Therefore, it remains unclear whether traditional or technology-assisted training methods will lead to a more permanent behavioral change towards sustainable environmental education. A plethora of studies have revealed whether traditional or technological methods affect the teaching and learning processes of environmental education of the preschoolers for sustainability. Raus (2016) described sustainability as a bridging concept between the existing western approaches towards environment and development and a new emerging ecological paradigm and proposed that a holistic education approach for sustainability of environmental education effective. Apart from this, Kabadayi (2016) examined education for sustainability from teachers' perspectives and emphasized that the teachers who actively work at schools and have a high expertise in a subject matter have to choose in-set courses to catch up with pre-service teachers who are being educated mostly more modern methods; therefore, they can adapt to the tremendous changes in education for sustainability. Salīte (2015) also suggested the theme of practical wisdom in participative action research which initiated an attention to self-potential and the research on the development of complex networks features for the reorientation of education towards sustainability. Additionally, Copsey (2018) put forward that ESD itself is primarily a process of connecting and contextualizing learning and knowledge to the real environments and communities where they are based. Furthermore, Cincera (2013) stated that special attention needs to be devoted to linking new concepts with practical examples from school environments to improve environmental education sustainability. Gedžūne (2015) and Iliško (2016) noted that identification emerges as a pathway towards human inclusion in nature, which should be pursued in education for sustainability. Moreover, Zecha (2013) emphasized that numerous environmental educational organizations wish to have long-term cooperation, and work with children not only in short-term, but also in light of long-term sustainability. Additionally, in studies (Salīte, 2002; Iliško, 2005; Salīte, 2008; Gedzūne, Gedžūne, Skrinda, & Mičule, 2011), environmental education and education for sustainable development ought to be implemented in order to encourage a change of mind – a transformation in people's frames of reference from consumerism, ownership, egocentrism and exclusion orientation

to holistic and eco-centric worldview, coexistence in harmony, and awareness of being included in a community and its supporting system.

The aim of this study is to compare traditional and technological methods in harnessing sustainable environmental pollution awareness of the preschoolers.

Sub questions are as follows:

> Is there a significant difference between pre-test achievement scores of preschoolers in the experimental and control groups in terms of sustainable environmental pollution awareness?
>
> Is there a significant difference between the pre-test and post-test achievement scores of the control group preschoolers' sustainable environmental pollution awareness?
>
> Is there a significant difference between the pre-test and post-test achievement scores of the preschoolers in the experimental group in terms of sustainable environmental pollution awareness?
>
> Is there a significant difference between the post-test success scores of preschoolers between the experimental and control groups in terms of sustainable environmental pollution awareness?

The attempts made by the Ministry of Education in Turkey to disseminate preschool education throughout the country shows that early education is important for the sustainable development of the child in any domains. The environment in which children will live throughout their lives is constructed in pre-school institutions in terms of recognition, protection, sensitivity and sustainability to the environment. In this period, children are known to be very curious and sensitive to flora and fauna in nature. They tend to work as detectives of the nature and tend to keep their environment. They seem to be interested in the plants, animals and insects living in nature. Similar to scientists, they tend to carefully investigate and examine nature and its content. It should be a good start for children to harness awareness for sustainable environmental education. Needless to say, some precautions should be taken to prevent the excess of environmental pollution and alarming dimensions world-wide. Therefore, the methods for educating children at early ages have important roles in the formation of sustainable environmental awareness and the prevention and elimination of environmental pollution for gaining a sustainable output. It is believed that if children receive education on environmental issues at early ages, they will be the strict conservationists of the environment and sustain and transfer what they instilled in early years for the rest of their lives. However, it is controversial whether manipulating the traditional or technology-based methods will be more beneficial in preschool periods when students are considered to be in conflict with abstract concepts such as environmental pollution. In this respect, the results of the present study may be important in terms of shedding light on the future studies.

Design of the Study

This study is an experimental study adhering to pre-test-post-test control group design. The participants were randomly assigned to experimental and control groups. Both groups were tested before and after the experiment. The pre-tests help the researchers to know the degree of similarity before the experiment between the groups (Karasar,

2011: 97). While the students in the experimental group were taught by technology-supported environmental education method the control group students were taught using the traditional method.

Sample

The sample of the study included the students attending a kindergarten in the Karatay district of Konya. The school was chosen randomly. The research was conducted in the academic year of 2016. In total, 80 preschoolers participated in the study; based on which the control and experimental groups were formed including 40 each.

Data Collection Tools

Preschool Students' Environmental Pollution Structured Interview Form (PSEPSIF) was developed and used by the researchers as the data collection tool. During the preparation phase, environmental educational gains included in the pre-school program of the Ministry of National Education of Turkey were taken into consideration. For each question, the scoring for PSEPSIF with 12 items (6 semi-structured and 6 open-ended) is as follows:

Table 2
Grading the Environmental Pollution Structured Interview Form (PSEPSIF)

Unacceptable	Partially Acceptable	Acceptable
1	2	3

Data Collection Procedure

In the experimental and control groups, differences were investigated before the course, and PSEPSIF was conducted among preschoolers. With regard to the results of PSEPSIF, it was found that the experiment and control groups were homogenous, and there was no significant difference between the two groups. As a consequence the courses of treatment started in the groups.

In both experimental and control groups, the course lasted 8 weeks containing the total of 16 lessons. The experiment group was taught via technological methods while the control group was taught using general teaching methods. PSEPSIF was conducted as a post-test at the end of the eight-week course for both groups.

Technological tools such as computer, internet, data-show, slides and projection were used in the experimental group. In the control group, no technological teaching material was used and general teaching methods were used. In this phase, the researchers generally used the white board and the lesson was taught through the presentation method, verbal expression, explanation, and question-answer. Attempts were made to instill the behaviors that should be gained in the direction of the existing gains in the research. The courses in the control group were designed and structured by the researchers and presented to the students. In the research process, the concepts were explained equally in the experiment and control groups and special care was taken to make the groups as similar as possible in order ensure the homogeneity and objectivity.

Data Analysis

The data were analyzed using SPSS (Statistical Package for Social Sciences) for Windows 23.0 program. Associated (dependent) t-test was used in evaluating the data. Some other testing techniques were run in case of the experimental and control groups such as mean, standard deviation, and t-value and freedom level of pre-test and post-test results were tabulated and interpreted.

Results

In this section, findings from the data analysis are presented. Explanations and interpretations were made based on the findings.

Table 3
Distribution of Participating Students

| | Experiment Group | | Control Group | |
	N	f (%)	N	f (%)
Female	27	67,5	24	60,0
Male	13	32,5	16	40,0
Total	40	100,0	40	100,0

27 (67.5%) female students and 13 (32.5%) male students were in the experimental group, and 24 (60.0%) female and 16 (40.0%) male students were in the control group.

Pre-Test Findings in Experimental and Control Groups

The pre-test scores of the students in the experimental and control groups were analyzed using t-test for the related (dependent) groups. The resulting data are given in Table 4.

Table 4
Comparison of Preliminary Test Scores in Experimental and Control Groups

GROUP	N	X	SS	sd	t	p
Experiment	40	23,40	5,1580	39	-4,386	0,00
Control	40	19,35	3,7041			

Table 4 shows the results of the t-test of the experimental group where the technologic methods were implemented as well as the control group where the traditional methods are applied. Accordingly, it was found that there was a significant difference between experimental and control groups' achievement scores before experimental studies ($t = -4.386$ $p < 0.05$). The resulting difference is in favor of the students in the experiment group. İlhan (2004) supported that there was no significant difference in the pre-test scores of the kindergarten students.

The analysis of pre-test and post-test scores of the students in the control group was done using t-test. The results are shown in Table 5.

Table 5
Comparison of Pre-Test and Post-Test in the Control Group

GROUP	N	X	SS	sd	t	p
Control Group Pre-test	40	19,35	3,7041	39	-5,083	0,00
Control Group Post-Test	40	22,50	3,823			

The dependent (t-test) results of the control group on whether there is a significant difference between pre-test and post-test scores are given in Table 5. The results show that there was a significant difference between pre-test and post-test scores in the control group (t = -5.083, p <.05). Given the mean score of the data, it can be concluded that this difference is in favor of post-test scores. This can be explained by the increase in the control group after being instructed through the traditional teaching methods. Kacar and Dogan (2007), concluded that there was no significant difference in the results of the courses implemented using traditional methods.

Analysis of the pre-test and post-test scores of the experiment group was done using t-test. The results are depicted in Table 6.

Table 6
Comparison of Final Test Scores

GROUP	N	X	SS	sd	t	p
Pre-test Experiment	40	23,400	5,158	39	-6,005	0,00
Pre-test Experiment	40	29,725	4,8091			

As shown in Table 6, there is a significant difference between the pre-test and post-test scores of the experimental group (p <0, 05). This finding suggests that the difference between pre-test and post-test results of pre-school students is due to the effects of technological methods on academic achievement (t = -6.005, p <.05). Çakıroğlu and Ünal (2016) found that there was a significant difference between the pre and post-test scores of the students in the study they carried out in favor of technology.

Analysis of the post-test scores of the students in the experimental and control groups was done using t test. The results are illustrated in Table 7.

Table 7
Comparison of Post-Test Scores with Experimental and Control Groups

GROUP	N	X	SS	sd	t	p
Experiment	40	29,725	4,8091	39	-8,386	0,00
Control	40	22,500	3,823			

As Table 7 shows there appears to be a significant difference between experimental and control groups. It can be concluded that the experimental group being exposed to technological methods is favored (t = -8.386, p <.05). Kacar and Dogan (2007) found that computer-aided education played a significant role in preschool education. İlhan (2004) concluded that there was a significant difference in favor of the experimental group in terms of the post-test scores for the kindergarten students in terms of technology assisted instruction.

Conclusion

A preliminary test was conducted to determine whether there was a significant difference in the knowledge level of the students regarding the concepts included in the study. The results indicated that the groups were not homogeneously dispersed and that the experimental group had more preliminary learning about environment and environmental pollution.

It is seen that when the pre-test and post-test scores of the control group students are examined it was observed that the students learn about environmental and environmental pollution as a result of the course via traditional methods.

When the pre-test and post-test scores of the students in the experimental group were examined, it was found that the post-test scores increased significantly and there was a significant difference between the pre-test and post-test scores. It was seen that pre-school students were interested in technology-supported environment and environmental pollution, resulting in more permanent learning.

When the final test scores of the students in the experimental group and the control group were examined, it was seen that the post test scores increased significantly in the experimental group. Besides it was seen that there was a statistically significant difference between the post test scores of the students in the experimental and the control groups.

Discussion

The environmental pollution issue in the pre-school program was investigated in the studyof "Traditional Methods and Technology Assisted Methods comparison". After the issue of environmental pollution, the scale was administered among the students by the researchers themselves. In this application, students were asked 12 questions about environment and environmental pollution and they were asked to make a picture of how they wanted to live in the environment. According to the findings, the learning was attained as a result of the lesson conducted through both the traditional method and technology supported method. It was found that the technology supported methods were more effective.

Individuals need to have environmental awareness in order to solve the increasing environmental problems. These individuals encountering early childhood environmental education will become more conscious eco-friendly individuals in the future. In this context, the importance of environmental education is increasing day by day. However, this will lead to more conscious generations growing up in schools when they have a lifestyle habit rather than a few hours of lessons. In traditional teaching methods, mostly teachers teach lessons and students are passive listeners. Due to the memorization and the bound of the book in the teacher-centered teaching methods, the lessons become more boring as a result of which the environmental education is not realized at the desired level. Since human beings are in the center of nature, the students should also be centralized in the lessons (Özbuğutu, Karhan, & Tan, 2014). In technology-assisted education, students are involved in an interactive process and have fun, practice and learn. Nowadays, the use of technology in the lessons is very popular. The use of computer-based instruction, computer-aided instruction and classroom software is repeatedly tested in different forms both in domestic and foreign studies (Sezgin, 2002; Teke Bodur, 2006; Kacar & Dogan, 2007).

According to the findings understanding environment and environmental pollution; is an effective method that enables students to be more effective in attracting their interest and attention and improving their achievement.

Suggestions for Further Studies

In the present study, the students were examined through a scale prepared about the environment and environmental pollution. Further studies can use different research methods. This study was limited to Konya province. Possible differences and similarities can be compared by conducting similar investigations in different provinces and regions. These surveys will give us a new perspective on the sensitivities of pre-school children in different provinces and regions with regard to environment and environmental pollution. Future research is suggested to replicate the research in elementary school in the course of Life Science and Science to be able to monitor the progress of learners in their learning.

This study, done by quantitative research method, can also be replicated by means of qualitative research method to reach an in-depth knowledge about the attitudes of students in terms of the environment and environmental pollution. Moreover, further research should be undertaken to work with broader samples to discover the roles of technology-supported education in pre-primary education institutions.

When preparing the annual program in the pre-school education, students need to be exposed to activities related to environmental awareness education in terms of the existing targets and the expected target behaviors to be acquired. The points to be considered in the preparation of these activities are suggested as follows: Training environments should be enriched with appropriate technological devices. Additionally, the teachers need practical training and seminars aiming to increase their competencies on technology supported teaching methods in order to make a better use of the technology in education. To realize this aim, it is necessary to organize meetings, seminars or environmental (tree planting, school or neighborhood garbage collection, etc.) activities to raise the awareness of the students and parents about the environment.

Apart from this, while preparing the education corner in schools, the science-nature corner should be prepared in detail and authentic samples should be replaced from the nature (sea shells, stones, and leaves) need to be examined through magnifiers. Furthermore, in school gardens, students should conduct a survey and provide plant cultivation in the soilfield. If there is no soil- rich field, the plants should be grown in big pots, and their maintenance should be done by children. In line with this, it should be emphasized that the students need to keep what they need while growing plants and how and why these materials (air, water, soil) should be kept clean.

To make the preschoolers love the nature, it is necessary to explain their responsibilities toward domestic and non-domestic animals, to create drama and story-telling about why they are respectful and sensitive toward their habitats, and organize trips to make them familiar with nature. In line with this, attention should be drawn to the students' inspections on these trips and to the sounds, smells and other living areas in the nature. Additionally, students should be shown the pictures, documents, photographs and other visual materials related to nature in order to create curiosity. Furthermore, students should be provided with the materials gathered from the nature in art activities and they should recognize these materials more closely. Additionally, students are suggested to draw the picture of the different parts of the nature. To make the environ-

mental education be more home-based in line with the school-based situations, parents need tobe informed about the necessities of care via letters and what they should do with the children at home. Thus, the awareness of this matter may increase in their families. At the same time, it becomes healthier for students to be informed about their behaviors due to the same attitudes hold at home and school.

Note:

(1) This study is a part of a dissertation of Fatma Altınsoy submitted to N.E.U. under the guidance of Assoc. Prof. Abdülkadir Kabadayı.

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Appendix 1

Preschool Students' Environmental Pollution Structured Interview Form (PSEPSIF).
1) What is environment? What comes to your mind when I say "Environment"?
2) What is environmental pollution?
3) Is sea polluted? Who pollutes the sea?
4) Is air polluted? Who pollutes the air?
5) Is the soil polluted? Who pollutes the soil?
6) Do you know the meaning of this sign? ♻
7) What precautions can we take to prevent environmental pollution?
8) In what kind of environment do you want to live?

Appendix 2

8-week preschool environmental education program.
1) Pretest application of the experimental and control groups.
2) "What is environment" training was given to the experimental and control groups.
3) "What is pollution" training was given to experimental and control groups.
4) "What is water pollution" training was given to the experimental and control groups.
5) "What is air pollution" training was given to the experimental and control groups.
6) "What is soil pollution" training was given to the experimental and control groups.
7) "Re-cycling" training was given to the experimental and control groups.
8) "Precautions to be taken against the pollution" training was given to the experimental and control groups.
9) "Friendly environment" training was given to the experimental and control groups.
10) Posttest application of the experimental and control groups.