DOI: 10.2478/dcse-2022-0016

sciendo

Discourse and Communication for Sustainable Education,
vol. 13, no. 2, pp. 26–39, 2022

Impact of In-Service Environmental Education on Early Childhood Teachers' Environmental Attitude

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Abstract

The purpose of this study is to examine the impact of in-service education designed to improve early childhood teachers' environmental awareness, knowledge, attitudes and their skills on integrating environmental issues in their teaching. Thirty early childhood teachers in the treatment group and Thirty in the control group participated the study. Teachers in the control group did not attain in-service education. Teachers responded to the Environmental Problems Attitude Scale (EPAS) before and after the in-service education. After the education process, teachers in the treatment group provided qualitative data about the impact of this education. For the treatment group the Mann-Whitney U test revealed a significant increase from pretest to posttest. Mann-Whitney U did not indicate a significant increase for the control group. Three major themes derived from qualitative data. These are an increase in environmental awareness, an increase in individual responsibility and taking action, as well as increased motivation and being better equippedfor environmental education.

Key words: environmental education, early childhood teachers, intervention, qualitative data, quantitative data

Introduction

Environmental problems are one of the most dangerous threats for current and future generations. UNCED (1992) stated that environmental issues should be handled globally because environmental protection is interdependent and indivisible. Therefore, in the United Nations (UN) many international treaties such as Rio, 1992, Kyoto, 1997, Rio, 2012 have been signed by countries all around the world (Oberthur & Ott, 1999;

UN, 1992; UN, 2012). In these and other international platforms, the need for raising new generations with environmental-awareness mentality has always been emphasized. Since education is the main tool of societies to raise future citizens of the world, it is reasonable to expect integration of environmental issues in the education system. As an example, in Rio 1992, Agenda 21pointedto the critical role of education for "promoting sustainable development and improving the ability of people to address environmental and development issues (UNCED 1992, p. 320)".

It is obviousthat to implement environmental education, first we should prepare teachers. Teachers should be qualified to provide environmental education. Their success in raising citizens with environmental awareness largely depends on teachers' competencies about delivering environmental education (Benjamin & Adu, 2019; Beatrix, 2021). Therefore, teachers' problems in teaching environmental issues are one of the main barriers that prevents effective environmental education (Güler, 2009; Türkošğlu, 2019). Güler (2009) conducted a project on environmental education with thirty teachers from different branches. She gathered qualitative data through interviews and teachers stated that they did not have enough information about environmental issues and that is why they lacked the necessary skills to teach environmental issues in their classrooms. In a more recent study Türkoğlu (2019) conducted interviews with preschool teachers and reported that they indicated that their lack of knowledge and interest in environmental education affected the quantity and quality of environmental education. When teachers do not feel competent about a subject, they tend to avoid it and rarely include it in their daily teaching program (Gerde, Pierce, Lee, & Van Egeren, 2018). Lack of knowledge about content and methodology prevents teachers from integrating environmental issues in their educational practices (Türkoğlu, 2019; Anderson & Jacobson, 2018). Anderson and Jacobson (2018) conducted in-depth interviews with twenty-five teachers teaching grade from 1–7. They investigated barriers to environmental education. Their findings revealed that teachers' lack of knowledge about content, lack of environmental education training, and lack of pedagogical knowledge were significant barriers for environmental education. Recently, Pamuk et al. (2021) conducted a survey with 1126 Turkish early childhood teachers, and they found that more than 50 % of the teachers declared that they did not have the skills to integrate environmental education in their classroom and 95 % of the teachers demanded in-service education on sustainable development and environmental education. Consequently, teachers should be supported in terms of environmental education. In a very recent international study Seikkula-Leino et al. (2021) examined the teacher education curriculum of environmentally friendly countries such as Sweden, Iceland and Finland and they have found that the teacher education curriculum did not emphasize environmental issues and sustainability.

Intervention studies that have aimed to support prospective teachers (Hamalosmanoğlu, Kızılay & Kırmızıgül, 2020; Kalungwizi, Krogh, Gjøtterud & Mattee, 2020; Sarıbaş, Küçük & Ertepınar, 2017) and teachers (Kerr, 2020; Okur-Berberoğlu, Özdilek & Yalçın-Özdilek, 2014) in terms of environmental education revealed promising findings. As an example, Sarıbaş et al. (2017) conducted an environmental education course with 58 prospective elementary school teachers. The course lasted 14 weeks. At the end of 14 weeks of training they found significant improvement in prospective teachers' environmental literacy, awareness on environmental problems, positive attitudes towards being part of the solution and self-efficacy of prospective elementary teachers. Similar findings occurred with teachers too (Okur-Berberoğlu, 2015; Okur-Berberoğlu et al., 2014; Kerr,

2020). Okur-Berberoğlu (2015) conducted in-service Eco-pedagogy-based environmental education with 24 elementary and middle school teachers. She found that the environmental education increased teachers' positive attitudes toward environmental issues. In a more recent qualitative study Kerr (2020) detected significant attitudinal change in teachers regarding environmental issues and in terms of integrating environmental education in their teaching after the in-service environmental education. These studies revealed that in-service education on environmental issues is effective for improving teachers' attitudes about environmental education and in integrating environmental education in their teaching. It is reasonable to expect that teachers with positive attitudes toward environmental education might have integrated environmental issues in their teaching practices more than teachers with less positive attitudes toward environmental education (Kerr, 2020).

Environmental Attitude

Attitudes might have predictive power on behaviors (Frymeir & Nadler, 2017), especially when measuring the how the predictive power of attitude over behavior increases by targeting the overlapping characteristics of action, context and time of behavior (Frymeir & Nadler, 2017). Therefore, for the purpose of this study we defined environmental attitudes as teachers' knowledge and awareness about environmental issues, which enable them to believe they can contribute to environmental well-being through their personal and professional practice (Bogner & Wiseman, 2006; Kaiser, Wölfing, & Fujrer, 1999; Manteaw, 2020). Teachers' attitudes about environmental issues also would extend their comprehension on sustainability (Manteaw, 2020). We hope that improvement in teachers' understanding on sustainability would have positively reflected on their teaching and thus, their students' development on sustainability (Beatrix, 2021).

Teachers' attitudes toward environmental issues can differ according to their disciplinary branches. Kara and Çelikler (2017) found that prospective science teachers' attitudes on solid waste recycling were significantly more developed than that of prospective primary and social sciences teachers. That is to say that prospective science teachers were significantly more willingthan primary and social science teachers to attempt to find solutions for solid waste issues, to warn people who use unnecessary paper, to prepare a list of needs before going out to shop, to warn people who do not throw out waste into recycle bins, to encourage family members to recycle solid waste produced in the house and to encourage their friends to contribute to recycle. They also tend to be familiar with legal regulations about solid waste and recycling. The authors did not detect similar differences between primary and social science teachers. None of the above-mentioned intervention studies targeted directly early childhood education teachers. Since early childhood education is foundational to acquisition of all traits and behaviors, we believe that it is important to start environmental education from early childhood years (Kotaman, 2013, 2014). Consequently, we developed an in-service education that aimed to increase teachers' knowledge about environmental issues, environmental awareness, to motive them to adopt more environmentally friendly behaviors and to show them how to integrate environmental issues in their classrooms. In addition, the above-mentioned studies did not measure the improvement of teachers' environmental attitudes through a pretest and posttest design with a control group. We believe therefore that our study will contribute to the improvement of environmental education for early childhood educators.

Conceptualization of Environmental Education for Early Childhood Teachers

We followed international organizations' conceptualization of environmental education while we were developing the in-service environmental education for teachers. So, at the Tbilisi Conference (1977) the following components of environmental education were declared:

(a) awareness: helping individuals and social groups gain awareness and sensitivity towards the environment and environmental issues;
(b) knowledge: helping individuals and social groups gain a variety of experiences and develop a basic understanding of the environment and environmental problems;
(c) attitude: to help individuals and social groups to create value judgments about the environment and to motivate active participation in the improvement and protection of the environment;
(d) skills: to help individuals and social groups acquire skills to identify and solve environmental problems;
(e) participation: to provide individuals and social groups with the opportunity to participate actively at all levels in works for the solution of environmental problems (as cited inTürkoğlu, 2019).

In another international document, UNESCO (2014) defined environmental education as "an organized effort to empower people and communities to work together towards a more sustainable future through education about how the natural environment functions, and how humans can manage their behaviour to live sustainably (p. 8)".

Environmental education first of all should promote personal awareness about environmental issues (Morrison, 2018). We planned activities that would foster environmental awareness and personal responsibility for taking action by displaying environmental behaviors more frequently. As an example, we asked teachers to close their eyes and dream about the place where they wanted to live. We gave the following instructions: "Now, please, close your eyes and think about the best place for you to live. What kind of view would you like to look at? Think about air, water, people's relations with each other, streets, parks, pavements in as much detail as you would like all of them to be? Dream about yourself in that place." After this instruction we divided teachers into groups of five and provided them with very large papers so that they could work together. We wanted them to draw their dream place in agreementwith others in their groups. In the next step we wanted them to dream about the place where they did not want to live. After they draw pictures of places they wanted and did not want to live in we discussed these two. During the discussion we emphasized two main issues. One was the difference between wish and will. Most of the time we wish for good things, however, we are not taking responsibility for it and not doing our part. If we do not try to improve our environment and work for preventing negative things it is only a wish for us to live in a good environment and this wish will not become true with the help of the genie of the lamp. Through this activity we pointed out environmental responsibility and discussed it with them. So we aimed to improve teachers' level of knowledge about environmental issues. In addition, we wanted to improve teachers' environmental sensitivity by showing that there are things they can do for the environment as an individual.

After this assignment we distributed an environmental behavior list, and we asked each teacher to evaluate themselves for each item such as "I always turn the lights off when I leave a room. I do not turn on the washing machine unless it is full." We brain-

stormed and teachers added new items to this list. After that we asked each teacher to choose two behaviors from the environmental behavior list that they thought they could improve. We emphasized what should be done for acquiring more environmental behaviors. Each teachers' individual weakness in terms of environmental behaviors, drawbacks, habits that were preventing them from acting environmentally friendly were discussed. Teachers provided suggestions to their colleagues about how to improve specific behaviors such as buying too much food and therefore wasting food. Thus, we aimed to show new skills that teachers could add to their environmental behavior inventory.

Next step was how to adopt environmental issues in the classroom. We provided examples of integrating environmental issues in everyday activities. Again, we divided teachers into groups and wanted them to write a story from the perspective of victims of environmental pollution, such as forest animals, farmland threatened by construction, rivers, trees, children. We asked teachers to use these stories as their starting point and create activities that were integrated with other subject areas, such as social-emotional development (empathy), fine and gross motor development, acquisition of healthy behaviors. We aimed to improve teaching skills on environmental issues and also wanted to show ways to integrate environmental issues in early childhood classroom.

On the fourth day of the training, we took teachers for a forest trip. Teachers were informed about phone applications that would allow them to examine different plants, so that they can use these applications when they conduct activities with children. Teacher also gathered natural objects, such as rocks, broken branches, dead cones and leaves. We grouped them and asked each group to create environmental activity with the objects that they gathered. Each group presented their activities and received constructive feedback from others. These activities also promoted teachers' skills and participation about environmental issues. Thus, by improving teachers' awareness, responsibility and skills on environmental issues, we empowered teachers' agency on environmental education.

In summary, early childhood education can contribute to raising environmentally sensitive citizens of future. Early childhood teachers need to be equipped with environmental awareness, knowledge and skills to integrate environmental education in their teaching practices. The purpose of this study is to examine the impact of in-service education, which was designed to improve early childhood teachers' environmental awareness, knowledge, attitudes and their skills on integrating environmental issues in their teaching. Accordingly, we aimed to answer the following questions:

1. Will treatment and control groups' environmental attitudes differ after the intervention?
2. How will these teachers evaluatethe impact of environmental education that they received?

Methodology

The study was conducted with the permission of X governorship of X, in Turkey. Permission dates and protocol numbers for X governorship of X, Turkey were E-2629 2541-604.01.03-34004647 06.10.2021. We received all required ethics permissions from related authorities including consents of parents.

A semi-experimental pretest and posttest with the treatment and control groups were deployed in this study as quantitative methods. In addition, phenomenological

research principles were used as a qualitative method. Thus, the study took a mixed-method approach.

Participants

The purpose and content of the study were announced through the City Representative of Ministry of National Education. So, teachers became aware of the project's website. Thirty volunteer teachers who filled online application forms formed the treatment group. Although we planned to have at least 60 applicants and among these 60 randomly assign 30 teachers to the treatment and 30 teachers to the control group, unfortunately only 30 teachers applied. Therefore, for the control group we informed early childhood teachers that we only wanted them to fill an attitude scale about environmental behaviors. Thirty teachers who volunteered to fill the scale formed thecontrol group.

Sixty teachers from 55 different kindergartens participated in the study. All teachers were female. The ages of the treatment group teachers ranged from 25 to 39 with the mean age of 28.6 (SD = 2.87). Participants' years of education, years of professional education and years of experience ranged from 15 to 18, 4 to 6, and 4 to 14, with a mean of 16.4 (SD = 0.84), 4.63 (SD = 1.23) and 8.64 (SD = 1.64) years, respectively. The ages of the control group teachers ranged from 23 to 46 with the mean age of 30.12 (SD = 3.67). Participants' years of education, years of professional education and years of experience ranged from 15 to 18, 4 to 6, and 3 to 17, with a mean of 16.78 (SD = 1.56), 4.89 (SD = 1.75) and 9.72 (SD = 1.89) years, respectively.

Table 1

Teacher Demographics

	Min	Max	Mean	Std.
Treatment group				
Age	25	39	28.6	2.87
Years of education	15	18	16.4	0.84
Years of professional education	4	6	4.63	1.23
Seniority	4	14	8.64	1.64
Control group				
Age	23	46	30.12	3.67
Years of education	15	18	16.78	1.56
Years of professional education	4	6	4.89	1.75
Seniority	3	17	9.72	1.89

Materials

Before the treatment all teachers responded to the Environmental Problems Attitude Scale (EPAS), which was developed by Güven (2013). The scale contains 45 items, and it aims to measure teacher attitudes about environmental problems. The scale provides a total score. There are five sub-dimensions of the scale aimedat measuring people's intensity about environmental problems. The sub-dimensions are the following:

Awareness (A)about environmental problems contains items such as "I am not informed about the environmental problems caused by acid rains"; reacting (R) about environmental problemscontains items such as "I wonder about sources of environmental problems"; valuing (V) the environment contains items such as "I find environmental problems that we face today extremely important"; organizing (O) contains items such as "To prevent environmental problems I want to inform as much people as I can"; becoming personality (P) contains items such as "I am aware that even small changes in my life style have impact on the environment, therefore I consider the environment in all my behaviors".

Cronbach alpha coefficients for pretest of control group's A, R, V, O, P and total were 0.73, 0.76, 0.074, 0.128, 0.86 and 0.90 respectively. Cronbach alpha coefficients for posttest of control group's A, R, V, O, P and total were 0.72, 0.83, 0.048, 0.54, 0.91 and 0.93 respectively.

Beside qualitative data we gathered quantitative data from the treatment group. A week after the education program, wesentthe treatment group open-ended questions about the education that they had received. It had taken two weeks to gather the data. We asked the following questions:

1. Will you recommend this education to your colleagues? Why or why not?
2. Did the education cause any change in your opinions about environment? If yes, what are they?
3. Did the education have an impact on your behaviors about environment? If yes, what were the contributions? If no, why do you think it was not effective?
4. Do you think this education will affect your teaching practices? If yes how?

One teacher among the treatment group volunteered to gather responses of all otherteachers; she compiled them and sent them to us without any identity information. Thus, we wanted to establish confidentiality of the responses to avoid social desirability bias as much as possible.

Procedure

Teachers in the treatment group received education on environmental awareness and on how to adapt environmental issues to the early childhood classroom. The education lasted four days. During the first three days lectures started at 10:00 and ended 16:00 with one-and-a-half-hour lunch break. The fourth day was allocated for the forest trip and activities were conducted in the forest from 09:00 until 16:00. A week after the forest trip teachers from both groups (treatment and control) filled EPAS. Teachers in the treatment group also responded to open ended questions. One of the teachers in the treatment group did not respond to the posttest EPAS.

Research Findings

The Shapiro-Wilks test revealed that the pre and posttests data of the treatment and control groups were not normally distributed; therefore, we could not conduct ANCOVA. We conducted two Mann-Whitney U through which we analyzed pre-posttest comparisons of treatment and control groups for EPAS.

Pretest mean scores for treatment and control groups were 122.46 (SD = 5.3) and 111.73 (SD = 12.23) respectively. Posttest mean scores for treatment and control groups were 127.48 (SD = 5.32) and 113.20 (SD = 13.40) respectively. Mann–Whitney U Test for treatment group indicated a significant increase from pretest (Mdn = 21.78) to posttest (Mdn = 37.22), U = 196.5, p = 0.000. Mann–Whitney U Test for control group did not indicate a significant increase from pretest (Mdn = 29.07) to posttest (Mdn = 31.93), U = 407.0, p = 0.524. The effect size was 0.73. It indicates that 73 % of the variability in the ranks is accounted for the independent variable.

Qualitative Data

28 teachers out of 30 in the treatment group responded to four follow-up questions. We gathered qualitative data through four questions, which each had closed and open-ended parts. Closed parts required yes-no responses. For this part we presented descriptive data. For question 1,27 out of 28 teachers reported that they would recommend this education to their colleagues. For question 2,26 out of 28 teachers indicated that the education positively affected their opinions about the environment. For question 3,27 out of 28 teachers pointed out that thiseducation content contributed their environmental behaviors. For question 4, all 28 teachers mentioned positive impact of the education on their teaching or teaching-related attitudes about environmental education.

To analyze teachers' responses to open-ended parts we employedphenomenological data analysis procedure. Creswell (2012, p. 52) stated, "Phenomenological data analysis proceeds through the methodology of reduction, the analysis of specific statements and themes, and a search for all possible meanings." A phenomenological study is a qualitative approach that describes the meaning of the lived experiences for several individuals about a concept or a phenomenon (Creswell, 2012). Creswell's methodology of reduction aimsto extract significant statements from the main transcript and cluster them into themes. Thus, it is possible to discuss the meaning of the phenomenon that is experienced by the participants. As recommended by Cohen and Crabtree (2008) for verification and to ensure confirmability, two researchers independently examined the data and derived themes from the data. Finally, researchers negotiated on naming the themes that had similar contents. Three major themes derived from the data.

Increase in environmental awareness: Teachers mentioned that the education experience informed them about environmental issues and by building relationship between their lives and environmental issues, it increased their awareness about environmental issues. This theme appeared 14 times in responses to question 1 and 19 times in responses of question 3. It appeared for a total of 34 times. Examples of teachers' responses are listed below:

> Teacher 1: "This education opened my eyes about the importance of environmental issues."
>
> Teacher 2: "The education increased my environmental awareness. I recognized environmental values and because the education provided an opportunity to practice them I feel more sensitive and conscious about the environment.
>
> Teacher 10: "I have realized how much damage we have made on environment unintentionally"

Teacher 12: "I realized that I was acting without thinking. For example, I used to leave lights on after I left the room and I did not think about its impact on the environment. Now I start to see things from a different perspective."

Teacher 15: "Education informed me about renewable resources and sustainability problems, which contributes on my environmental awareness."

Teacher 19: "I have learned about many environmental problems that I was not aware of. Thus, it reinforces my ideas about protecting nature."

Increase in individual responsibility and taking action: Teachers pointed out that through thiseducation they realized their individual responsibilities regardingnature and they decided to act in a more responsible manner than they were acting before. They mentioned environmentalist behaviors they had already started to perform after the education. Both in question 3 and 4,18 responses out of 36 were related with this theme. Examples of teachers' responses are listed below:

Teacher 5: I am not wasting electricity and water anymore. I started to act extra careful about natural sources and recycling.

Teacher 7: I do not use paper cups anymore. Especially in self-service restaurants and cafes I am offering them not to use paper cups.

Teacher 9: The education greatly changed the ideas that I had at the beginning. At the beginning I was too lazy, I was thinking that only my actions would not change anything for the environment. After the education, my thoughts completely changed.

Teacher 10: "I used to think that my personal actions could not make a difference for the environment. The education changed my thoughtsand now I am telling people things that I learned from this education and informing them about the environment.

Teacher 12: I started to pay special attention to paper and water extravagance. I am trying to act frugal. I informed my students too.

Teacher 13: Before the education I was thinking that my individual effort would not matter for environmental issues. After the education I realized that I have a profession which can be very effective in advocating environmentalist approaches and contribute to sustainability. I will strive more for the environment.

Teacher 21: I am not pouring frying oil in the sink any more. I am warning people around me about this.

Teacher 22: I am separating oil, batteries, and other wastes. I was thinking one will not change anything, but now I am not thinking in that way.

Teacher 23: I have realized that environmentalist actions were way easier than I thought they were. I am not pouring frying oil and collecting them in a jar.

Teacher 25: The education helped me to question myself. I realized that I did not think about several issues at all, such as batteries, buying too much food and wasting them etc. I will act differently.

Motivated and equipped me for environmental education: Teachers' responses revealed that the education inspired them to allocate more time to environmental education in their classrooms. Some teachers pointed out that they had already started to integrate environmental issues in their teaching. This theme appeared 26 times. Examples of teachers' responses are below:

> Teacher 5: I am applying things that I had learned in the education in my classroom. I started to conduct environmental activities.
>
> Teacher 8: I am doing environmental activities, almost everyday we are working in the garden.
>
> Teacher 9: I think we had written activities on the second day of the education. Planning activities with my colleagues contributed to my professional development. I will definitely use these activities.
>
> Teacher 11: After theeducation I believe I will make a better role model for my children about environmental behaviours.
>
> Teacher 12: Right after the education we have started to chat with my children about the environment. I brought my storybooks about environmental issues to classroom. We started to do activities. We planted the pine sapling that was given to me from the education.
>
> Teacher 17: I will apply more science and nature related activities in my teaching.
>
> Teacher 22: I already started to apply things that I had learned in education in my classroom.
>
> Teacher 24: I started to teach everything I had learned from the education to my children. Environment became part of our daily activities.
>
> Teacher 27: The education contributedto my teaching in several ways. Now it is easier for me to teach children about the importance of the environment, being careful about sustainability, recycling and how to protect the environment.

Discussion

The purpose of the project was to conduct an in-service education on environmental education for early childhood teachers and increase their awareness about environmental issues, environmental education and improve their skills on integration of environmental issues in their teaching practices. The teachers in the treatment group displayed statistically significant increase in their environmental attitude from pretest to posttest. This was consistent with earlier intervention studies that were conducted with prospective teachers (Hamalosmanoğlu, Kızılay, & Saylan Kırmızıgül, 2020) and elementary and middle school teachers (Okur-Berberoğlu, 2015; Okur-Berberoğlu et al., 2014; Kerr, 2020). So, in their recent intervention study that Hamalosmanoğlu et al. (2020) conducted with prospective elementary and social sciences teachers, the authors found a significant increase in environmental attitudes on solid waste and recycling after watching the Wall-E movie. Okur-Berberoğlu (2014) conducted an environmental in-service education project with 27 teachers. The intervention lasted for 10 days and contained subjects

such as the geological structure of Çanakkale (name of the place where that education took place), the forest ecosystem of Çanakkale, ethnobotany. Their findings revealed a significant increase in teachers' environmental awareness and sensitivity to the natural environment. Kerr (2020) collected qualitative data from four elementary and four middle school teachers on the effectiveness of their project about outdoor science and environment education. They reported an improvement in teachers' attitudes towards environmental issues too. Likewise, our study also indicated a significant increase in the environmental attitudes of the treatment group teachers, whereas such increase was not detected in the control group teachers. Our study contributed to the environmental education literature by showing that an intervention focused on early childhood teachers can significantly improve their environmental attitudes too. We did this with the use of a control group. However, when we compared the differences between the two groups, we could not find a significant difference. The small number of participants and their irregular distribution might be the reason for this outcome.

We have also gathered qualitative data about the treatment groups' experiences. Qualitative data supported quantitative findings. Teachers reported that they had experienced an increase in their environmental awareness. Although through measuring attitudes the expectation is that attitudes and behaviors will be consistent (Frymier & Nadler, 2017), as Kerr (2020) stated, attitudinal change and the link with behavioral change (actual ongoing teaching practice) can be difficult to prove because teacher practices only partially correspond to their beliefs and attitudes (p. 41) that may not always be the case. Qualitative data on attitudes does not provide us with information about the impact of environmental attitudes on environmental behaviors. This information came from qualitative data. Teachers pointed out that after the intervention they had started to embrace and apply more environmentally friendly behaviors, such as not wasting electricity and water, recycling more, separating wastes, not using paper cups. Qualitative data also revealed some immediate impact of the intervention on teachers' teaching. Most of the teachers reported positive contribution of the intervention on their ideas about integrating environmental issues in their teaching. This contribution was achieved mostly by increasing teachers' subject knowledge and equipping them with techniques that allow them to integrate environmental issues in their classroom. Teachers' content knowledge is a factor that affects students' learning (Gess-Newsome et al., 2019). Since environmental teaching is a relatively new subject, increasing teachers' content knowledge about environmental issues can have a positive effect on children too (Alvarez-Garcia, Sureda-Negre, & Comas-Forgas, 2015). Beside these contributions, some teachers reported that they had already started to implement things that they had learned from the project in their classrooms.

Limitations and Future Studies

There are several limitations of this study. We could not achieve random assignment to treatment and control groups because a very limited number of teachers accepted to join the project. Since we could not establish a random assignment, we could not achieve experimental design. Our data did not show a normal distribution. We could not recruit parametric statistical methods such as ANCOVA. Future studies can strive to establish experimental conditions through which they can reach better casual results.

Teachers' environmental attitudes were measured through self-report scale. So, they are subject to social desirability bias. Future studies can be supported with children's pretest posttest measurement of environmental skills. Thus, it will be possible to evaluate how much a teacher is able to integrate what they had learned from in-service education to their teaching. Sample size was also very limited; with a larger sample size results would be more generalizable.

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