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Natural Scientific and Ecological Environmental Education in the Training of Kindergarten Teacher Students at the University of Sopron, Hungary

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Abstract. The greatest challenge of the 21st century is to recreate the disturbed balance between people and their environment. The functioning of the changed global system warns us about the multiplying of today's global and local problems, which are affecting the world's population. International organizations deal with this issue. In their opinion, environmental education and environmentally conscious thinking can be a way out of the crisis. The efficiency of environmental education is influenced by the ratio of theory and practice as well as the appropriately applied teaching methods, which is confirmed by the experience of the *Ecology and Environmental Protection in Kindergarten* course of the Benedek Elek Faculty of Pedagogy at the University of Sopron, Hungary.

Keywords: environmental education, environmental attitude, cooperation, creativity, recycling

Introduction

From the mid-1900s, international organizations have recognized that environmental protection is becoming increasingly global. There is a need for long-term thinking and action on environmental issues. The development of environmental awareness, i.e. environmental education, appeared in most countries, as it had become clear that the maintenance and protection of the state of our environment could only be ensured in the event of a significant change in social perspectives (Havas–Varga 2006). The basic preconditions for this are environmental awareness, the development of environmentally conscious behaviour, values, and emotional attitudes, as well as the formation of thinking and the expansion of knowledge about the environment and society.

In the 1930s, conservation education flourished in the American society. Its aim was to draw the attention of the American people to environmental problems and the importance of conserving various natural resources (Victor 1998). Rachel Carson's book *Silent Spring* was published in 1962, in which the ecologist drew attention to the dangers of technological development (Carson 1994). After the publication of the book, many non-governmental organizations were established, and the state environmental protection got also started. In 1972, a world conference on the environment was held in Stockholm, organized by the United Nations and entitled *United Nations Conference on the Human Environment*. The right to a humane environment, the need for environmental education, and the renewal of educational tasks and methods were formulated here for the first time at the international level. According to Principle 19, environmental education broadens the horizons of students and adults, and therefore they will act responsibly to protect the environment (Stockholm 1972). The first international event on environmental education was the *Environmental Education Workshop* conference organized by UNESCO in Belgrade in 1975. In the *Belgrade Charter*, in relation to environmental education, UNESCO set out new knowledge, expertise, values, and attitudes for a new environment and quality of life (UNESCO 1975). The *Tbilisi Intergovernmental Conference* was held in 1977, co-organized by UNESCO and UNEP, where recommendations were made on environmental education. According to their definition:

> A basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of their biological, physical, social, economic, and cultural aspects, and acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of the environment. (Victor 1998)

In 1979, at the UNESCO conference, the *Munich Recommendation* document stated the fact that environmental education was a way out of the ecological crisis (Kováts-Németh 2010).

The World Commission on Environment and Development was set up by the United Nations and its members in 1984. The 22-member Brundtland Commission made a report entitled *Our Common Future*, which set out the concept of sustainable development. It states that a sustainable development is a form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The Commission has identified three pillars for sustainable development: environment, society, and economy. The 1987 UNESCO Conference in Moscow issued an action strategy

entitled *International Strategy for Action in Environmental Education and Training for the 1990s*. The second part of the strategy formulates the principles, goals, and tools of environmental education. The 1997 conference, also organized by UNESCO, set out the topics concerning environment, society, education, and social responsibility for sustainability in the *Thessaloniki Declaration*. In 1999, a conference on *Environmental Education and Training* was organized in Brussels by the European Union. At this conference, it was stated that environmental education and training were the basis for sustainable development in the Union. In their final document, the participants stated that environmental education no longer only meant protecting and loving the environment and encouraging doing it, but it also extended to the topics of sustainable development and society.

In 2002, the UN General Assembly declared the ten years from 2005 to 2015 to be the *Decade of Education for Sustainability*. Its strategy encourages member states to integrate sustainability education into formal and informal education. The *Bonn Declaration* summarizes the achievements and further tasks of the *Decade of Education for Sustainability* in 2009 (Kováts-Németh 2010). Nowadays, the concept, purpose, and task of environmental education have become clearer. Accordingly, environmental education includes the following: environmentally conscious lifestyle, harmony between people and their environment, development of knowledge, skills, and attitudes towards environmental problems, effective prevention of environmental problems, and the management of current problems as well as the prevention of new ones (Ádám–Kuti–Kuti 2007). According to Lehoczky, the goal of environmental education is multi-layered: it is not just the transfer of environmental knowledge, but it also seeks to influence the whole personality, and so it influences the consciousness with knowledge, the emotions with experiences, and the will with purposeful activities (Lehoczky 1999).

According to Kárász, there are still significant shortcomings in teacher training today although the content of environmental (environmental protection, ecological and nature conservation, etc.) trainings have been analysed, its shortcomings have been identified, and the strategic elements have been determined by several national conferences since the 1980s (Kárász 2002, 2003). This fact is also stated by Kiss and Zsíros: in higher education, the teaching of knowledge about environmental protection and sustainable development is not yet fully developed (Kiss–Zsíros 2006: 7).

The teacher has a big role to play in the educational process because it is not only that their task is to pass on the knowledge, but they also affect the students with their whole personality. The personal example and the attitude cause a change in students' behaviour. In the context of social learning, we learn the most through imitation or model following (Bandura 1976).

In kindergarten teacher training, it is especially important that our students get to their future workplace, i.e. kindergartens, with the right environmental

attitude, because by deepening their theoretical knowledge and methodological culture, they will be able to improve the efficiency of their science and ecological education. They will be able to convey and implement the expectations of environmental education and education for sustainability. It is very important that they know and apply the methods that help preschool children to think and behave in an environmentally conscious way. It is especially important that our students have all this by the end of the training because the national basic programme of kindergarten education defined by Government Decree 363/2012 (XII. 17.) lists the formation of habits related to the protection and preservation of the environment and the establishment of environmentally conscious behaviour among the general tasks of kindergarten education. Environmental education in kindergarten is linked to almost all areas of education.

The most important principle of the *National Strategy for Environmental Education* is that both the environment and the education affect every single person, which is why every citizen is interested in the learning process for the future. It also states that the effectiveness of environmental education and the preparedness of environmental teachers must be increased because this is the only way to achieve lasting and well-founded improvements in the state of the natural and human environment. Curriculum theory in Hungary needs to be renewed; the path of progress leads to practice. One of the ways of organizing the literacy material is a system that divides the subjects into larger units, which is organized by some kind of system (interest of students, their experiences). It focuses on problem areas, practical tasks, student activities, and comprehensive knowledge (Ballér 2003). Environmental education and the development of environmentally conscious behaviour are more effective with consciously applied task-oriented methods (Czippán et al. 2004: 21). Studies and research prove that environmental education can be implemented more effectively in projects (Kováts-Németh 2010).

Materials and Methods

Ecology and Environmental Protection in Kindergarten Course – SoE, Benedek Elek Faculty of Pedagogy, Kindergarten Teacher Education

The 2nd-year, full-time students of the Benedek Elek Faculty of Pedagogy at the University of Sopron study *Ecology and Environmental Protection in Preschool Education* as a compulsory course. The objective of teaching this subject was to expand the environmental knowledge of the students, increase their sense of responsibility, and develop their environmental awareness. We also aimed to increase the sensitivity of the students about solving environmental problems. The task of the class was to introduce the students to the main conceptual fields

and studies of ecology as well as the development and history of environmental protection, the global problems in detail, the topics of international conferences, the characteristics of sustainable development and economy. Our task was to provide students with an understanding of the links between ecological and environmental issues so that they would think creatively and critically about sustainability and critically consider environmental issues.

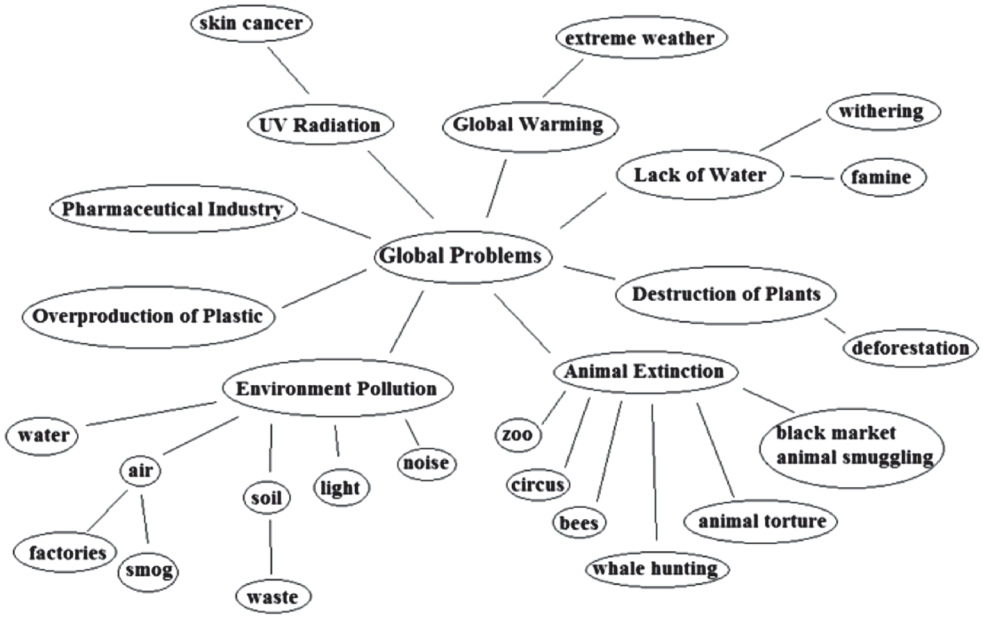
We designed theoretical and seminar classes with a duration of 13 hours of theory and 13 hours of practice – a total of 26 hours. We used work forms and methods in rotation. In order to renew the pedagogical culture, we emphasized methods that promote creativity, problem-solving, development of critical thinking, student cooperation, and active participation. Individual work was the form of theoretical lessons used for individual knowledge acquisition, global and local exploration of environmental problems, recognition of problems, and independent search for solutions. We used the group and pair work form in the seminar classes. The task assigned at the beginning of the semester – making a toy from recycled material – could only be achieved by our students if they cooperated with each other. Together they discussed who made what kind of toy and what materials were used. This was the only way they could present different toys by the end of the course.

Our students received aids for the theoretical lessons, which were IT tools, writing pads, pencils, photos, and books. For the seminar classes, students brought from home the material of which the toy was made. Our teaching methods – the concept map, the questionnaire assessing prior knowledge, the discussion, the explanation, the data collection, the research, the creation, and the correction – were present from the beginning of the course until the end of it, i.e. the presentation of the product. When we chose our methods, we took into account which skills and abilities needed to be developed. Our aim was to develop the acquisition of knowledge and enrich the vocabulary. Additionally, we aimed at: developing learning and observation skills, development of visual memory, improving sensitivity to ethical norms and value-preserving behaviour, and development of cognitive skills: e.g. perception, retention, and processing of information, development of visual memory. We also aimed at developing constructive ability, problem recognition, and analysis and problem-solving skills during planning.

Assessment of Prior Knowledge with a Concept Map

At the beginning of the course, students' preliminary knowledge was assessed with a concept map (*Graph 1*). The central concept of the map was the "global environmental problem", to which the students linked their ideas with free association. Our students worked in groups consisting of 4–6 people and had 15

minutes to process. At the end of the work, the global problems were introduced and supplemented. Our task was to uncover and correct misconceptions and to fill in the missing knowledge. We stated that our students considered environmental protection important but did not see environmental problems in the context of causality.



Source: author's drawing based on the project

Graph 1. *Type 1 concept map*

Assessment of Prior Knowledge with a Questionnaire Survey

At the beginning of the course, we conducted an anonymous questionnaire survey, asking students about their environmental awareness in their daily activities. The survey looked at students' background knowledge and environmentally conscious behaviour, particularly focusing on energy and water use, their shopping habits, and how they collected waste. The primary aim of our research was to improve students' environmental knowledge. Our further aims were to compare the results of students coming to each institution and to develop an adequate new subject programme based on the results of the survey. During the examinations, we chose the method of sentence starting. The survey included 84 of the kindergarten teacher students, 59 of the wildlife engineer undergraduate students, and 63 of the undergraduate medical students – a total of 206 first-year undergraduate students. Our hypothesis was that the students who study or have studied environmental protection were more sensitive to act in order to

protect their environment than the students whose curriculum did not include this subject. Thus, in their case, the lack of information and knowledge prevents effective action. A summary diagram of the study was prepared.

The results of the survey confirmed our hypothesis that there is a significant difference between the environmentally conscious attitude of the students studying environmental protection and the students who previously did not study the subject. The only similarity was found in the shopping habits of the surveyed students, namely the places where they shop. The results of the three surveyed universities showed that for most students their knowledge of the subject and their current lifestyle regarding their shopping habits and energy use required improvement. Based on their water use and waste collection habits, we came to the conclusion that they were willing to lead a more environmentally conscious lifestyle (Nmarné Kendöl 2019).[1]

Results and Discussion

Theoretical and Seminar Classes

Based on the results of the survey, we designed our theoretical and seminar lessons. We created a Power Point demonstration to convey new knowledge. The environmental problems and topics were examined from the perspective of the kindergarten life, that is, how the relevant topics can be introduced into the kindergarten so that the students can integrate it into the everyday life of the kindergarten. We considered important to emphasize customs and traditions from the past, which have been forgotten but could be made relevant again with conscious attention. Our students were given assignments and were free to choose between a global environmental problem and a local one in their own area.

Students prepared a Power Point presentation of the issues and then presented the processing of the problem to their group. The students were given the opportunity to discuss their questions and listen to their opinions, as they did not always know the background of the many environmental problems that surfaced and, like the general public, they had superficial knowledge and even misconception about some of them. Discussing environmental issues helped students to understand that these challenges affect everyone in their environment, in their direct human relationships, and in their individual lives. We gave our support and helped to develop a holistic approach to environmental education, because it is very important that the surveyed age-group be aware of the problem about their home environment, community, or country (Molnár–Hartl 2017).

1 We wrote more about the results of the survey in the 17th issue of the educational journal *Training and Practice* in 2019.

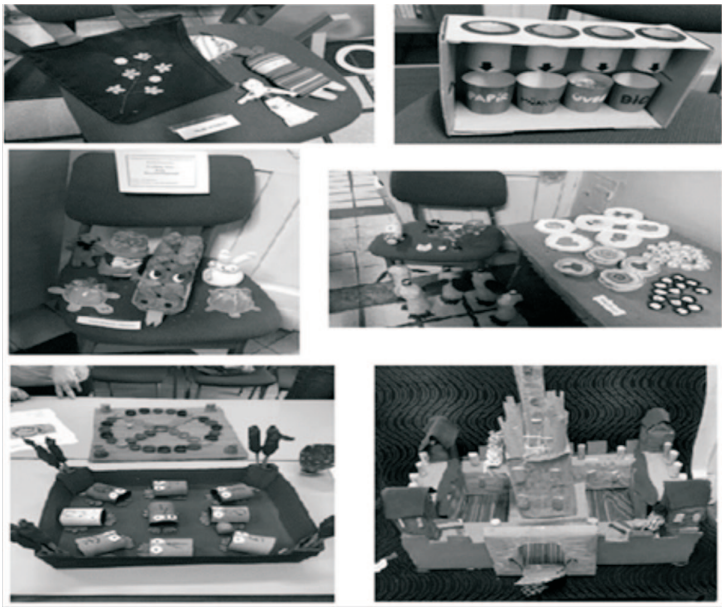
Recycling Options

During the semester, our students were given a practical assignment: they made a recycled toy, documented the material needed for the toy and the technique of making it, and named the age-group to whom the toy was recommended. Toys were made of paper, cork, plastic, textiles, yarns, wood, foil, felt, toothpicks, and buttons (*Graph 2*). Our students took the task seriously – one of the toys was made over several days. They were creative and were developing problem-solving skills while making the toy. The task also put their patience to the test: there was a case where they had to rebuild one of the toys because they failed at the first attempt. Our students also developed their ability to cooperate, learned to work together and to help each other. The toys were presented to each other at the end of the course. Trying out each other's toys and sharing the tricks of making it was a great experience for both the teacher and the student.

An environmental awareness lifestyle is characterized by a greater focus on our tiny, everyday environmental habits, such as energy and material management, the issues of drinking water and waste, and the relationship with our living nature. This constant attention, or awareness, is primarily based on emotional attitudes (Havas n. y.). To protect our environment, it is very important that we know what we can recycle in our daily lives. In addition to experiencing the joy of creation, students viewed waste as a creative resource. According to the opinion of our students, this task posed the greatest challenge to them. The finished toys were exhibited at the end of the semester and were available for everyone to see and try out. At the time of the exhibition, our faculty held an International Week. The *International Conference on Training and Practice in Education* also took place during this time. We were pleased to see that many of the participants in both events saw and tried out our students' toys.

Developing environmentally conscious lifestyles, saving energy, water and electricity, avoiding wasting, and waste management were given priority during the training.

By the end of the semester, our students were able to explain, analyse, and find solutions to environmental issues. They evolved a rich methodological repertoire that enables them to properly educate on environmental issues as preschool educators. We assume that through our project we managed to increase the environmental sensitivity of our students. They recognize environmental problems, look for possible solutions to problems, and see causal relationships. A problem can only be solved by recognizing, defining the problem itself, recognizing that our actions have consequences, and then acting together to solve the problem. Our goal can only be to make environmentally responsible, value-based, and sustainable behaviour – based on the knowledge and love of nature and environment – dominant in our students (Molnár 2015: 131).



Source: photo taken by the author

Graph 2. *Toys of recycled materials*

In the course of environmental education, we form environmental and emotional attitudes and expand the knowledge that can be formed about the environment and society. However, material knowledge of nature and society is not enough. It is very important that we feel a connection, love, and care for nature and are able to act effectively to protect our environment (Wilson 1994). Thus, in environmental education, we develop and shape all three parts of environmental attitudes – cognitive, affective, and behavioural. The environmentally conscious person and the environmentally conscious educator pays attention to their environment, have the knowledge, and are motivated. The goal of environmental education is not only to expand the cognitive domain but also to develop emotional attitudes and environmentally friendly behaviours. An environmentally conscious lifestyle and the pursuit of sustainability can only be achieved if people's attitudes in their thoughts, knowledge, and human feelings and actions become part of the everyday life. This is when we will be able to talk about internalized actions (Molnár 2009, Abelson–Rosenberg 1958). Researchers also point out that changing the ratio between theory and practice and new forms of cooperative learning can make environmental education more effective. Thus, authors suggest experience-based, activity-focused, sensitizing, and interactive methods (Czippán et al. 2004: 21).

Working together with the students in the *Ecology and the Environment in the Kindergarten* course confirmed that the learning process was effective with

properly chosen teaching methods. Students were successful and creative in their approach to solving problems. Environmental education, like all educational processes, also depends on the commitment of the teacher and on their commitment to the subject. According to Keith Wheeler (2001), teachers also have a role to play in preparing their students to recognize environmental problems, to be able to prevent them, to find solutions to problems that have arisen, and to take active action in solving them.

Conclusions

In conclusion, we can see that effective and efficient education has a number of conditions: the law and the curriculum regulate some of them. Environmental education should cover all areas of human life. Environmental education starts in the family, and later, in the course of socialization, this education continues within an institutional framework, first in the kindergarten, then in primary and secondary institutions, and finally in higher education institutions. Environmental education is a lifelong process, which has been emphasized by various conferences since the 1990s. Environmental education can take place in both institutional and non-institutional settings. Research confirms that the current form of education does not make the upcoming generation active so that they can be active citizens who improve their environment and society.

The goal of education is teaching specific environmental issues, which can ultimately lead to the development of environmentally responsible behaviour based on personal judgment (Carter 1998). Environmental education is characterized by complexity because analysis and synthesis are present at the same time, complementing each other and promoting the development of a holistic vision. It can be integrated into all subjects and is interdisciplinary in nature. It appears in all of the natural and social sciences, and it also deals with the frontiers of each science, but it can also appear as a separate subject.

Based on the results of the course, we set the goal of developing a new subject programme, in which we should place more emphasis on practical tasks, personal experiences, individual responsibility, opportunities to influence environmental problems, and increasing the skills and abilities needed to enhance the effectiveness of science-based environmental education. Paradigm shift and the formation of students' environmental awareness are also necessary for environmental education. The more prominent role of the topics – energy, water use, waste management, recycling, wasteful lifestyle – would pave the way for their daily actions and more environmentally conscious thinking. Furthermore, we recommend that all graduates receive environmental education, as our survey conducted at the beginning of the course points to the fact that students studying

the subject of environmental protection live more environmentally conscious in their daily lives, and a more environmentally conscious way of life is reflected in their daily activities.

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