

Supplementary Information

Effect of a Toolkit and a One-Day Teacher Education Workshop on ESD Teaching Content and Methods—A Study from Kosovo. *Sustainability* 2015, 7, 8051-8066

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Supplement: Detailed description of activities in the toolkit

The toolkit comprised five different environmental topics, *i.e.*, air pollution, water pollution, waste management, energy saving and biodiversity, and overall 23 different activities.

Air Pollution

Six activities related to air pollution: (1) pencil-and-paper-questionnaires; (2) carbon emission calculations; (3) pH measurements; (4) observations of exhaust fumes from vehicles in the street; (5) soil acidity tests; and (6) essay writing for the Earth Day. In activity 1, pupils work in teams and develop small written questionnaires about air pollution (or other environmental issues), go out and let people fill in these questionnaires, analyse the data and present, and critically discuss the results in class. Activity 1 is hands-on and place-based, and especially aims to promote feelings of responsibility and citizenship. Activity 2 aims to visualize CO₂ emission and to raise pupils' awareness. It asks pupils to draw a table and to calculate carbon emissions when walking, cycling or driving to school and other places. Activity 3 is inspired by the WATCH Acid Drops Projects [1]. It encourages pupils in an easy and enjoyable way to collect rainwater at home, to measure its pH with simple indicator strips, to analyse the data, and to present and discuss the results in class. Activity 4 asks pupils to go out and monitor the exhaust fumes from different vehicles with the help of a spreadsheet. Activity 5 encourages pupils to test with the help of vinegar and baking soda the acidity or alkalinity of soil. Activities 3 to 5 provide pupils with monitoring and analytic skills, which are required by the new Kosovo Curriculum

Framework. Activity 6 focuses on citizenship behaviour. Here, pupils are invited to write essays about environmental issues shortly before an environmental event such as the Earth Day. Pupils can submit their essays to a local journal or publish in their school newspaper.

Water Pollution

Four different activities related to water pollution: (1) writing letters to environmental stakeholders; (2) poster exhibitions; (3) water conservation in school and (4) field trips. A special focus is on engaging young people in public affairs to promote action competence and feelings of steward- and citizenship. Activity 1 asks teachers to provide an input about environmental stakeholders in Kosovo and to explain their responsibilities and activities. Pupils are then invited to write a letter to the Kosovo Environmental Protection Agency (KEPA) addressing questions about water quality and management. Activity 2 aims for pupils to create posters on the importance of clean water, to frame them and to install them at the nearest river or lake. Activity 3 involves pupils in decision-making processes that affect their own learning environment. Groups of pupils should investigate leaking taps and flushes in school with the goal being to come up with practical suggestions on how to conserve water. Activity 4 includes a field trip with the Hydrometrological Institute of Kosovo to observe how experts monitor water quality. Co-operation with different kinds of stakeholders is an important quality indicator for ESD in Kosovo.

Waste Management

The issue of waste was approached with six different activities: (1) art exhibitions; (2) waste behaviour investigations; (3) waste separation; (4) waste counts; (5) garbage container investigations; and (6) recycling of waste. Activity 1 asks pupils to collect every-day waste, to produce a piece of art out of it, and to display it at an exhibition either in school or the local community. This activity especially draws on imagination, aesthetic appreciation, and creativity with the aim that pupils become sensitive to the aesthetic dimension of the natural world, develop imaginative ways of thinking, express themselves, and participate in creative activities. Activity 2 aims for pupils to browse the Internet on waste prevention and management, to design leaflets on appropriate waste behaviour, and to distribute them in school. Before and after the distribution, waste behaviour in school is observed and recorded. All data are presented and discussed in class. Activity 3 asks pupils to create small containers from cardboard for waste separation, to strategically place them in school, and to observe whether they are actually used. Activities 2 and 3 use whole-school approaches and foster capacities needed for meaningful participation and co-operation. Moreover, the presentation of data in class enhances skills such as listening, expressing points of view, taking responsibility, and showing solidarity which are all important components of ESD in Kosovo. In activity 4, pupils are provided with the per capita amount of daily waste in Kosovo, and asked to calculate the amount of waste in their family, city, and the country. Teachers are encouraged to talk about waste treatment in class. Activity 5 asks pupils to empty a garbage container, to separate the waste, to weight it, and to analyse the data. Activity 6 gives instructions on how to create bird feeders by using one-litre plastic bottles. Pupils are then asked to fill the feeders with seeds and to install them somewhere on the school ground. This activity again aims to foster imagination, expression and aesthetic appreciation, and also care for nature.

Energy Saving

Pupils are not only encouraged to recycle materials, but also to save energy (two different activities). In the one activity, pupils are asked to list all energy consuming articles at home, to find out how much energy they use and to calculate the daily amount of energy consumption. In the other activity (which could also be used for water saving), teachers explain the importance of energy saving and look up the monthly electricity bill of their school. Pupils look up the bill from home. At the first day of a month, both in school and at home small energy saving steps are undertaken, e.g., all lights are turned off when leaving a room, all electronic devices are switched off when not in use, light bulbs are changed to energy efficient ones. Afterwards, pupils compare the electricity bills before and after the intervention and discuss the results in class. Both hands-on activities promote feelings of responsibility and citizenship and foster pupils' action competence.

Biodiversity

Five activities of the toolkit focus on biodiversity: (1) nature gallery; (2) planting trees; (3) species observations; (4) environmental games; and (5) compost heap. All require outdoor teaching, which is regarded as an important component of environmental education and liked by high school teachers in Kosovo. Activity 1 asks pupils to place a self-made picture frame around a plant (or, if possible, animal) that they especially value, to identify and observe the object framed, to take a picture of it and to create an exhibition at school. Activities such as the nature gallery were found to be very successful in increasing young people's perception and appreciation of local plants and animals [2]. In activity 2, pupils plant trees in their school ground, name the trees and take care of them as long as they are at school. Activity 3 asks pupils to find as many different species on their way to school as they can (price for the winner), to investigate them for a month, to make notes about their observations, and to present the results in class. Activity 4 includes an environmental game. A card with the name of a plant or animal is fixed to the head of each player with sellotape. Each player must now guess his own plant or animal by asking the others questions. These questions can only be answered with yes or no. In activity 5, pupils are encouraged to make a compost pile, to care for it and to observe it.

References

1. Thomson, C.H. The acid drops project: Pollution monitoring by young people. *Biol. J. Linnean Soc.* **1987**, *32*, 127–135.
2. Lindemann-Matthies, P. 'Loveable' mammals and 'lifeless' plants: How children's interest in common local organisms can be enhanced through observation of nature. *Int. J. Sci. Educ.* **2005**, *27*, 655–677.

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