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The Idea of Sustainable Development in the Area of Environmental Protection at the Lower and High School Level

Introduction

Human aspirations to achieve high economic growth cause over-exploitation of natural resources. The rapid and dynamic development of civilization generates rapid economic growth and maximization of consumption at the expense of environmental degradation (Kozłowski 2005).

The United Nations Conference in Rio de Janeiro in 1992 resulted in the adoption of the concept of sustainable human development towards improving quality of life in every aspect of maintaining a healthy environment for future generations. As a condition for the proper implementation of the objectives of sustainable development (SD), educational activities in this field were considered. The next summit of the UN in Johannesburg ended with the announcement of the Decade of Education for Sustainable Development (DEZR) 2005–2014 and the implementation of the 2005 Strategy for Education for Sustainable Development (ESD). The need to spread the idea of SD is included in the section of Article 5 of the Constitution: *“The Republic of Poland [...] ensures the protection of the environment, guided by the principle of sustainable development”*.

Education in the field of environmental protection is now important in the face of the challenges posed by the development of civilization, and in the context of the search for appropriate solutions to facilitate the adaptation of the members of the society to function in intensely changing circumstances. Contemporary educational tasks are dependent on the general trends in the perception of human responsibility for the environment, according to the meaning found in nature and the need to preserve biodiversity. Developing students' competences in the field of biological interest and taking actions to protect nature is dependent on the preparation of teachers in this area and their responsibility in the education of youth (Potyrała 2010). ESD status in Poland, unfortunately, is not satisfactory due to the fact that quite a large number of teachers is not familiar with or is unable to explain the concept of sustainable development (Tuszyńska 2010). At the same time an

increasing number of teachers begin to see the need to move the subject of the SD and are increasingly willing to take part in training sessions and workshops on this topic.

The objective of international cooperation for solving contemporary problems is education which, is an effective means to implement the idea of SD. The Agenda 21 (Ch. 36 Section 36.5 b) clearly specifies that governments should develop measures to integrate environmental issues and include them in the curriculum in all subjects at all levels of education (Panasiewicz 2010). The objective of the strategy for education for sustainable development is to develop an incarnation of the principles of ESD for not only formal education, but also non-formal learning, in order to equip people with the knowledge and skills by raising their competence in the field of living in harmony with nature and actions to solve environmental problems caused by excessive exploitation of natural resources, urbanization, industrialization, and automotive. An important aspect of this is also educating teachers on sustainable development and ensuring public access to educational materials on SD. The implementation of subjects of SD into school curricula at all levels of education should be based on the actions taken by teachers and students in the search for solutions to current environmental problems (ESD Strategy).

A competent teacher is a pillar of the objectives of ESD at school. Attitudes and skills that will help them live in the community require the teacher to deepen their knowledge in the field of SD (Samonek-Miciuk, Pedryc-Crow, 2010). In pursuing the subject of SD, a teacher should use problem activating teaching methods such as discussion, simulation, modelling, games method, laboratory method, as well as philosophical analysis, fieldwork information technology, communication and mediation.

The strategy of ESD stresses that a significant impact on the education of both children and adults is non-formal education. Training in this area should address the various professional groups, particularly teachers transferring students the examples of good practices of SD. All these activities should be supported by governments to promote conscious consumption among its citizens and the media to disseminate reliable information on the SD.

The substantive scope and methodical implementation of Sustainable Development in the area of environmental protection resulting from the requirements of the core curriculum of general education.

The ESD strategy is reflected in the records of the core curriculum of general education of 23 December 2008 in the form of inventory needed to meet the issues and shape by the level of education students' competences. At the same time, the way of formulating the general and specific requirements influences the choice of the teacher's teaching methods and techniques.

During the execution of the biology subject in high school, the student should present the causes and analyze the effects of global warming. Students should justify the need to segregate waste in the household and the need for special handling of

waste batteries, fluorescent tubes, overdue medicaments, propose means to reduce the consumption of water and electricity and the production of wastes in households.

At the high school level, in the field of basic biology section, teaching biodiversity and its threats are provided in the course of this chapter. The student should, among other things: describe biodiversity at various levels, depict themes of nature, present the impact of modern agriculture on biodiversity, provide examples of species that have become extinct, endangered species, outline the differences between active and passive protection, represent legal forms of nature protection in Poland and give examples of plants and animals which are protected species. Moreover, they should justify the need for international cooperation to prevent threats to nature and give examples of such cooperation (e.g. CITES, "Natura 2000", Agenda 21).

The authors of the core curriculum put even more demands before a student studying biology as an extended subject. Among the general requirements, conservation and the environment are as important as knowledge and understanding of the principles of sustainable development. The presentation of an attitude of respect towards each other and all living beings, the environment describes attitudes and behaviours of a responsible person who benefits from nature and the environment, has knowledge of animal rights and can analyse their relationship to living organisms and the environment. What should be emphasized, among the specific requirements, is the presentation of human impact on biodiversity, knowing the examples of this impact (risk to native species, introduction of alien species), justification of the need to preserve old varieties of crops and breeds of farm animals as part of biodiversity, justification of active protection for the preservation of selected species and ecosystems.

Education for sustainable development takes place not only during biology classes, but also in the daily functioning of the students in the school environment by representing the appropriate behaviour and participation in school activities that promote the idea of sustainable development.

Methodology and organization of research

In order to diagnose the degree of realization of the idea of sustainable development the research was conducted in 2014 in schools where methods were used to observe and analyze documents. The observation was conducted by students of the Pedagogical University in Krakow who had teaching practice in schools. The observations were carried out in 105 schools in Krakow and smaller towns of Małopolska and Podkarpackie regions – in 75 junior high schools and 35 high schools. The observers prior to the start of the research have been adequately trained and provided with instructions and observation sheet, prepared on the basis of the literature (Angrosino 2010). Observation sheet was divided into 6 areas: hygiene and health of members of the local community, nutrition, physical activity, relationships between members of the school community, school management and organization of the school, the local environment. It was found that observers in each school have

made a compact record of events observed in each area for 5 days during the so-called long break and for 20 minutes after lessons. Some of the information necessary to complete the worksheet was obtained by the observers during discussions with members of the school community. Each observation sheet had the surname and name of the observer. The comparative analysis was made within the areas of observation between various types of schools. Separate analyses have been carried out for junior high schools and for secondary schools. In addition, apart from the observations, there was also an analysis of curricula and education implemented in the surveyed schools carried out. In total, 10 programs were analyzed - 6 programs for junior high and 4 to high school. The study was carried out in accordance with a unified guide program analysis. There was searching for keywords like: ecological and health-related topics, human rights, combating inequality in various spheres of life. On the basis of programs supplemented for each school, the frequency of the appearance of the general and specific terms was counted.

For the purposes of this study, only those aspects of sustainable development were selected, from all areas of observation and analyzed curricula, that are associated with environmental protection.

Test results

Results of the analysis of curriculum conducted in surveyed schools.

The general keywords most often occurring in the biology curriculum implemented at the junior high school were: "Ecology" (carried out by 20 schools), "Man and the Environment" (11 schools). In contrast, the least (only 1 time) appearing keywords are: "Pollution and protection of the atmosphere", "Matter and energy in the ecosystem".

Among the detailed keywords "Biodiversity" has appeared 14 times (most of all), followed by: "The impact of interspecies" (12 times) and "Global Warming" (11 times). In the curriculum there are also keywords related to the economy and human activities: "Ways of saving water and electricity" (9 times), "The human impact on the purity of water" (5 times), "Energy management" (3 times), "Waste separation in the household" (2 times), "Renewable energy sources" (1 time), "Generation of waste in households" (1 time).

At the high school level the most frequently appearing general keywords are: "Threats to biodiversity" (11 times), "Protecting the environment" (7 times) and "Protection of nature in Poland" (6 times). The keywords only appearing once are: "Protection of species of living organisms" and "Interspecies dependence."

In comparison to junior high schools, in high schools there are new keywords such as "International forms of nature" (4 times) and "Biotechnology in Environmental Protection" (3 times).

Among the detailed keywords the ones that appear most frequently are: "Human impact on biodiversity" (9 times) and "Biodiversity of the Earth" (5 times). Whereas detailed keywords, including issues related to human activity, which

appeared in the study, are: “The advisability of preserving old varieties of crops and breeds of farm animals as part of the conservation of biological diversity” (3 times), “Economic and social aspects of the relationship between man and his activities and environments” (2 times), “The modern system of the world economy and its effect on the degradation of environmental resources” (2 times) and “The effect of modern agriculture on biodiversity” (1 time).

The keywords “International initiatives in the field of environmental protection” and “The idea of sustainable development” appear in all three curricula.

In the educational programs for both junior high and high schools, the most attention is being paid to building respect for nature and carrying out such actions, as “Clean Up the World” and ecological knowledge quizzes.

Results of observations – Education for sustainable development in the field of environmental protection – junior high school.

Actions taken by the junior high schools in environmental issues are shown in Table 1.

Tab. 1. Activities in junior high schools in environmental issues

Activities	
Waste segregation	In the 98% of schools there are bins for waste segregation, which students and staff willingly use.
	Segregated garbage: paper, plastic, glass, aluminium, batteries.
	Only one school did not segregate waste.
Light saving	All schools promote saving light by establishing energy-efficient light bulbs, turning off the lights when it is bright enough or when there is no one on the corridors.
Water saving	Only 20% of schools emphasize saving water – these are rare cases.
Paper saving	In 90% of schools teachers print double-sided and reduce the font size of text; the same text is used in several classes.
Promoting public transport and bicycles	In 20% of schools, such a solution is used in order to reduce pollution and traffic jams.
	In the one of the schools in Krakow, to propagate actions like that, the district community put forward the motion to the city authorities to use free transport within the old city.
Using renewable sources of energy	There are solar panels installed.
Caring about order and repairing the equipment	All schools rarely buy new electronic devices if there is a chance for repair.
	All schools emphasize the general order and taking care of the property for both school and students.
Disposal and recycling	Campaigns such as collecting waste, large size materials, CDs refer to 80% of schools.
Campaigns / projects for environmental actions	A campaign such as “Pure Lesser Poland”.
	A campaign such as “Clean Up the World” appears in all schools.
	Planting trees refers to 20% of schools.
	School competitions, festivals promoting environmental protection take place in 85% of schools.

Eco products	Shops stocked with fresh, healthy products to protect the health and promote the belief that organic products are good occur in 30% of schools.
	Using eco-bags is promoted in 40% of schools.

Results of observations – Education for sustainable development in the field of environmental protection – high school.

Activities taken by high schools in the field of environmental protection are presented in Table 2.

Tab. 2. Activities taken by high schools for environmental protection

Activities	
Waste segregation	In 98% of schools there are coloured waste bins and boxes properly marked for used batteries.
	The organization of the campaign for collecting caps for charity on almost 90% of schools.
	In a few schools, there are no segregation waste bins, but the conducted interview implies that students segregate waste at home.
Light saving	All schools do not use the lights in sunny days.
	The rooms are well lit, and when using the lamps students switch them off during the breaks.
	Only in a few schools the lights are switched on all the time, and computers and projectors are turned on during breaks.
Water saving	Only half of the schools take actions to save water.
Paper saving	Teachers can save paper by printing tasks for several students on a single sheet and using them in several classes.
	In a few schools, paper consumption is very high – teachers print materials for students in large numbers.
Promoting public transport and bicycles	80% of students arrive to school on foot or using public transport.
	An increasing number of them are travelling to school by car.
Using renewable sources of energy	Only 6 out of 35 schools benefit from such solutions.
	95% of the students are familiar with alternative energy sources but do not use them.
Caring about order	Few students smoke cigarettes, and throw cigarette butts on the lawn.
Campaigns / projects for environmental actions	“Clean Up the World” campaign takes place in all schools.
	In 85% of schools, students organize and share eco-themed contests.
	In a small number of schools (10%) there is the ecological club.
	In a few schools (10%) there are lessons that promote ecological behaviour.
Citizens’ budget and the local environment	Actions funded from the citizens’ budget are not widely promoted at the beginning, so the students are not involved in them.

The activities of schools in terms of achieving the objectives of sustainable development in the field of environmental protection are becoming more apparent. More and more often we hear about the behaviour designed to lead to taking actions

to nature. Teachers and local authorities insist on the development in this field. In most schools the most developed aspect is the one concerning protection of the environment and the promotion of waste segregation, saving energy and paper, as well as taking care of order and property.

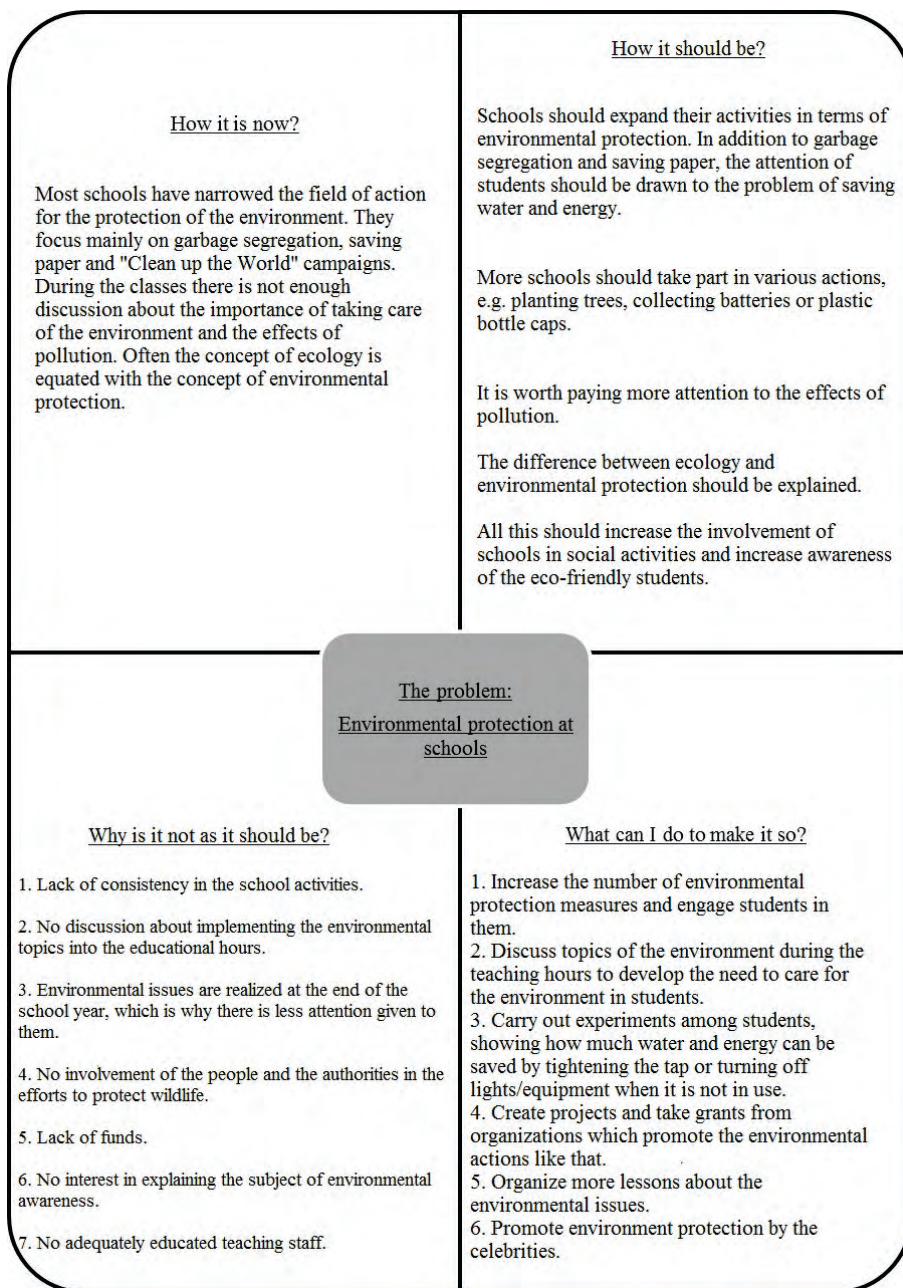
In larger cities (e.g. Krakow) a common way to implement the concept of SD in environmental protection was to promote public transport instead of commuting to school by car. Teachers willingly complied with this rule by using buses, trams, and even walking on foot. Unfortunately, the problem is to promote activities in terms of rational water management and use of renewable energy sources (e.g. the use of solar collectors). Also, the actions involving the planting of trees or the promotion of sustainable consumption are taken rarely.

Summary

The acquisition of habits with conscious attaining sustainable development is related to the educational activities of a school, the local community, and a variety of non-formal education institutions. Their scope of activity includes the development of students' beliefs that the functioning of the natural environment depends on the actions taken by the man to influence the improvement of the functioning of the nearest surroundings. Observations of nature, environmental actions, and rational intervention in the environment at the place of residence are translated into the environment and maintaining biodiversity at a global scale.

The observation and analysis of the curriculum were supplemented with a discussion with the students of second year of biology Master's students with a teaching specialty participated in the study as observers. On this basis, a diagnosis of the current situation and proposals for action to increase pupils' awareness of sustainable development outlined in Scheme 1 were established.

The ESD is a kind of permanent education, which should be started at the lowest level of education and take place through both formal and informal education. Certainly it is the school (due to the range of influence) that is the main area of the ESD implementation by developing awareness and competence. The students should be drawn the problem of taking pro-environmental actions at the local, national and global level.



Scheme 1. Proposals for raising the pupils' awareness of sustainable development in the field of environmental protection

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Abstract

Sustainable development of society largely depends on the implementation of the concept of education towards respect and protection of the natural environment. The keyword ‘think globally – act locally’ is increasingly reflected in educational activities and educational schools that through the implementation of sustainable development, spread students’ knowledge about nature conservation among students.

The analysis of the data relating to the implementation of sustainable development in the area of environmental protection in the junior high school and high schools has submitted the information that increases pro-environment awareness in Polish schools, and the involvement of teachers and students in activities for the benefit of nature are becoming larger and more diverse.

Key words: sustainable development, education for sustainable development, environmental protection, junior high school, high school

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