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## Serbian School System as a Barrier to the Development of Environmental Awareness

### Abstract

The aim of the research was developed in need to determine the level of environmental content (Environmental protection issues) in the didactic material of primary and secondary schools in the Republic of Serbia, as an important factor of the development of students' environmental awareness. Mixed content analysis was used for the purpose of this study. This analysis included techniques for data collection. All textbooks and workbooks for primary and secondary school were used. The research showed that there is no equal distribution of questions about environmental protection within curricula and programs by classes and levels of education. Basically, didactic material includes about 5.4% of the content related to protection and preservation of the environment, which can influence the development of students' environmental awareness.

**Keywords:** *didactic material, environmental education, environmental awareness, primary and secondary school, presence of environmental content*

### Introduction

Environmental issues have reached their significant point in the 20<sup>th</sup> century and their development has continued ever since. Global warming, greenhouse effect, ozone layer depletion, environmental degradation, nuclear pollution, reduction of green areas, the extinction of some plant and animal species are some of the most important environmental problems of today. (Bonnett, 2007). The increase in environmental issues has developed many questions without an answer about

environmental education, including the education included in the school curriculum. (Miles et al., 2006)

Because of its content, environmental education has a multidisciplinary feature. The purpose of the environmental education is to help students to develop environmental attitudes through a system of protection and preservation of the environment (Uzin et al., 2012). According to Carvalho de Suosa et al. (2012), the entire education is considered as environmental and the environmental dimension should be included in the teaching process. Environmental awareness is the basic product of environmental education. There are different definitions of this concept, which is justified considering that environmental awareness is a dynamic dimension which changes on a daily basis, as man himself, nature and the relationship toward nature change. It is encouraging since the development of positive environmental awareness and the relationship between the individual and nature create the possibility for us to hope for better forecast (Djordjević, 2002). Hannigan (2006) claims that environmental awareness presents part of wider philosophy of social movement aimed at the preservation and development of the environment on behalf of individuals, civilization and its survival as a whole. Environmental awareness includes environmental knowledge, environmental values and environmental behavior. All the three components are necessary for true knowledge, respect for and practice of the environmental way of living. (Milotojević, 2005).

There are many articles on global warming, recycling, irrational use of natural resources, extinction of certain plant and animal species, organic diet, eco-tourism. All of them create environmental awareness. The problem lies in the fact that environmental awareness cannot be easily measured. Also, someone who is environmentally aware does not need to align with his/her consciousness. Therefore, actions of family, school, media, local government, local community and environmental organizations are considered as significant (Goldeman, 2010).

Providing environmental knowledge was one of the objective components in implementing Environmental Education other than enhancing awareness, attitudes, skills and behaviour towards the environment among students. According to Tanaka (2000), environmental knowledge can be defined as an individual understanding of how the environment functions; how humans interact with the environment; how environmental problems arise; and in what way these problem can be overcome. According to Marić – Jurišin (2013), environmental knowledge can be explained in the context of the environmental literacy component regarding the knowledge of issues related to environmental sustainability and its influence on human life. Erdogan et al. (2009) divided environmental knowledge into three

themes, namely: I. knowledge of natural history and ecology; II. knowledge of environmental issues and problems; and III. socio-political-economic knowledge.

## **Material and Methods**

The subject of this research was to determine the circumstances, requirements, and possibilities of the formal environmental education through didactic materials in the primary and secondary schools of the Republic of Serbia. From this purpose emerges the next main task of the examination: to establish environmental issues in the student's books, workbooks and other teaching materials as a means of achieving the goals of environmental education. The environmental issues are defined as issues which include "the interrelationship between organisms and their environment" (Andevski et al., 2004), as well as, issues "that involve understanding of the human influence on the environment, suggesting actions that may be taken to mitigate that influence, such as conservation, or examining values and attempting to resolve conflicting interests".

We are aware of the extent of the environmental education, so we are focusing primarily on establishing the quantitative aspect of environmental issues in the student's books, workbooks and other teaching (didactic) materials. For this reason we set the following three sub-tasks within the main task of this study:

1. to establish environmental issues in the didactic materials by classes and educational levels (primary and secondary school);
2. to establish the presence of environmental issues in the curriculum of natural sciences;
3. to establish environmental issues in the didactic materials of different educational backgrounds in Serbian secondary schools and,
4. to establish environmental issues in the didactic materials based on the aspects (ecological aspects of nature, the living and working space, traffic and noise) of the environment they treat.

In accordance with the object and task of this research, and in the interest of confirming the set hypothesis, we applied a method of theoretical analysis and empirical – non experimental method. Taking into consideration Berelson's definition of content analysis, we applied it on the basis of her main characteristics. Environmental issues are classified into 10 environmental categories (according to Kundačina) and modified by the author. These categories meet the following requirements: they are unambiguous; they are mutually exclusive; they cover all the possible responses, etc. (Kundačina, 2006).

The presented study used a mixed content analysis as a technique for data collection. Textbooks, workbooks and other didactic materials (used in primary and secondary schools of the Republic of Serbia) were analyzed. A total of 67 textbooks and workbooks (15 of lower grades of primary school, 28 of higher grades of primary school, 24 of high school grades) were used. They were mostly published during the period of 2004 – 2012. According to the analyzed textbooks, it can be concluded that a third of the analyzed high school textbooks, and only a fifth of the textbooks for the 1<sup>st</sup>-4<sup>th</sup> grade of primary school cover the area of environmental education.

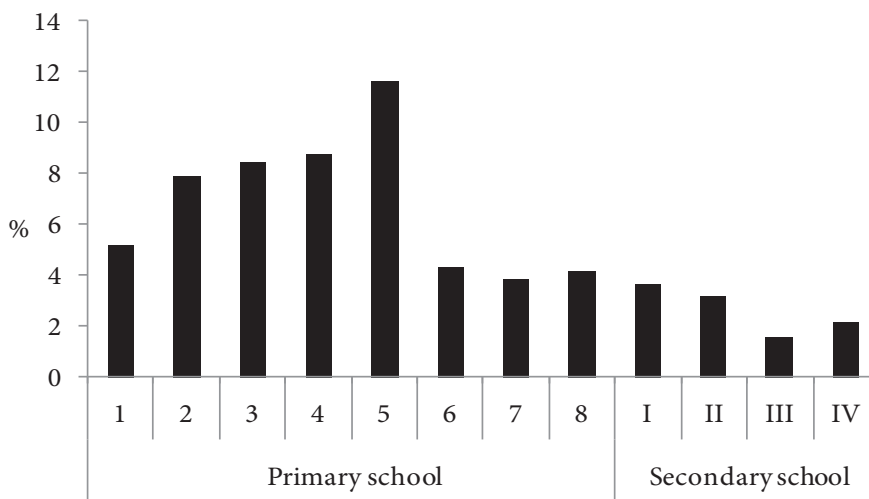
## **Results and Discussion**

In the first primary education cycle of the Republic of Serbia, environmental content can often be found in almost all subjects, using correlations. However, this content is present in the subjects called *the World around us* during the first and second grade, and *Nature and societies* in the third and fourth grade of primary education. Ecological content in the higher grades of primary education, from grades 5 to 8, is represented in science subjects: Biology, Geography, Chemistry and Physics.

For the first time, the environment appears at the level of secondary education as a separate subject and as a subject in some secondary vocational schools. It should be noted that in addition to this separate subject, the environmental content is taught through general education subjects (chemistry, physics, biology, geography) in a number of areas of work and educational profiles. The status of the subjects in which environmental content is taught depends primarily on occupations for which students are being educated. High school is one of the general education secondary schools, so that ecology as a separate subject does not appear there, but the ecological content is present in the subjects of natural sciences: chemistry, biology, physics, geography and according to the nature of these subjects and the object of their studies, they are directly or indirectly related to the environmental contents.

Our first task was to establish environmental issues according to grades and educational levels (Figure 1).

We can see from the figure that there is unequal distribution of environmental issues by grade and level of education. So, didactic material in the fifth grade is the richest in these issues (11.7%), and on the other hand, the poorest in the third grade of secondary school (1.6%). It is obvious that the distribution of these contents

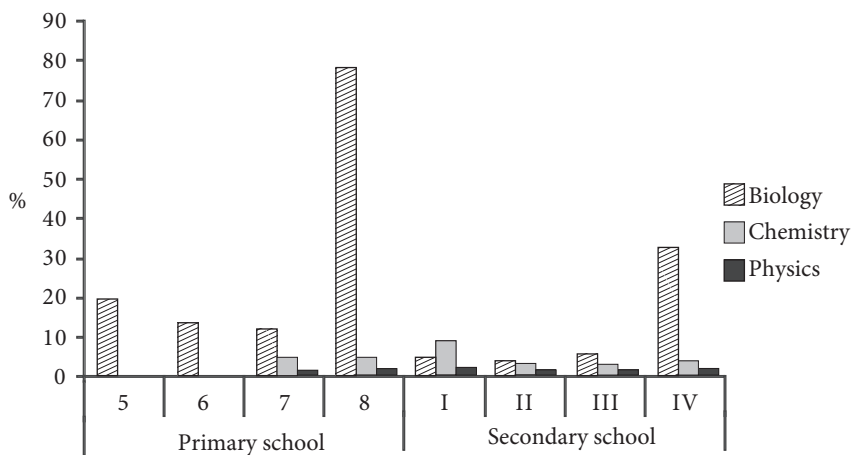
**Figure 1.** Environmental issues by grades and educational levels

(except for the first to fifth grades) declines toward upper grades of primary and secondary school.

At the same time, the research has shown that the current environmental education in primary and secondary schools in the Republic of Serbia is not of permanent character. This considers the teaching system as a whole, as well as particular teaching subjects. It is necessary for environmental education to start in childhood and to go on throughout life. On average, the didactic material for the lower grades of primary school is the richest in the environmental issues (7.6%) compared to higher grades (6.0%) and those of the secondary school (2.6%). Analysis of the didactic materials showed how little time (5.4%) is spent teaching ecology as a means of achieving the goals of environmental education.

Considering the significant position of natural sciences (Biology, Chemistry and Physics) in the development of students' environmental awareness and education regarding the sustainable development, we decided to present (Figure 2) the distribution of the environmental content and environmental issues according to grades. Biology is studied in schools of the Republic of Serbia in the 5<sup>th</sup>-8<sup>th</sup> grades in primary schools while chemistry and physics are studied in the 7<sup>th</sup> and 8<sup>th</sup> grades of primary school. These three subjects are studied in all grades of high school.

**Figure 2.** Distribution of environmental issues in biology, chemistry and physics according to grades



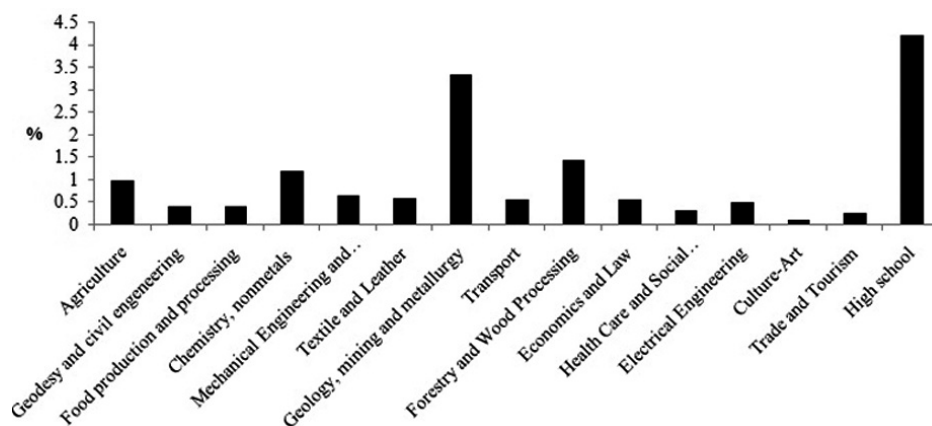
The Figure shows that the whole eighth grade textbook is related to environmental issues. According to the curriculum of the Republic of Serbia the contents that are related to environmental issues are studied in the eighth grade. The next conclusion is that biology textbooks for secondary schools are poorer (10.9%) compared to primary school (30.6%). On average, about 19.4% of the biological issues are ecological.

The graph shows that the environmental content in school curricula for chemistry are mostly included in the first grade of high school (8.2%), while it is at least included in the second grade of high school (2.5%). The environmental content is mostly included in school curricula for physics in the seventh grade of primary school (1.7%).

Secondary schools in the education system of the Republic of Serbia cover a number of areas of work with a wide range of educational profiles. Areas of work of high schools that educate students are: High school; Agriculture; Geodesy and Civil Engineering; Food Production and Processing; Chemistry, nonmetals and graphics; Mechanical Engineering and Metalworking; Textile and Leather; Geology, Mining and Metallurgy, Electrical Engineering; Transport; Forestry and Wood Processing; Health Care and Social Protection; Economics and Law; Culture and Art; Trade and Tourism. In the four-year educational attainment, in almost all areas of work, contents related to ecology are studied through general subjects (chemistry, physics, biology, geography), whereas through the vocational subjects

ecology is studied in those educational profiles that are directly related to the issues of ecology and environmental protection. During the three-year educational attainment, in almost all areas of work, environmental content is often taught in general education subjects (chemistry, physics, geography). As a separate subject, ecology and environmental protection occurs for the first time. In most of the educational profiles, this course is taught during one school year. Representation of environmental content in secondary schools in Serbia is shown in Figure 3.

**Figure 3.** Environmental issues in the didactic materials of secondary schools in Serbia



According to the results, it can be noted that the percentage share of educational content related to ecology and environmental protection is unreasonably low. The need for environmental education is evident when we consider all educational profiles, and all people, because it relates to the environment in which we live and work, and which is growing more vulnerable and more polluted. Environmental education is particularly important for the educational profiles that are directly aimed at the production and processing of food, or at workers in the chemical industry. Since workers in the food production and processing need to know all the procedures for the safe handling of food, ways and means of their pollution, environmental and health risks involved in the ingredients that are used in food as additives, as well as measures for the safe disposal of biological waste materials. The low proportion of the content related to ecology in the three-year and four-year educational profiles (which ranges from 0.26% to a maximum of 1%) is not sufficient for the acquisition of the knowledge necessary for future workers in the food production and

processing. The situation is similar when it comes to other education levels, because future chemical industry workers also have a small number of hours devoted to the ecological content in their curricula. In the chemical, graphic and non-metal education attainment, the highest incidence of this content appears with education profiles of a rubber and plastic technician, up to 1.15%, and the lowest incidence appears with educational attainment in the printing field, only 0.13%. Since this is about jobs at risk, it is essential that chemical workers and graphics professionals be more aware of the environmental and health risks of their profession.

Of all the above curricula, the largest share of the ecological teaching content in secondary vocational schools have the future workers of mining and geology, up to 3.43%, as well as some sections of agricultural education profiles (e.g., veterinary technician) and mechanical engineering profiles (thermal power plant mechanic, heating and cooling equipment mechanic, ship mechanic, shipbuilder). However, in no educational profiles that educate workers for the industrial production, the ecological content is represented with more than 4.5% in general education subjects, general professional subjects and strictly professional subjects.

It was very important to define the aspects of the environment included in the didactic materials, according to the one of the aims of the environmental education: “to enable human beings to understand the complex nature of the environment as this results from the interaction of its biological, physical, social, economic and cultural aspects”, in terms of “maintaining a dynamic between the quality of life and quality of the environment”.

Environmental issues in the didactic materials in the Republic of Serbia do not treat equally all aspects of the environment (Figure 4).

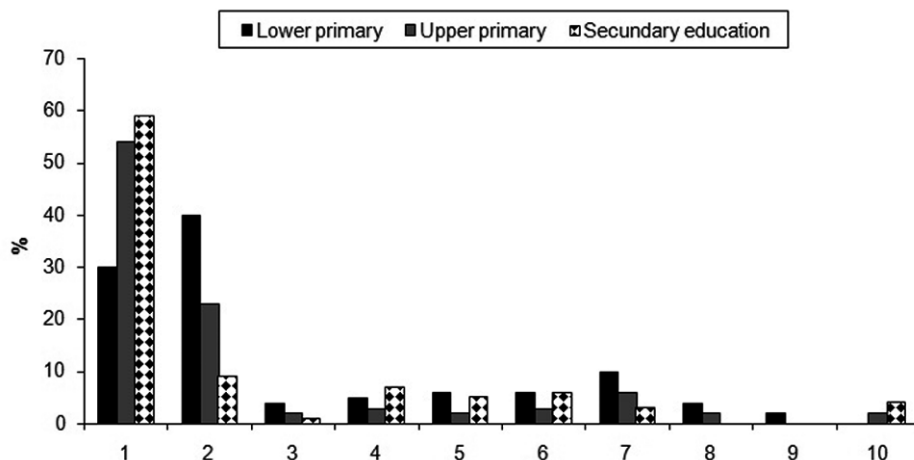
The fewest teaching contents are dedicated to “environmental actions”, “traffic and noise as factors which imperil the environment”, “natural and man-made disasters” and “ecology – health problems”.

In the existing teaching materials great attention is paid to the living and work place, but they do not pay enough attention to the pollution and protection of water, the air, the soil, the acid rain and its effects, the greenhouse effect, ozone layer thinning and sustainable development.

We can conclude that in the didactic materials the environment is mainly treated as a natural environment, but not as social, economic, political, cultural and historical surroundings. Thus, the first problem of the environmental education in Serbia is a result of the curriculum and syllabus, as well as the didactic material. The environmental education in them has a “formal” and “superficial” position. It is necessary to promote and foster environmental education in Serbia, especially through elaboration of national strategy of environmental education.



**Figure 4.** Aspects of the environment included in the didactic material in primary and secondary school in the Republic of Serbia



**Legend:** 1. Ecological aspects of nature in narrow sense, 2. Ecological aspect of the living and working space, 3. Traffic and noise factors which imperil the environment, 4. Protection of the soil and food from destruction, 5. Protection of water from destruction, 6. Protection of the air from destruction, 7. Rational use of the natural resources and energy, 8. Ecology – health problems, 9. Environmental actions, and 10. Natural and man-made disasters.

## Conclusions

The education system of the Republic of Serbia is not satisfying as to the issue concerning the development of students' environmental awareness and obtaining eco-chemical information as a significant factor for the life process and prevention of the environment for future generations. The reason for that is that ecologic and eco-chemical contents were included in our school system in fragments through certain teaching subjects in the 1980s. Therefore, teaching the contents of biology, chemistry and ecology partly influenced the environmental awareness and attitudes of students. Furthermore, our country and other developing countries do not have a sufficiently developed structure of environmental, eco-chemical education, including the policy of environment protection.

In the Serbian education system, the teaching of science in the junior classes and biology in the senior classes of the primary and secondary education, has a domi-

nant position in the field of environmental education. Most environmental issues exist in the didactic materials for the fifth grade, but the fewest in the third grade of secondary school. In general, in the didactic materials for primary and secondary school in the Republic of Serbia there are about 5.4% of environmental issues. There is no vertical or horizontal linking, and there is disharmony in presenting the extent of some problems of the protection and advancement of the environment.

There is a need to improve the teaching process in order to increase the level and development of environmental awareness of students in primary and secondary schools. This can facilitate the way to obtain environmentally desirable behavior of young people. Integrating environmental education into school life requires a coherent approach to various fronts for there to be progress towards sustainable development in the school itself. Because of the lack of national guidelines and institutional coordination we are not able to make a qualitative leap forward, and we also need to seek a holistic approach to contribute to education about and for the environment. Despite the fact, we must be creative and persistent because didactic material is to be varied, just like the environment in which we live. It is necessary to promote and encourage more environmental education, particularly through the development of a national strategy concerning environmental protection. In this sense a priority should be given to the approach to environmental issues in the didactic materials.

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