CHARACTERISTICS OF ENVIRONMENTAL KNOWLEDGE, ENVIRONMENTAL RESPONSIBILITY AND PRO ENVIRONMENTAL BEHAVIOR AMONG PRIMARY AND SECONDARY SCHOOL STUDENTS IN SERBIA

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Abstract: This study analyzed trends in the environmental knowledge, responsibility and behaviour of primary and secondary school students in Serbia. The survey covered a sample of 252 students from 18 government schools from Belgrade. It was found that the majority of students showed responsible environmental attitudes, but did not display sufficient environmental knowledge and pro-environmental behaviour in all tested situations. The obtained results can help to identify social changes concerning environmental protection in Serbia that can be anticipated, as well as future directions for formal and informal education regarding the development of environmental awareness and pro-environmental habits among young people in Serbia.

JEL: I21, I23

Aims and background

Considering that environmental awareness includes cognitive, affective and behavioural components[3], the purpose of this research was to determine the level of environmental knowledge, responsibility towards the environment and pro environmental behaviour among primary and secondary schools students in Serbia.

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[3] POOLEY J.A., O'CONNOR M. S. BARR: Factors influencing environmental attitudes and behaviors? - A UK case study of household waste management. Environ. Behav., 39 (4), 435 (2007).: Environmental Education and Attitudes: Emotions and Beliefs are what is Needed. Environ. Behav., 32 (5), 711 (2000).

The starting point of this study was the hypothesis that environmental knowledge is one of the basic indicators of an environmentally aware person[456]. An environmentally aware individual should be able to recognize main environmental concepts, facts, phenomena, processes, principles and norms regarding the situation and environmental protection at the local and global levels. In order to recognize the role of their own activities in the environment they must also be able to understand the laws underlying the functioning of natural and socio economic systems, as well as ecological problems which appear as a consequence of interaction between people and nature.

Another determinant of environmental awareness which was examined in this study is the attitude of the students towards environmental responsibility. An individual with such an attitude is aware of the presence of environmental risks and is capable to critically evaluate the effectiveness of various factors (e.g. individuals, the development of modern science and technology, legal and political activities, economy) in the reduction of existing environmental risks[7] . Such an individual displays an intention to take adequate actions which are necessitated by the environmental situation, to oppose all that which threatens the environment and through individual actions manages to keep the burden on the environment at a low level. Schwartz[8], in the framework of his Norm-Activation Theory, stresses that environmental responsibility appears as a result of a cause effect link between the behavior of the individual and his awareness of the consequences to which a certain behavior leads.

Many environmental problems today, at least to some degree, are affected by the daily behavior of individuals. Environmentally responsible behavior can be defined as specific actions which are directed towards solving environmental problems[9]. In this context, Monroe[10] identifies following categories of envi-

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[7] MONTADA L., E. KALS, R. BECKER: Willingness for Continued Social Commitment: A New Concept in Environmental Research. Environmental Behaviour. 39 (3), 287 (2007).

[8] SCHWARTZ H.S.: Normative influences on altruism. In: Advances in experimental social psychology (Eds. L. Berkowitz). Academic Press, New York, 1977, 221-279.

[9] SIMMONS D.: Developing a framework for national environmental education standards. In: The NAAEE standards project: Papers on the development of environmental education standards (Eds.

ronmentally responsible behavior: environmental activism, passive political behavior, consumer behavior, responsible behavior towards ecosystems and other behaviors which are specific to professions or the workplace. Some researchers believe that environmentally responsible behavior is a product of consideration and intent, while others think that it is a product of knowledge, values and abilities. A larger part of the explanation of environmentally responsible behavior comes from socio psychological theories of human behavior including Norm Activation Theory[11] and Theory of Planned Behavior[12].

Experiment

Sample

The participants of this study were a total of 252 students (54.76% female and 45.24%), aged from 14 to 17 (M = 15.5 years) from state schools in Belgrade. The sample was uniform in the number of students coming from primary schools, gymnasiums and secondary vocational schools (84 students each), the number of schools from which students were chosen randomly (six schools from each type of school) and the number of randomly chosen students from each school (14 students).

Instruments

Environmental knowledge is a continuous variable with a score ranging from 0 to 12 based on the sum of correct answers to 12 questions. The questions tested declarative (6 questions), conceptual (3 questions) and procedural (3 questions) knowledge related to environmental protection. The final test included acceptably discriminating questions, most of the questions were neither too difficult (more than 10% of the subjects knew correct answers), nor too easy (less than 90% of the subjects knew correct answers). The Skewness and Kurtosis coefficients were used to confirm the normal distribution of the knowledge test (Skewness 0.015, Kurtosis -0.346). Cronbach's Alpha coefficient (α) was 0.66 which indicated that test was reliable.

To evaluate the personal environmental responsibility, the scale of 8 items was used. All questions were measured on five-point rating scale, from 1 (most negative attitude) to 5 (most positive attitude). Skewness (-0.269) and Kurtosis (-0.406) coefficients confirmed that the environmental responsibility scale had approximately a normal distribution, while high value of Cronbach's Alpha (α =

D. Simmons). North American Association for Environmental Education, Troy, Ohio, 1995, 9–58.

[10] MONROE C.M.: Two Avenues for Encouraging Conservation Behaviors. Hum. Ecol. Rev., 10 (2), 113 (2003).

[11] SCHWARTZ H.S.: Normative influences on altruism. In: Advances in experimental social psychology (Eds. L. Berkowitz). Academic Press, New York, 1977, 221-279.

[12] AJZEN I.: The theory of planned behavior. Organ. Behav. Hum. Dec., 50 (2), 179 (1991).

0.94) signified the reliability of the scale. Using factor analysis on the environmental responsibility scale, one factor explaining a total variance of 70.4% was extracted. Primary load on the first factor was found to be exceedingly high in all items (from 0.80 to 0.87).

Participants were asked to indicate how often they had performed each of the specific 13 behaviors on a five-point rating scale, from 1 (never) to 5 (very often). Skewness (-0.162) and Kurtosis (-0.474) coefficients confirmed that the pro environmental behaviour scale had approximately a normal distribution, while high value of Cronbach's Alpha ($\alpha = 0.73$) was acceptable. Using factor analysis, one factor was extracted from the pro-environmental behavior scale, explaining for a total of 27.7% variance. The factor loading value of most items on the first factor was high, above 0.30. Only two items were outside of these factors.

Results and discussion

Characteristics of Environmental Knowledge

Subjects gave correct answers to six questions on average, which is 50% of the total number of possible answers to the questions in the environmental knowledge test (M = 5.65, SD = 2.53). As many as 47% of the participants were unable to answer half of the questions in the test. These included 12% students about whom it could be said that they were exceptionally unsuccessful because they did not give more than two correct answers (for detail information see Fig. 1).

Figure. 1. Distribution of the number of correct answers given by the students on the environmental knowledge test.

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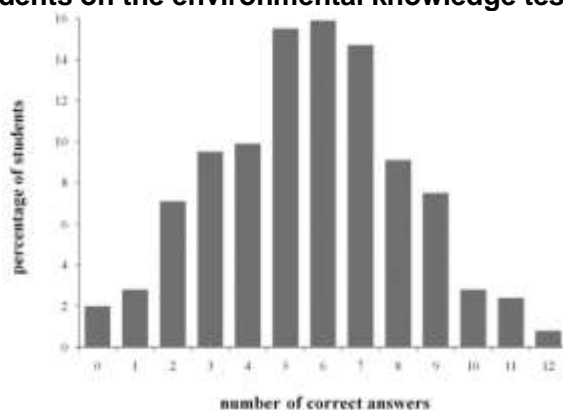
These results show that a large number of students (>60%) know to list recycled waste used as secondary raw materials in production and to separate easy degradable substances from difficult degradable ones, nevertheless they do not realize the importance of recycling in the reduction of non degradable substances in the environment. The lack of information displayed by the students regarding the characteristics of renewable and non renewable natural resources (only 41% of the students successfully differentiated between these two groups of natural resources), and about the recycling process itself, shows that they do not have sufficient understanding of the significance of this process for saving raw materials, and energy and water conservation (only 16% of the students replied correctly). This indicates that students do not realize the environmental and economic significance of recycling and that recycled products have to be cheaper than non recycled ones. It can be said that environmental knowledge, which is not based on a comprehension of the importance of recycling for the economy and the environment, will not lead to responsible behaviour towards waste disposal or a change in an individual's consumption habits. The study carried out by Barr[13], reached the similar conclusions.

A large number of the students (>80%) can differentiate between the chemical structure of fresh and polluted air and show knowledge about physical processes going on in the atmosphere, but at the same time they do not realize the effect of these processes on the spatial distribution of pollutants in the air. As many as 89% of the students do not understand how wind, precipitation and air temperatures influence the spread of pollutants in the environment. Only 44% of the students successfully identified the most suitable place for the construction of a factory in relation to the position of inhabited areas, topographic effects and prevailing wind systems. On the basis of these results, it can be said that many students will fail to properly assess the seriousness of negative processes and phenomena in their immediate environment due to an absence of applied knowledge, therefore their behaviour will not be suitable in a given situation.

Over 60% of the subjects do not realize that processes such as technological modernisation, recycling, the use of alternative energy sources and contemporary scientific achievements are leading to a rational use of natural and energy resources. Moreover, they are not aware of the fact that the use of non renewable resources, increased industrial production, population increase and higher living standards are endangering the environment. More than half of the subjects do not understand the laws governing natural ecosystems, or the

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[13] BARR S: Factors influencing environmental attitudes and behaviors? - A UK case study of household waste management. Environ. Behav., 39 (4), 435 (2007).

negative effects of human activity on the environment. They do not realize that forest clearings, marsh drainage, forestation, artificial insect control, the introduction of allochthonous species and pollution are activities which have led to disturbances in the food chain and the entire balance of natural ecosystems. More than half of the subjects do not realize that the destruction of the Amazon rainforest is leading to a global decrease in oxygen concentration in the atmosphere and is disturbing natural carbon dioxide self regulation. Consequently, these students do not understand the importance of preserving the Amazon forest for the development of life processes on the planet, the survival of living beings, and global climate change. Accordingly to the presented results of qualitative analysis, it can be concluded that knowledge itself is not enough for individuals to undertake conscientious activities. The conclusions by Monroe are similar.

Characteristics of Environmental Responsibility

The average score on the environmental responsibility scale was 30.58 points (SD = 4.58). Considering that points ranged from 8 to 40 on the scale (median is 24), the mean value of the score indicates that, on average, students have a positive attitude towards both personal and collective environmental responsibility. This is confirmed by the fact that approximately 52% of the students scored higher than the average value (complete data were shown in Fig. 2).

Fig. 2. Distribution of achieved scores on the environmental responsibility scale.

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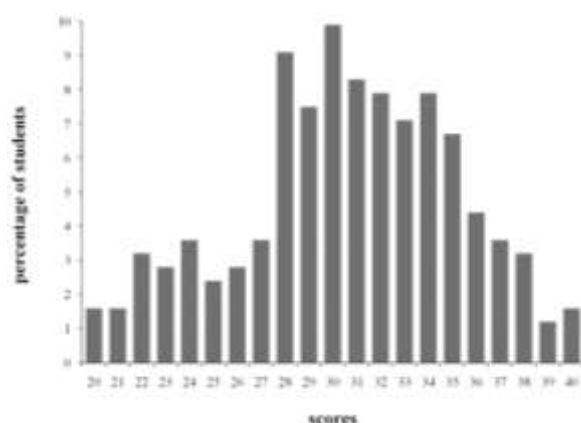
Most subjects (75%) considered that personal responsibility is more important in environmental protection than collective responsibility. A large number of the subjects (86%) agreed with the statement that water should be used rationally while taking care of personal hygiene. For a significant number of students, however, this was just agreeing in theory since in everyday life, only 30% of them behave in accordance with the stated attitude. Almost 62% of the students expressed readiness to save electricity in the household for energy conservation. They also believe that money should not be a consideration in achieving this goal. The results of our research indicate that as many as 74% of the students accept environmentally responsible consumption. However, considering that only 25% of the students always or generally pay attention to the environmental characteristics of a product, it can be concluded that a large number of subjects gave a positive opinion concerning this issue only in theory.

Only 36% of the subjects were of the opinion that events which directly endanger natural ecosystems ought to be boycotted even if this involves sacrificing personal pleasure. On the basis of these results, it can be concluded that a large number of the students have still not developed empathy towards their environment and anthropocentric attitudes are more dominant than ecocentric attitudes among the majority of the students. Positive effects of ecocentric attitudes on the development of environmental responsibility were demonstrated by Thompson and Barton[14] and the positive effects of empathy were shown by Schultz[15] and Hoffman[16]. In our research, 49% of the subjects expressed the readiness to participate voluntarily in efforts for environmental protection. This result shows that most students have still not developed moral obligation to the degree to get involved in these efforts, that is, external motivation factors are more significant predictors of the students' environmental activism than internal ones (personal norms).

The stated qualitative analysis of the data indicate that pro-environmental behaviors of students cannot be completely predicted on the basis of personal responsibility towards the environment. It is evident that because of acquired habits (routine) students often behave independently of their attitudes[17].

Characteristics of Pro-environmental Behaviour

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[14] THOMPSON S. C. G., BARTON M. A.: Ecocentric and anthropocentric attitudes toward the environment. J. Environ. Psychol., 14 (2), 149 (1994).

[15] SCHULTZ P. W.: Knowledge, information, and household recycling: Examining the knowledge-deficit model of behavior change. In: New Tools for Environmental Protection: Education, Information, and Voluntary Measures (Eds. T. Dietz, P. C. Stern). National Academy Press, Washington, 2002, 67-82.

[16] HOFFMAN L. M.: Empathy and moral development: Implications for caring and justice. Cambridge University Press. Cambridge, UK, 2000.

[17] C. P. STERN: Toward a coherent theory of environmentally significant behavior. J. Sociol.

The average score on the pro-environmental behavior scale was 44.09 points (SD = 6.65). Considering the fact that the points ranged from 13 to 65 (median is 39), the mean value of the score indicates that most subjects do not display pro-environmental behavior in all situations. This was ascertained for approximately 65% of the participants (see Fig. 3). Students with a score lower than 39 points showed the lowest level of pro environmental behavior (20% students).

Fig. 3. Distribution of achieved scores on the pro-environmental behaviour scale.
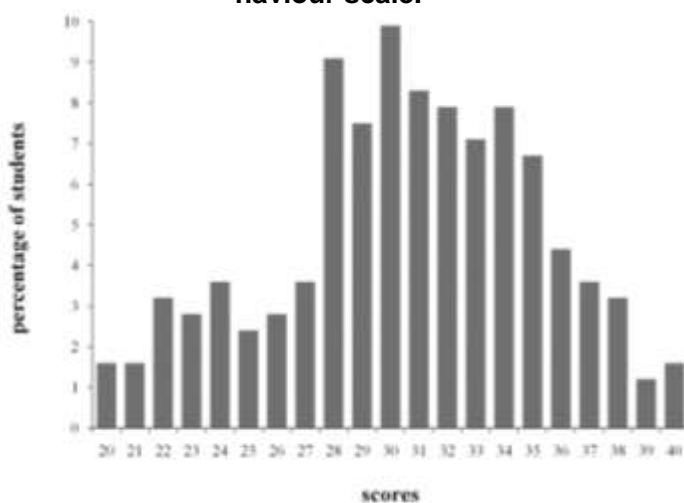
In this research we wanted to see how students deal with waste disposal when they are outdoors. Only 37% of the subjects always or generally dispose of waste in waste disposal bins, and only 40% of the students always or generally pick up litter outdoors. The mentioned data indicate that students have not developed the habit of correct behaviour for waste disposal. Obtained results can be associated with a weak perception of esthetical environmental characteristics, an insufficiently developed critical attitude towards their own behaviour and the behaviour of others, as well as insufficient awareness and self control. Schultz[18] emphasizes that understanding the consequences of one's

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[18] P. W. SCHULTZ: New Environmental Theories: Empathizing with nature: The effects of perspective taking on concern for environmental issues. J. Sociol. Issues, 56 (3), 391 (2000).

own behaviour, as well as perceiving environmental problems are the most significant factors in the formation of a certain type of behaviour. In our research we found that 72% of the students dispose of waste non selectively, and that 28% students sometimes dispose of household waste selectively. This result can be explained by the fact that Serbia still does not have suitably encouraging environmental conditions for waste recycling (insufficient number of waste disposal bins for various categories of household waste and insufficient number of recycling facilities) and the fact that students still do not have developed personal norms. The significance of environmental conditions and personal moral norms that can encourage the habit of sorting household waste has been emphasized by Barr. The strong influence of personal norms to the environmental behavior was, also, reported by Lalazisi and Latinopoulos[19].

The results of this research also have indicated that students save electricity (49.6%) more than water (29.8%) in their households. It is obvious that many students do not conserve water while taking care of their hygiene, even though they are aware of global water supply problems. Stern[20] indicates that individuals often behave regardless of knowledge and attitudes due to acquired habits (routine). Moreover, it is a fact that water costs considerably less than electricity and differences in electricity and water conservation can be connected with costs and not with the attitude of an individual[21].

Only 25% of the subjects always or generally pay attention to the environmental characteristics of a product while buying it. This result can be explained by the fact that a variety of eco friendly products are still not available in Serbia, and that these products are usually expensive. One of the objectives of our study was to verify how many students take care of green areas while being outdoors. The dissatisfactory behavior of more than half of the students can be linked to a low level of perception of the esthetic importance of green areas and an inadequate level of awareness among individuals about the consequences of their personal behavior. For these reasons, during the educational process students should develop a love towards nature and care for other living beings, as only with such individuals it is possible to guarantee a positive future for the planet.

Conclusions

The results of this research indicate that most subjects showed an average

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[19] LALAZISI CH., LATINOPOULOS P.: Investigation of the factors of influence on personal environmental norms and on environmental behaviour of lyceum students. J.of Environm. Protection and Ecology, 11 (1), 371, 2010.

[20] STERN C. P.: Toward a coherent theory of environmentally significant behavior. J. Sociol.

[21] BAMBERG S.: How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. J. Environ. Psychol., 23 (1), 21 (2003).

achievement level in the environmental knowledge test. A large number of students showed exclusively factual knowledge, so it can be concluded that they will not be able to estimate the seriousness of negative processes and phenomena in the environment due to a lack of applied knowledge. For almost half of the subjects it cannot be said that they showed fully responsible attitudes towards the environment since they expressed indecision or negative attitudes regarding many issues. The realized mean score value indicates that students do not fully display the desirable behaviour towards the environment. Students showed healthy living habits, but inadequate behaviour regarding waste management, water conservation, as well as pro environmental consumption. The results of this research pointed out to a necessity for more efficient activities to bring about a pro environmental developing of young people through education in Serbia, especially regarding environmental knowledge, environmental responsibility and pro environmental behaviour.