

PERCEPTION OF APPLIED ECOLOGY BY SECONDARY SCHOOL STUDENTS

Henrieta Pavolová^{1*}, Tomáš Bakalár¹, Nad'a Sasáková², Mária Zelenáková¹, Nadya Bozakova³

¹Technical University of Košice, Faculty of Mining, Ecology, Process Control and Geotechnologies,
Letná 9, 042 00 Košice, Slovakia

²University of Veterinary Medicine and Pharmacy in Košice, Komenského 73, 041 81 Košice,
Slovakia

³Trakia University, Stara Zagora 6000, Bulgaria

Abstract

Applied ecology is a science that manages ecosystems including conservation, harvesting and animal and plant control. Environmental attitudes of secondary school students include their psychological tendency towards the environment. The study concentrates on secondary school students in the Košice Region, in Slovakia. Using Google Forms a questionnaire was delivered to 1,012 secondary school students from the mentioned region. From the participants 59.3% were female and 40.7% were male students. The most numerous age category was 17-year-old secondary school students. 76.6% were students at a secondary school with a general certificate of secondary education (GCSE), 22.1% at a grammar school and 1.3% at a secondary school without a GCSE. Based on the results of the questionnaire most students are interested in the quality of the environment on average and there is no student absolutely not interested in the quality of the environment regardless of the school type. No students, regardless of the school type, consider there is absolutely no impact of all anthropogenic activities on the quality of the environment. As to the assessment of environmental quality in the place of permanent residence and the knowledge of drinking water quality there is no conformity depending on the type of school. The most students save water on average regardless of the school type. There are no students definitely not saving energy in their households, but there is no compliance on saving energy in the households depending on the type of school. There are no students definitely not separating waste in their households and only a few students that rather not separate waste but most students definitely separate waste regardless of the school type.

Keywords: applied ecology, environmental attitude, secondary school students, questionnaire, environmental quality

1. INTRODUCTION

The term ecology was used by German zoologist Ernst Haeckel for the first time; however, it is connected to other sciences such as biology, geology and evolution, etc. The latest definition of ecology by Odum (1971) focuses on study of ecosystems. Ecology studies the relationships between living organisms, including humans, with each other and with their environment. Ecology considers organisms at the individual, population, community, ecosystem, and biosphere level. Ecology is a branch of biology, but it is not a synonym of environmental science.

“Applied ecology is the science of managing ecosystems for defined outcomes, such as conservation, sustainable harvest, and animal pest and weed control” (Hone et al. 2015).

Environmental attitude was defined as “a psychological tendency expressed by evaluating the natural environment with some degree of favor or disfavor” (Milfont and Duckitt 2010). This attitude combined with opinions of adult and young people – secondary school students abstractive and often changes with the psychological character. The aim of the study is to improve the attitude of students towards nature if they understand the attitudes towards the environment. As the opinions may change objective predictors such as the place of gender and type of school are used in the study. The focus is put on the type of school that was also discussed with other studies.

2. MATERIALS AND METHODS

For obtaining information on the environmental attitudes of secondary school students in the Košice Region, in Slovakia, a questionnaire survey was conducted in the period of April – May 2022. In the survey 1,012 secondary school students took part. The free software application from Google was used to create the questionnaire form. In creating the form, the following partial steps of the recommended procedure for creating a questionnaire were uncompromisingly followed (Stehlíková and Taušová, 2015, Žiaková 2009):

1. a list of necessary requirements determining the level of environmental education of secondary school students and the associated environmental behavior was created,
2. the formulation of questions to get the necessary information on the issues addressed in the field of environmental education and behavior was specified,
3. the specified questions were classified according to predefined areas of evaluation of the questionnaire survey and then they were logically arranged, thus finalizing the form of the questionnaire form,
4. the comprehensibility and non-suggestiveness of the questions was verified on a randomly addressed sample of 35 high school students during a promotion of university studies in the city of Košice, that is not only the mentioned intelligibility and non-suggestiveness of questions, but also their logical sequence, graphic design and clarity of instructions were monitored in an interactive contact with the respondents.

The questionnaire survey form was created exclusively by ten closed questions focused on the behavior of students in relation to individual components of the environment and their awareness of environmental quality, which was logically organized into two basic areas:

- the first area consisted of three questions and focused on obtaining demographic information and the type of secondary education,
- the second area focused on the level of environmental education and behavior of high school students, while five of them were rated by the Likert scale focused on the issues addressed in a clearly defined range below:
 - Definitely yes,
 - Rather yes,
 - On average,
 - Rather no,
 - Definitely no,

one that monitored respondents' interest in the quality of the environment was also rated by the Likert scale in the range below:

- Yes, active,
- Yes, passive,
- On average,
- Rather not,
- Absolutely not.

and one that monitored respondents' ability to assess the environment in their place of permanent residence was rated using the Likert scale in the range below:

- High,
- Good,

- Average,
- Bad,
- Very bad.

3. RESULTS

In order to determine the level of environmental education and related behavior of high school students in the Košice region, the questionnaire survey, responded by 1,012 secondary school students, of which 688 answered all the questions in the questionnaire form and thus formed the research statistical file with a total of 688 respondents. Of the total number of respondents, 59.3% (408 respondents) were female and 40.7% (280 respondents) were male (Fig. 1).

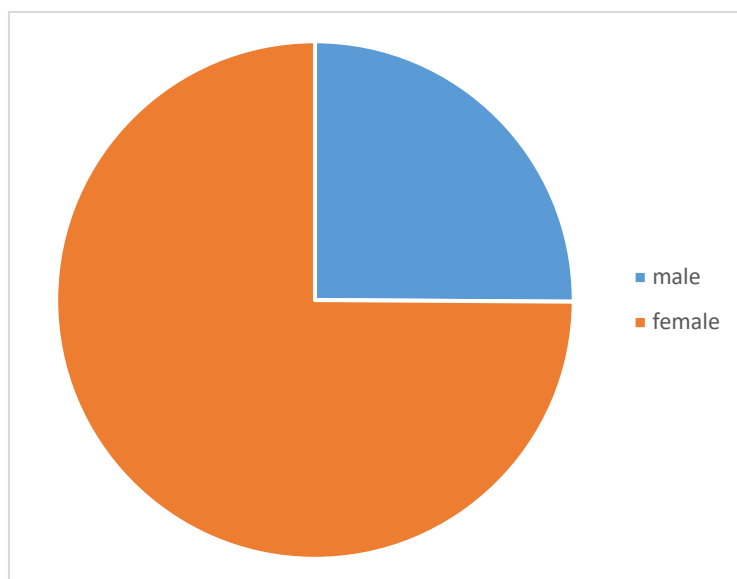


Fig. 1. Gender of respondents of the research statistical file

The most numerous age category consisted of 17-year-old secondary school students – 60.5% (416 respondents), followed by 18-year-old secondary school students – 29.4% (202 respondents), then secondary school students under the age of 16 – 7.0% (48 respondents) and secondary school students aged 19 and over – only 3.2% (22 respondents) (Fig. 2).

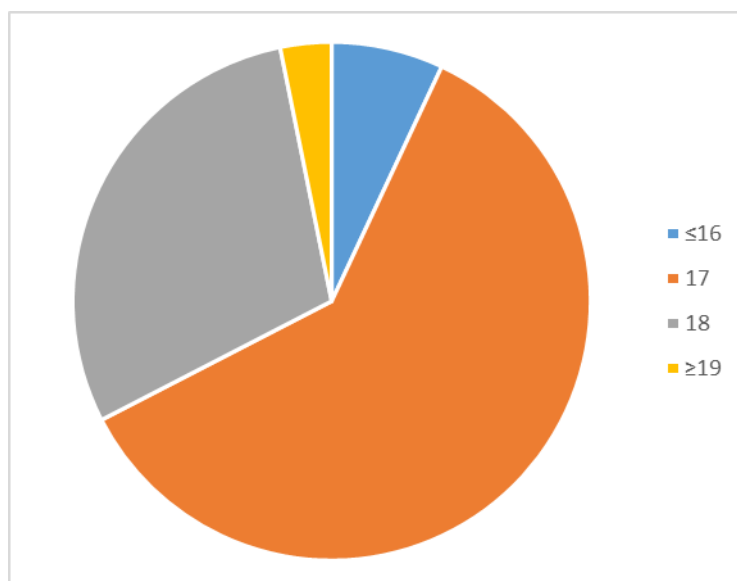


Fig. 2. Age of respondents of the research statistical file

With regard to obtaining an overview of the respondents' demographic indicators, the focus of their secondary school studies was also questioned in a logical connection to the previous questions. 76.6% – 527 respondents study at a secondary school with a general certificate of secondary education (GCSE), 22.1% – 152 respondents study at a grammar school, 1.3% – 9 respondents study at a secondary school without a GCSE and there are no respondents from a vocational school or a conservatory.

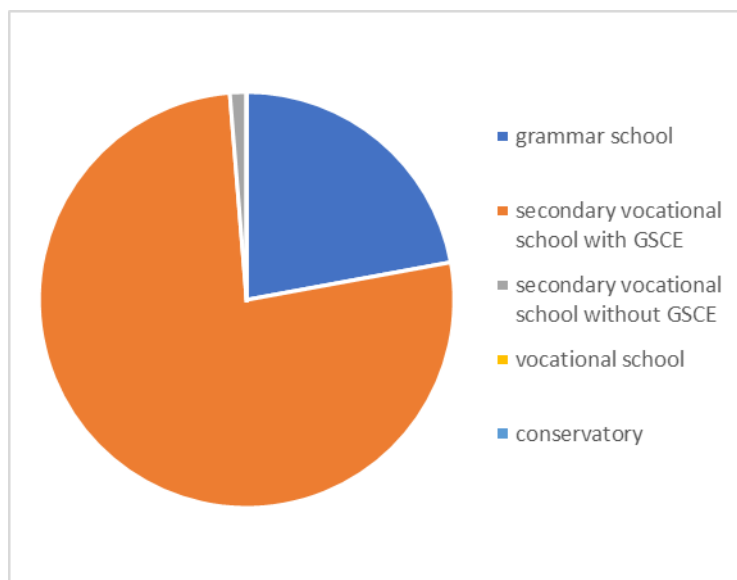


Fig. 3. Focus of study of respondents of the research statistical file

22.09% – 152 grammar school students were interest in the quality of the environment, of whom 21.10% – 32 students actively, 36.8% – 56 students passively and 42.10% – 64 students on an average. 76.60% – 527 secondary school students with a GCSE were interest in the quality of the environment, of whom 4.60% – 24 students actively, 30.40% – 160 students passively, 52.90% – 279 students on an average and 12.10% – 64 students rather not. Only 1.31% – 9 secondary school students without a GCSE were

interest in the quality of the environment, of whom 11.10% – 1 student actively and 88.9% – 8 students on an average (Table 1).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Yes, passive	56	36.8%	0	0.0%	160	30.4%
Yes, active	32	21.1%	1	11.1%	24	4.6%
On average	64	42.1%	8	88.9%	279	52.9%
Rather no	0	0.0%	0	0.0%	64	12.1%
Absolutely no	0	0.0%	0	0.0%	0	0.0%

Table 1. Interest in the quality of the environment

In the question whether the quality of the environment is affected by all anthropogenic activities, up to 76.6% – 527 secondary school students with a GCSE answered the question, of which 38.0% – 200 students stated that anthropogenic activities affect the quality of the environment passively, 34.7% – 183 stated that actively, 22.8% – 120 students stated that on an average and 4.6% – 24 stated that they do not affect the quality of the environment. In the same question up to 22.9% – 152 grammar school students answered that 68.4% – 104 students stated that anthropogenic activities affect the quality of the environment actively, 31.6% – 48 stated that passively. As only 1.31% – 9 students of a secondary school without a GCSE took part in the survey, 88.9% – 8 students stated that this effect is on an average and 11.1% – 1 student stated that it is actively (Table 2).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Yes, passive	48	31.6%	0	0.0%	200	38.0%
Yes, active	104	68.4%	1	11.1%	183	34.7%
On average	0	0.0%	8	88.9%	120	22.8%
Rather no	0	0.0%	0	0.0%	24	4.6%
Absolutely no	0	0.0%	0	0.0%	0	0.0%

Table 2. The impact of all anthropogenic activities on the quality of the environment

Up to 47.4% – 72 grammar school students, 24.1% – 127 secondary school students with a GCSE and 11.1% – 1 secondary school student without a GCSE described the quality of the environment in their place of permanent residence as high. Not a single questioned student rated the quality of the environment in their place of permanent residence as good. 18.4% – 28 students of a grammar school, 66.7% – 6 students of a secondary school without a GCSE and 58.8% – 310 students of a secondary school with a GCSE indicated an average quality of the environment in their place of permanent residence. 18.4% – 28 grammar school students consider the quality of the environment to be bad and 15.8% – 24 grammar school students to be very bad. 22.2% – 2 secondary school students without a GCSE consider the quality of the environment to be bad. 12.5% – 66 secondary school students with a GCSE consider the quality of the environment to be bad and 4.6% – 24 secondary school students with a GCSE to be very bad (Table 3).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Good	0	0.0%	0	0.0%	0	0.0%
High	72	47.4%	1	11.1%	127	24.1%
Average	28	18.4%	6	66.7%	310	58.8%
Bad	28	18.4%	2	22.2%	66	12.5%
Very bad	24	15.8%	0	0.0%	24	4.6%

Table 3. Assessment of environmental quality in the place of permanent residence

47.7% – 72 grammar school students, 33.4% – 176 secondary schools students with a GCSE consider their knowledge of drinking water quality to be high, while 36.8% – 56 grammar school students, 30.0% – 158 secondary school students with a GCSE and 22.2% – 2 secondary school students without a GCSE consider the information about the quality of drinking water to be average. Bad information about the quality of drinking water was reported by 44.4% – 4 secondary school students without a GCSE and 28.1% – 148 secondary school students with a GCSE. 33.3% – 3 secondary school students without a GCSE and 4.0% – 21 secondary school students with a GCSE have very bad information about the quality of drinking water (Table 4).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Good	24	15.8%	0	0.0%	24	4.6%
High	72	47.4%	0	0.0%	176	33.4%
Average	56	36.8%	2	22.2%	158	30.0%
Bad	0	0.0%	4	44.4%	148	28.1%
Very bad	0	0.0%	3	33.3%	21	4.0%

Table 4. Knowledge of drinking water quality

31.6% – 48 grammar school students and 27.3% – 144 secondary students from with a GCSE fully agreed with saving water. An average water saving was marked by 50.0% – 76 grammar school students, 44.4% – 4 secondary school students without a GCSE and 31.9% – 168 students secondary school students with a GCSE. Rather yes for water saving was selected by 2.6% – 4 grammar school students, 22.2% – 2 secondary school students without a GCSE and 17.1% – 90 secondary school students with a GCSE. Definitely do not save drinking water 4.6% – 24 secondary school students with a GCSE and rather not save water 15.8% – 24 grammar school students, 33.3% – 3 secondary school students without a GCSE and 19.2% – 101 secondary schools students with a GCSE (Table 5).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Definitely yes	48	31.6%	0	0.0%	144	27.3%
Rather yes	4	2.6%	2	22.2%	90	17.1%
On average	76	50.0%	4	44.4%	168	31.9%
Rather no	24	15.8%	3	33.3%	101	19.2%
Definitely no	0	0.0%	0	0.0%	24	4.6%

Table 5. Saving water in the households

34.2% – 52 grammar school students and 17.5% – 92 secondary school students with a GCSE fully agreed with saving energy in the home., 18.4% – 28 grammar school students, 22.2% – 2 secondary school students without a GCSE and 21.6% – 114 secondary school students with a high GCSE expressed rather yes with saving energy. Average energy saving was expressed by 15.8% – 24 grammar school students, 33.3% – 3 secondary school students without a GCSE and 38.9% – 205 secondary school students with a GCSE. 31.6% – 48 grammar school students, 44.4% – 4 secondary schools students without a GCSE tend rather not to save energy in their homes and 22.0% – 116 secondary schools students with a GCSE absolutely not save energy (Table 6).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Definitely yes	52	34.2%	0	0.0%	92	17.5%
Rather yes	28	18.4%	2	22.2%	114	21.6%
On average	24	15.8%	3	33.3%	205	38.9%
Rather no	48	31.6%	4	44.4%	116	22.0%
Definitely no	0	0.0%	0	0.0%	0	0.0%

Table 6. Saving energy in the households

None of the interviewed secondary school students definitely separate waste. Only 4.6% – 24 secondary school students with a GCSE do not separate waste. 33.30% – 3 secondary school students without a GCSE, 19.9% – 105 secondary school students with a GCSE and 2.6% – 4 grammar school students separate waste on average. 78.9% – 120 grammar school students, 33.3% – 3 secondary school students without a GCSE and 49.5% – 261 secondary school students with GCSE definitely separate waste. 18.4% – 28 grammar school students, 33.3% – 3 secondary school students without a GCSE and 26.0% – 137 secondary school students with a GCSE rather separate waste (Table 7).

	Grammar school		secondary school without a GCSE		secondary school with a GCSE	
Definitely yes	120	78.9%	3	33.33%	261	49.5%
Rather yes	28	18.4%	3	33.33%	137	26.0%
On average	4	2.6%	3	33.33%	105	19.9%
Rather no	0	0.0%	0	0.00%	24	4.6%
Definitely no	0	0.0%	0	0.00%	0	0.0%

Table 7. Waste separation in the households in the place of residence

When investigating the causality of environmental education of secondary school students and the nature of secondary school studies, the focus of secondary school studies determines the level of environmental education and behavior of secondary school students, as the Pearson test showed a value of < 0.0001 for all responses to the questionnaire survey.

4. DISCUSSION

Most students are interested in the quality of the environment on average and no student is absolutely not interested in the quality regardless of the school type. No students, regardless of the school type, consider there is absolutely no impact of all anthropogenic activities on the quality of the environment, but most grammar school students consider the impact active, most secondary school students with a GCSE consider it passive and most secondary school students without a GCSE consider it on average,

so there is no conformity depending on the type of school. As to the assessment of environmental quality in the place of permanent residence there is no conformity depending on the type of school as most grammar school students consider it high, most secondary school students both with and without a GCSE consider it average. The knowledge of drinking water quality is also not uniform with respect to the secondary school type. There is quite a big difference in the view of drinking water quality. While in the view of grammar school students the drinking water quality is from average to high, the view of secondary school students without a GCSE it is from average to very bad. About the same number of secondary school students with a GCSE think that the quality is good and bad. The most students save water on average regardless of the school type. Only a few secondary school students with a GCSE definitely not save water in their households. There are no students definitely not saving energy in their households, but there is no compliance on saving energy in the households depending on the type of school. There are no students definitely not separating waste in their households and only a few students that rather not separate waste but most students definitely separate waste regardless of the school type.

Other studies also confirmed that the type of school has a significant impact on secondary school students' attitudes (Shobeiri and Prahallada, 2007). Grammar school students have more positive attitudes to environment than secondary school students with/without a GCSE (vocational school students) (Atik et al. 2022). The most negative attitude towards the nature had secondary school students without a GCSE (Tikka et al. 2000). The differences in attitudes of secondary school students towards environment may be caused by different school subjects, training and thus the connected life experiences. The subjects of secondary school students without a GCSE concentrate more on the field of their study, vocational study, than environment, ecology or biology that are preferred by grammar school students. However, there are also studies that found no significant differences between students' attitudes based on school type (Polat and Kırpık, 2013, Yalmanci, 2015).

Citizens living in more rural areas have a higher contact with nature (Barrutia et al. 2022). The environmental attitudes of secondary students do not depend on the place of their residence. But there is a significant impact of income of the household and the frequency of talking about environmental problems at home (Atik et al. 2022). The two letter factors were not the subject of this study. The environmental attitudes also depend on the size and location of the place of residence, as well as other socio-demographic factors (Sechi et al. 2018). The most positive environmental attitudes have students from densely populated urban cities (Tikka et al. 2000). But students from rural areas are worried and tense about nature conservation and natural resource reduction but students from cities are concerned about pollution (Chung and Poon 2001). Gender has also a significant impact on the environmental attitudes. Girls have more positive environmental attitudes than boys (Atik et al. 2022). This fact was also confirmed by other studies (Tikka et al. 2000, Huang and Yore 2005, Uğulu et al. 2013).

5. CONCLUSIONS

The study concentrates on the perception of applied ecology by secondary school students using a questionnaire survey on environmental attitudes. The area of interest is the Košice Region, in the eastern part of Slovakia. The questionnaire was delivered by 1,012 secondary school students by Google Forms of which 408 respondents were female and 280 respondents were male; 416 respondents were 17-year-old, 202 respondents were 18-year-old, 48 respondents were under the age of 16 and 22 respondents were aged 19 and over; and most importantly 527 respondents were students at a secondary school with a GCSE, 152 respondents were students at a grammar school, 9 respondents were students at a secondary school without a GCSE and there were no respondents from a vocational school or a conservatory. Students are interested in the quality of the environment regardless of the school type, but they are not unified in the opinion on the impact of anthropogenic activities on the quality of the environment, on the assessment of environmental quality in the place of permanent residence and on the knowledge of drinking water quality. The most students save water on average regardless of the school type.

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