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**SECONDARY SCHOOL STUDENTS' ENVIRONMENTAL CONCERNS: A CASE STUDY FROM SLOVENIA**

*Students' environmental concerns were investigated using a questionnaire with 12 items. The study sample comprised 410 first and second year students of general upper secondary school from NW Slovenia. Results provide evidence that students' concerns for the consequences of environmental damage formed three correlated factors organized around self and family, all people, and the biosphere. The highest was students' environmental concern for the biosphere, followed by concern for self and family, and concern for all the people. Gender differences were significant in concerns for all people and for the biosphere; female students were more concerned than male students. Age differences were significant in concerns for the biosphere in favour of older students. Since humanity is facing challenges in balancing our demands and ecological limitations, the results of this study could be beneficial for further development of environmental education.*

**Key words:** environmental concern, secondary school, students, gender, age, Slovenia

**I. INTRODUCTION**

Knowing local peoples' attitudes, taking into account their needs, and respecting their opinions should become a priority for success of conservational activities and sustainable use of natural resources [Macura et al. 2011]. Increasing number of people around the world are concerned about environmental problems (i.e. loss of habitats, introduction of invasive exotic species, pollution, over-exploitation), but they express different types of environmental concerns [Schultz 2001, 2002]. Schultz [2001] explains that different types of environmental concern result from the degree to which an individual perceive an interconnection between self and nature. Attitudes of concern about environmental issues are based on a person's more general set of values [Stern and Dietz 1994]. Stern and Dietz [1994] argue that attitudes about environmental issues are based on the relative importance that a person places on themselves, other people, or plants and animals which they labelled egoistic, social altruistic, and biospheric position. Stern & Dietz' [1994] value-basis theory for environmental attitudes, and is an extension of Schwartz's [1992] norm-activation model of altruism [Schultz 2002], suggests that concerns about specific environmental issues are due to an awareness of harmful consequences of environmental problems to a value or valued object. By examining the different types of environmental attitudes we attempt to identify the values associated with different concerns [Schultz 2002]. Values are often invoked in discussions of how to develop a more sustainable relationship with the environment. Values provide an efficient instrument for describing and explaining similarities and differences between persons, groups, nations, and cultures [Rokeach 1973]. The importance of these values may differ across persons and cultures, but the structure of these values is believed to be universal [Schwartz 1992].

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Rock and Degeling [2015] highlighted the inevitable tension between concern for health of individual, population, species and/or biosphere. They introduced the term “more-than-human solidarity” which implies people respecting (valuing) commitments to one another as well as to places, plants and non-human animal, because people are not concerned for fellow humans in isolation from non-human animals, nor from places, nor are people necessarily more concerned about fellow humans than about non-human species, individual animals, particular places, or multi-species collectives.

Gender has been one of the most examined factors predicting concern about the environment. Influence is vague and inconsistent [e.g. Onur et al. 2012, Dunlap et al. 2000]. An important way of raising awareness on negative environmental impacts is the establishment of Environmental Education (EE) Initiatives [e.g. UNESCO 1978], which are intended to change the way we interact with the natural environment. This is of special importance for youth as they will grow up to be the decision-makers of the future. Many researchers in the field of EE are studying adults and there is an extensive and growing body of knowledge in this area, but young people, their environmental attitudes and behaviours still remain an underresearched topic [Boeve-de Pauw et al. 2011].

## II. AIM OF THE PRESENT STUDY

The survey used for this study was designed to investigate Slovene secondary school students' environmental concerns, and gender and age differences. In Slovenia, primary and lower secondary education are unified and called compulsory basic education, which is divided into three, three-year cycles (students aged from 6 to 14). This is followed by secondary grammar, vocational or professional schools (students aged from 15 to 18 or 19) with the system of state exams for continuing studies at the university. In the White paper on education in the Republic of Slovenia is written that schools and teachers should help students' develop their knowledge, concern and responsible behaviour towards the environment and nature [Krek 2011].

## III. METHODOLOGY

### *Sampling*

The study sample comprised of 410 first and second year students of general upper secondary school (in Slovenian: gimnazija) from NW Slovenia. They were questioned via a self-administered questionnaire. More than 90% of students from the study area attend secondary schools in selected towns [SORS 2013]. The sample consisted of 134 (32.7%) males and 276 (67.3%) females. Their average age was 15.64 years ( $SD = .59$ ,  $Min = 15$ ,  $Max = 18$ ).

### *Design and procedure*

The administration of randomly selected schools were contacted by phone to confirm or refuse their participation in the survey. Schools were later visited by a researcher, who provided printed copies of the questionnaire and instructions for teachers. The questionnaire format is a widely used and useful instrument for collecting survey information [Cohen et al. 2011]. Teachers conducted questioning in the classrooms, at the beginning of science or biology lessons. Environmental concerns were investigated using an adopted questionnaire with 12 items introduced by Schultz [2001]. A Likert scale from 1 (not important) to 7 (supreme importance) was used. Students were also asked some demographic questions and some other questions which are not discussed here. At all data collection steps, full anonymity was guaranteed to the participants.

### *Data Analyses*

Data entry and analysis was conducted using the Statistical Package for the Social Sciences. Basic descriptive statistics of the numerical variables (mean, standard deviation, frequency) was employed. Environmental concern items were subjected to factor analysis (with varimax

rotation). The nonparametric Mann–Whitney (U) test was used to test for significant differences in environmental concerns. Spearman’s product moment correlation coefficient was used for exploring the relationship between environmental concerns. It was used also to measure the impact of student’s age on environmental concerns.

#### IV. RESULTS

Students’ attitudes of environmental concern were assessed using twelve items. Mean scores and standard deviations were calculated for each item (fig. 1). For students concern for their health, family and the future of their children were the most important, followed by concern for all living beings and animals. They rated as the least important environmental concern for people of all nationalities. Spearman correlation coefficients were calculated for all 12 environmental concerns (tab. 1). All correlations were statistically significant. Particularly high were correlations between concerns for plants, animals and all organisms on the planet.

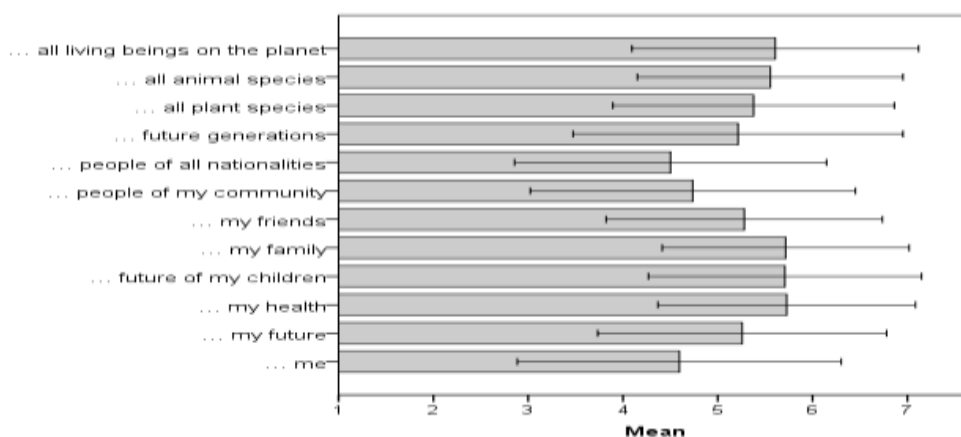


Fig. 1. Mean score and standard deviation for environmental concern items

*Rys. 1. Średni wynik i odchylenie standardowe zaniepokojenia aspektami życia z uwagi na stan środowiska naturalnego*

Environmental concern items were subjected to factor analysis (with varimax rotation) (tab. 2). Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .87, exceeding the recommended value of .6 [Kaiser 1970, 1974] and the Barlett’s Test of Sphericity [Bartlett 1954] reached statistical significance, supporting the factorability of the correlation matrix. Three factors with an eigenvalue were greater than 1.0 derived. These factors explained 72.6 % of the total variance. The scree test proposed by Cattell [1966] was used and it was decided to retain three components for further investigation. Scores for the three environmental concerns were produced by averaging the items. Alpha reliability for the three scales was very high: concern for self and family (.85), concern for all the people (.72) and concern for the biosphere (.92).

The highest was students’ environmental concern for the biosphere ( $M=5.51$ ,  $SD=1.37$ ), followed by concern for self and family ( $M=5.39$ ,  $SD=1.18$ ), and concern for all the people ( $M=4.92$ ,  $SD=1.30$ ). The Shapiro-Wilk statistic was used to assess the normality of the distribution of environmental concern scores. Significant values ( $p < .001$ ) for each of the groups suggest violation of the assumption of normality. The Mann-Whitney test was used to test for differences between concern for the biosphere and for self and family ( $Z = -2.442$ ,  $p < .015$ ), for the biosphere and for all the people ( $Z = -9.778$ ,  $p < .001$ ), and for self and family

and for all the people ( $Z = -8.808, p < .001$ ). Next, differences between male and female students in environmental concerns were investigated. Shapiro-Wilk statistic was used to assess the normality of the distribution of environmental concern scores. Significant values ( $p < .001$ ) for each of the groups are suggesting violation of the assumption of normality.

**Table 1 - Tabela 1**

Spearman correlation coefficients for environmental concerns / *Współczynniki korelacji Spearmana w zakresie zaniepokojenia stanem środowiska*

| Environmental concern for / <i>Zaniepokojenie stanem środowiska w odniesieniu do</i> |        |        |        |        |        |        |        |        |        |        |        |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|  | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     |
| 1  | .567** | .504** | .360** | .465** | .441** | .342** | .299** | .210** | .216** | .214** | .177** |
| 2  |        | .646** | .503** | .525** | .484** | .422** | .403** | .334** | .262** | .281** | .278** |
| 3  |        |        | .611** | .620** | .577** | .464** | .404** | .389** | .362** | .397** | .350** |
| 4  |        |        |        | .674** | .599** | .551** | .462** | .484** | .313** | .339** | .337** |
| 5  |        |        |        |        | .795** | .586** | .473** | .388** | .295** | .297** | .272** |
| 6  |        |        |        |        |        | .699** | .557** | .430** | .287** | .265** | .277** |
| 7  |        |        |        |        |        |        | .781** | .593** | .391** | .387** | .369** |
| 8  |        |        |        |        |        |        |        | .686** | .519** | .497** | .475** |
| 9  |        |        |        |        |        |        |        |        | .513** | .526** | .467** |
| 10   |        |        |        |        |        |        |        |        |        | .892** | .741** |
| 11   |        |        |        |        |        |        |        |        |        |        | .760** |

Correlation is significant\*\* at  $\alpha < 0.001$  (2-tailed) / *Korelacja jest istotna\*\* dla  $\alpha < 0.001$  (test dwustronny)*

1) me / *mnie*; 2) my future / *moją przyszłość*; 3) my health / *moje zdrowie*; 4) future of my children / *przyszłość moich dzieci*; 5) my family (parents, brother, sister) / *moja rodzina (rodzice, brat, siostra)*; 6) my friends / *moi przyjaciele*; 7) people in my community / *moi sąsiedzi*; 8) people of all nationalities / *ludzie wszystkich narodowości*; 9) future generations / *przyszłe pokolenia*; 10) all plant species / *wszystkie gatunki roślin*; 11) all animal species / *wszystkie gatunki zwierząt*

**Table 2 – Tabela 2**

Factor analysis (with varimax rotation) for students' environmental concerns / *Analiza (z rotacją maksymalizującą wariancję) dotycząca zaniepokojenia uczniów stanem środowiska*

| Environmental concern for<br><i>Zaniepokojenie stanem środowiska w odniesieniu do</i>  | Component / <i>Komponent</i>                                      |  |   |
|--|---|--|---|
|  | Concern for self and family / <i>Nie-pokój o siebie i rodzinę</i> | Concern for the biosphere / <i>Niepokój o biosferę</i> | Concern for all the people / <i>Niepokój o wszystkich ludzi</i> |
| my future / <i>mojej przyszłości</i>   | .813  |  |   |
| me / <i>mnie</i>   | .790  |  |   |
| my health / <i>mojego zdrowia</i>  | .759  |  |   |
| my family (parents, brother, sister) / <i>mojej rodziny (rodziców, brata, siostry)</i> | .665  |  |   |
| future of my children / <i>przyszłość moich dzieci</i>                                 | .597  |  |   |
| all animal species / <i>gatunki zwierząt</i>   |   | .920   |   |
| all plant species / <i>gatunki roślin</i>  |   | .910   |   |
| all organisms on the planet / <i>wszystkich organizmów żyjących na naszej planecie</i> |   | .860   |   |
| people in my community / <i>ludzi z sąsiedztwa</i>                                     |   |  | .830  |
| my friends / <i>moich przyjaciół</i>   |   |  | .688  |
| people of all nationalities / <i>ludzi wszystkich narodowości</i>                      |   |  | .656  |
| future generations / <i>przyszłych pokoleń</i>   |   |  | .549  |

The Mann-Whitney U-test was used to test for differences in environmental concern scores by gender. The results of the test showed that the ranks for concern for all the people ( $Z = -4.597$ ,  $p < .001$ ) and concern for the biosphere ( $Z = -2.024$ ,  $p = .043$ ) differ significantly between male and female students; female students being more concerned. There is no statistically significant difference in the concern for self and family ( $Z = -1.557$ ,  $p = .120$ ) between males and females. Spearman correlation coefficients were calculated to determine the impact of student's age on environmental concerns. There was only weak positive correlation found between student's age and concern for all living beings ( $r_s = .104$ ,  $p = .036$ ).

## V. DISCUSSION

People around the world are generally concerned about environmental problems, because of the consequences that result from harming nature, but they differ in the consequences that concern them the most [Schultz 2001, 2002]. Our findings show that students were most concerned for their health, family and the future of their children, followed by concern for all living beings and animals. Environmental concern items were subjected to factor analysis. The study showed that concern for the consequences of environmental damage formed three correlated factors organized around self and family, all people, and the biosphere which is in line with previous research findings [Schultz 2001, 2002]. The highest was students' environmental concern for the biosphere, followed by concern for self and family, and concern for all the people. This shows that students, participating in the study, possessed ecocentric worldview: human as a part of nature [Dunlap et al. 2000]. As Boeve-de Pauw et al. [2011] showed in their study that adolescents willing to take responsibility for their actions and who felt in control over the outcomes of their decisions were more likely to have an ecocentric worldview. Furthermore, this study demonstrated that egocentrism and ecocentrism are opposite conceptions.

Our study shows that female students were significantly more concerned for all the people and for the biosphere than male students. Despite the fact that the correlation between the students' age and concern for the biosphere was low this study does show that age and gender cannot be neglected in future studies aiming to come to a comprehensive understanding of individual differences in environmental concerns. It should be emphasized once more that different types of environmental concerns result from the degree to which an individual perceive an interconnection between self and nature [Schultz 2001] and this is probably to great extent connected to their environmental literacy and science education.

Since humanity is facing challenges in balancing our demands and ecological limitations, the results of this study are beneficial for further development of environmental education and education for sustainable development. However, caution should be exercised in generalizing the results of this study, because only secondary school students from one region in Slovenia were considered. Nevertheless, the findings and methodological approach could be a useful basis for the further research.

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## **NIEPOKOJE WYWOŁANE STANEM ŚRODOWISKA W OPINII UCZNIÓW SZKÓŁ ŚREDNICH: STUDIUM PRZYPADKU ZE SŁOWENII**

### Streszczenie

*Do zbadania niepokoju uczniów wywołanych stanem środowiska użyto kwestionariusza złożonego z dwunastu elementów. Próba badawcza składała się z 410 uczniów pierwszej i drugiej klasy liceum ogólnokształcącego z północno- zachodniej Słowenii. Wyniki wskazują na to, że zaniepokojenie uczniów konsekwencjami niszczenia środowiska oscylują wokół trzech skorelowanych czynników dotyczących siebie i rodziny, wszystkich ludzi i biosfery. Młodzi ludzie wykazali najwyższy poziom zaniepokojenia stanem biosfery, potem sobą i rodzina, na końcu troską o wszystkich ludzi. Wśród kobiet i mężczyzn różnice były istotne jeśli chodzi o wszystkich ludzi i biosferę; kobiety wykazały większe zaniepokojenie tymi aspektami niż mężczyźni. Jeśli chodzi o wiek respondentów, starsi uczniowie byli bardziej zaniepokojeni stanem biosfery niż młodszy. Z uwagi na to, że ludzkość stoi przed wyzwaniem związanym z dążeniem do równowagi pomiędzy chęcią zaspokajania naszych potrzeb, a ograniczeniami ekologicznymi, wyniki tego badania mogłyby mieć korzystny wpływ na dalszy rozwój edukacji pro- środowiskowej.*

**Słowa kluczowe:** niepokoju wywołany stanem środowiska, uczniowie liceum, płeć, wiek, Słowenia