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Assessing Children's Environmental Worldviews and Concerns

GREGOR TORKAR^{*1}, VANJA DEBEVEC², BRUCE JOHNSON³ AND
CONSTANTINOS C. MANOLI³

~ The goal of the present research was to assess the environmental worldviews and concerns of students from the fourth to the seventh grade in Slovenia. The New Ecological Paradigm Scale for Children was translated and validated for use with Slovenian primary school students ($N = 310$). The students were also asked about their environmental concerns (using statements from the Environmental Motives Scale) and demographic questions. A confirmatory factor analysis was conducted for the New Ecological Paradigm scale using AMOS software, confirming a three-dimensional model with ten items. The students showed the highest agreement with the items in the factor Rights of Nature, and the lowest agreement with Human Exemptionalism. The environmental attitudes of the students decreased from the fourth to the seventh grade, while altruistic environmental concerns significantly increased with higher grades. Gender differences were not statistically significant for environmental worldviews and concerns. The reported results show that biospheric environmental concern positively correlates with the factors Rights of Nature and belief in Eco-Crisis, and negatively correlates with Human Exemptionalism. The New Ecological Paradigm tool will enable the evaluation of education programmes for children in Slovenia.

Keywords: environmental worldviews, environmental concerns, New Ecological Paradigm, children

1 *Corresponding Author. Faculty of Education, University of Ljubljana, Slovenia;
gregor.torkar@pef.uni-lj.si.
2 Škocjan Caves Public Service Agency, Slovenia.
3 College of Education, University of Arizona, Tucson, Arizona, USA.

Vrednotenje otrokovih okoljskih svetovnih nazorov in skrbi

GREGOR TORKAR, VANJA DEBEVEC, BRUCE JOHNSON IN
CONSTANTINOS C. MANOLI

∞ Cilj raziskave je bil oceniti okoljski svetovni nazor in skrb za okolje učencev od četrtega do sedmega razreda v Sloveniji. Lestvica nove ekološke paradigme za otroke je bila prevedena in validirana za uporabo s slovenskimi osnovnošolci ($N = 310$). Učence smo tudi spraševali o njihovi skrbi za okolje (z uporabo lestvice okoljskih motivov) in zastavljali demografska vprašanja. Za Lestvico nove ekološke paradigme je bila izvedena potrditvena faktorska analiza s pomočjo programske opreme AMOS, ki je potrdila tridimenzionalni model z desetimi trditvami. Študentje so pokazali najvišje soglasje s trditvami v faktorju pravice narave, najnižje pa s faktorjem človeška izjemnost. Odnos do okolja se je od četrtega do sedmega razreda poslabšal, medtem ko so učenci v višjih razredih pokazali bolj altruistično skrb za okolje. Razlike med spoloma niso bile statistično pomembne za njihove okoljske svetovne nazore in skrbi. Izsledki kažejo, da je okoljska skrb za biosfero v pozitivni korelaciji s faktorji pravice narave in vera v ekološko krizo ter v negativni korelaciji s faktorjem človeška izjemnost. Nova ekološka paradigma nam bo omogočila vrednotenje izobraževalnih programov za otroke v Sloveniji.

Ključne besede: okoljski svetovni nazor, skrb za okolje, nova ekološka paradigma, otroci

Introduction

Environmental problems are among the most pressing social issues of our time. Major environmental problems can readily generate strong feelings in anyone delving into the roots of the current situation. Addressing these issues will require people to do things differently. The goal of environmental education is to develop a world population that is aware of and concerned about the environment (Palmer & Neal, 1994). The success of environmental education depends particularly on cognitive development and environmental knowledge (with special attention to knowledge of biology and ecology), affective and motivational factors (especially a connection to nature and feelings about one's ability to achieve effects in the world), and actual behaviour (participating, taking action and problem-solving) (Clayton & Myers, 2009). Schools must play their part in the process of raising the awareness and competence of citizens in managing our planet in a sustainable way, and must accept responsibility for building "environmental literacy" by means of environmental education (Brennan, 1994). The Slovenian school system is expected to assist children and adolescents in developing their knowledge, attitudes and personal commitment with regard to the environment (Krek, 2011). Slovenia has introduced an obligatory curriculum for environmental education as education for sustainable development, which must be autonomously introduced into the curricula of each primary and secondary school (Šorgo & Kamenšek, 2012). However, researchers have stressed that teaching is mostly about environmental issues, and often does not include teaching within the environment nor using the environment in active, vernacular learning (Selby, 2017). Moreover, environmental issues are not taught as cross-curricular and interdisciplinary themes, a failing that can result in insufficient ability to evaluate an environmental problem critically (Šorgo & Kamenšek, 2012; Torkar, 2014). There is a clear need for assessing environmental worldviews and concerns during childhood and adolescence. This concerns those offering both formal and informal environmental education programmes in Slovenia, as well as researchers investigating the development of environmental attitudes.

Environmental Worldviews

Since the 1970s, as people all over the world have increasingly witnessed industrial and nuclear accidents, oil spills, depletion of resources, mismanagement of waste, environmentally induced diseases and other environmental problems, an ecocentric paradigm has arisen, leading to the postulation of the New Environmental Paradigm (Dunlap & Van Liere, 1978), the New Ecological

Paradigm (Dunlap et al., 2000) and the Ecological World View (Blaikie, 1992). The New Ecological Paradigm (NEP) focuses on beliefs about the ability of humans to upset the balance of nature, the existence of limits to growth for human societies, and humanity's proper role as part of the rest of nature (Dunlap et al., 2000). The New Environmental Paradigm Scale and the New Ecological Paradigm Scale (NEP Scale) are widely used instruments for studying environmental worldviews among adults (Dunlap & Van Liere, 1978; Dunlap et al., 2000) and children (Manoli et al., 2007; Johnson & Manoli, 2010). They see environmental perception as a unidimensional construct on a continuum from a biocentric to an anthropocentric worldview, or as three dimensions: Rights of Nature, Eco-Crisis and Human Exemptionalism (Manoli et al., 2007). The NEP Scale for Children is still in use in a variety of locations (e.g., Collado et al., 2013; Izadpanahi & Tucker, 2018), which makes it a useful instrument for cross-cultural comparisons of environmental worldviews among children.

Environmental Concerns

Another line of empirical studies has concentrated on motives that underlie environmental concerns. People around the world are generally concerned about environmental problems because of the consequences of harming nature, but they differ in which consequences concern them the most (Schultz, 2001). Stern et al. (1993) first proposed a value-basis theory. This was modified a year later into a value-belief-norm (VBN) theory (Stern & Dietz, 1994), which extends the existing norm-activation theory of altruistic behaviour (Schwartz & Howard, 1981). Within the VBN theory, values are regarded as the source of environmental concern, as people's attitudes about environmental issues and pro-environmental behaviour are thought to focus either on self and self-oriented goals (egoistic), on other people, such as family members, humanity and friends (social-altruistic), or on the wellbeing of all living things, such as plants, animals and trees (biospheric) (Stern & Dietz, 1994). For example, concern over water pollution can be expressed for fundamentally different reasons: polluted drinking water is dangerous to my health (egoistic), dangerous to the health of all children (altruistic), or damaging for organisms living in freshwaters (biospheric). Thus, concern for environmental issues may originate in an awareness of and belief in harmful consequences with regard to all three sets of values (valued objects) leading to concern for environmental issues (Schultz et al., 2004). Subsequently, scales were developed including egoistic, social-altruistic and biospheric value orientations. The Environmental Motives Scale (EMS) has favourable reliability scores and factor structure (e.g., De Dominicis et al., 2017)

as well as cross-cultural validity (e.g., de Groot & Steg, 2007; Schultz et al., 2005; Torkar, 2016; Torkar & Bogner, 2019). Furthermore, cross-validation studies with other item batteries has assured further insight (Schultz et al., 2005), such as connectedness with nature and the NEP Scale (Schultz, 2001), and pro-environmental behaviour (de Groot & Steg, 2007).

The main aim of the present research was to translate and validate the New Ecological Paradigm Scale for Children (Manoli et al., 2007) for use with primary and lower secondary school students in Slovenia, with the goal of assessing their environmental worldviews and environmental concerns. In previous studies, the environmental concerns of Slovenian upper secondary school students were examined (Torkar, 2016; Torkar & Bogner, 2019); however, to the best of our knowledge, there are no studies involving Slovenians in which the NEP Scale for Children has been employed.

Research Questions (RQ)

- RQ1: How do the environmental worldviews of Slovenian students change from grade 4 to grade 7?
- RQ2: Are there any gender differences in the environmental worldviews of Slovenian children?
- RQ3: How do the egoistic, altruistic and biospheric environmental concerns of Slovenian students change from grade 4 to grade 7?
- RQ4: Are there any gender differences in the environmental concerns of Slovenian students?
- RQ5: How are the environmental concerns of Slovenian students related to environmental worldviews?

Method

Participants

The survey was carried out in the autumn of 2018. Four of the seven schools invited agreed to participate in the survey. Teachers administered the questionnaires in the classrooms and the instructions were read aloud to the students. A total of 310 primary and lower secondary school students from the fourth to the seventh grade (aged 9 to 13) participated in the survey. In Slovenia, the education system consists of nine years of compulsory education (from age six to fifteen). The first six grades can be identified as primary (ISCED 1) level, and from seventh to ninth grade can be identified as lower secondary school level (ISCED 2) (Eurydice, 2018). In the period of nine-year compulsory

school, students learn the most about environmental education in the compulsory school subjects Knowing the Environment (grades 1–3), Science and Technology (grades 4–5), Home Economics (grades 5–6), Science (grades 6–7), Biology (grades 8–9) and Chemistry (grades 8–9).

Measures

The students' environmental worldviews were explored with the Slovenian version of the New Ecological Paradigm Scale for Children (Manoli et al., 2007) with ten items. It was translated from English to Slovenian by the first author and then reviewed by two experts in educational research (for details, see Table 1 and Appendix). The Environmental Motives Scale (EMS) (Bruni et al., 2012; Schultz, 2000, 2001; Schultz et al., 2004) had been previously translated into Slovenian and used in research by Torkar (2016) and Torkar and Bogner (2019). In the present research, only three items of the EMS were used to measure concern for environmental problems: the egoistic item "me", the altruistic item "all people" and the biospheric item "all living beings". The students rated items about which they were concerned from 1 (not important) to 7 (supreme importance). They were also asked demographic questions (gender, grade). Full anonymity was guaranteed to the participants during all of the data collection steps. Under Slovenian regulations, such studies do not require the approval of an ethics committee.

Data analysis

A confirmatory factor analysis (CFA) was conducted for the NEP Scale using AMOS software. The initial research reporting the development and validation of the NEP Scale for Children (Author) recommended that the factor structure of the scale be tested each time it is used in a new context, in order to verify whether a 1-factor model or a 3-factor model should be used. Significant values of Shapiro–Wilk statistics ($p < .001$) for each of the groups suggest a violation of the assumption of normality. The non-parametric Mann-Whitney U test and the Kruskal-Wallis H test were used to analyse the differences between students' NEP and EMS results with respect to grades and gender. Spearman rank correlation r_s was calculated for exploring correlations between the NEP and the EMS.

Results

In order to test this with the current data, we conducted a CFA for both the 1-factor and 3-factor solutions using AMOS software. The 1-factor model showed a poor fit of the model to the data: Chi^2/df ratio = 2.396, CFI = .692, TLI

= .517, RMSEA = .063. However, the 3-factor model showed a much better fit: χ^2/df ratio = 1.865, CFI = .847, TLI = .700, RMSEA = .050. The three factors are Rights of Nature, Eco-Crisis, and Human Exemptionalism. A Shapiro-Wilk Normality Test was used to assess the normality of the distribution of scores. Table 1 contains response frequencies, mean and standard deviation for all 10 NEP items. The students agreed most (strongly) with the statements “People must still obey the laws of nature” and “Plants and animals have as much right as people to live”. The students disagreed most (strongly) with the statement “People are supposed to rule over the rest of nature”.

Table 1

Frequency distributions of the responses to the New Ecological Paradigm Scale for Children

Scale items	Responses (% of students)					M	SD
	5-Strongly agree	4-Agree	3-Not sure	2-Disagree	1-Strongly disagree		
1. Plants and animals have as much right as people to live.	71.8	23.1	3.9	1.0	.3	4.65	.64
2. There are too many (or almost too many) people on Earth.	7.8	25.6	38.9	16.9	11.0	3.02	1.09
3. People are clever enough to keep from ruining the Earth.	11.1	24.2	26.8	23.9	14.1	2.94	1.22
4. People must still obey the laws of nature.	81.4	14.7	2.6	1.0	.3	4.76	.58
5. When people mess with nature it has bad results.	33.9	29.6	23.4	6.9	6.3	3.78	1.16
6. Nature is strong enough to handle the bad effects of our modern lifestyle.	5.8	12.0	23.7	27.6	30.8	2.34	1.20
7. People are supposed to rule over the rest of nature.	6.2	4.9	13.4	23.9	51.5	1.91	1.18
8. People are treating nature badly.	41.4	29.8	14.4	8.0	6.4	3.93	1.22
9. People will someday know enough about how nature works to be able to control it.	11.1	17.3	28.7	21.2	21.8	2.75	1.28
10. If things don't change, we will have a big disaster in the environment soon.	63.3	22.1	9.7	2.6	2.3	4.42	.93

Next, the scores for each of the three factors – Rights of Nature, Eco-Crisis and Human Exemptionalism – were calculated (see Table 2, Figure 1). Mean scores ranged from 1 (strongly disagree) to 5 (strongly agree). The students showed the highest agreement with items in the factor Rights of Nature and the lowest with Human Exemptionalism.

Table 2

Factor scores for Children's NEP

	<i>M</i>	<i>SD</i>	<i>N</i>
1. Rights of Nature (items 1, 4, 7*)	4.05	.52	309
2. Eco-Crisis (items 2, 5, 8, 10)	3.78	.68	309
3. Human Exemptionalism (items 3, 6, 9)	2.67	.81	309

Note. *Item 7 was a reverse scored.

Figure 1

Boxplots for the 3-factor Children's NEP

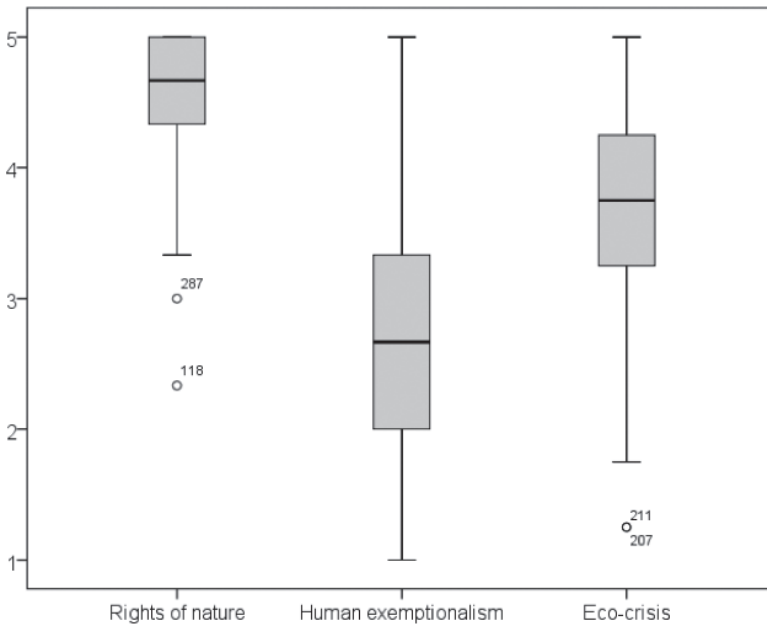
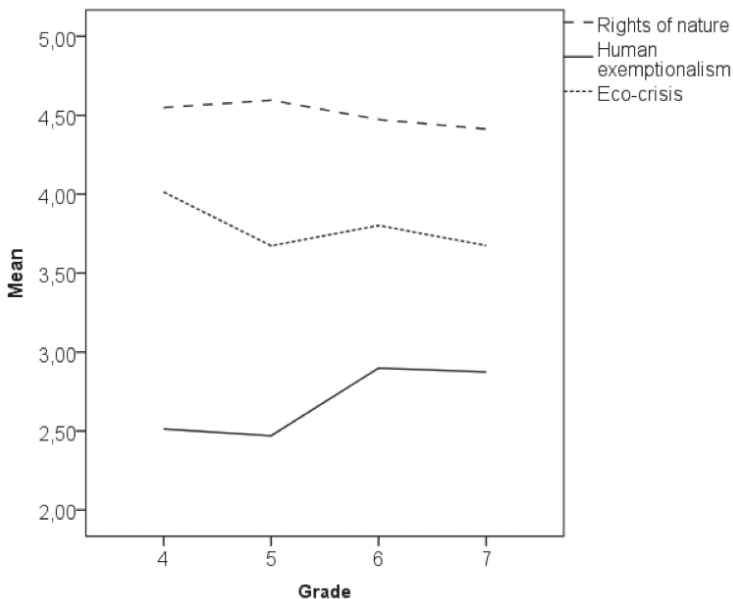


Figure 2 shows the differences in the scores for the three factors: Rights of Nature, Eco-Crisis and Human Exemptionalism. The Kruskal-Wallis H test showed no significant difference from grade 4 to grade 7 in the Rights of Nature

factor ($H(3) = 6.815, p = .078$). There was a statistically significant increase from grade 4 to grade 7 in the Human Exemptionalism factor ($H(3) = 21.836, p < .001$). There was also a significant decrease in the average score from grade 4 to grade 7 in the Eco-Crisis factor ($H(3) = 15.928, p = .001$).

Figure 2

Multiple line graphs for environmental worldviews from grade 4 to grade 7



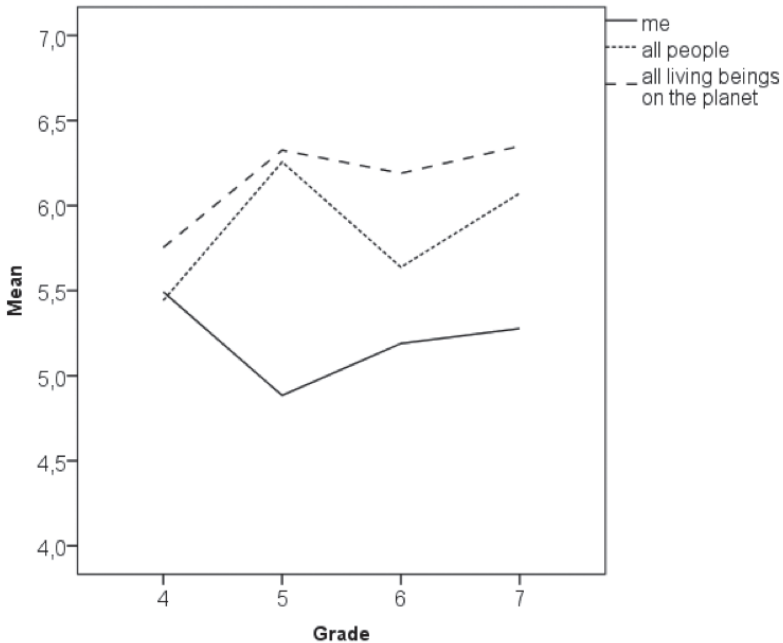
The Mann-Whitney U -test was used to test for gender differences. The difference between male and female students in factor mean scores for Rights of Nature ($U = 10897.0, p = .520$), Eco-Crisis ($U = 10257.5, p = .140$) and Human Exemptionalism ($U = 11053.5, p = .675$) were found to be not statistically significant.

Figure 3 shows the differences in the students' environmental concerns. The results show that they are most concerned for all living beings. The fourth-grade students are equally concerned for themselves and all humans, but, with age, their altruistic concern for the environment increases and their egoistic environmental concern decreases slightly. The Kruskal-Wallis H test showed no significant difference from grade 4 to grade 7 in the students' environmental concern for themselves (egoistic environmental concern) ($H(3) = 2.681, p = .443$) and for all living beings (biospheric environmental concern) ($H(3) = 5.286, p = .152$). There was a statistically significant change in environmental

concern for all of the students (altruistic environmental concern) ($H(3) = 11.957$, $p = .008$) in favour of students in the higher grades.

Figure 3

Multiple line graphs for environmental concerns from grade 4 to grade 7



The Mann–Whitney U -test was used to test for gender differences. The differences between male and female students in egoistic environmental concern ($U = 9725.0$, $p = .576$), altruistic environmental concern ($U = 9728.5$, $p = .698$) and biospheric environmental concern ($U = 9324.0$, $p = .121$) were found to be not statistically significant.

Correlations between the NEP and the EMS are presented in Table 3. The Rights of Nature factor is significantly negatively correlated with Human Exemptionalism, $r_s(308) = -.195$, $p < .001$, and positively correlated with the Eco-Crisis factor, $r_s(308) = .175$, $p = .002$. The Rights of Nature factor is significantly positively correlated with biospheric environmental concern, $r_s(308) = .209$, $p < .001$. The Human Exemptionalism factor is significantly negatively correlated with biospheric environmental concern, $r_s(308) = -.170$, $p = .004$. The Eco-Crisis factor is significantly positively correlated with biospheric environmental concern, $r_s(308) = .120$, $p < .037$. Altruistic environmental concern is significantly positively

correlated with biospheric environmental concern, $r_s(308) = .368, p < .001$. Altruistic environmental concern is also significantly positively correlated with egoistic environmental concern, $r_s(308) = .118, p = .038$.

Table 3

Correlations between environmental worldviews and concerns

		1.	2.	3.	4.	5.	6.
1. Rights of Nature	r_s	1	-.195**	.175**	.029	.019	.209**
2. Human Exemptionalism	r_s	-.195**	1	-.062	.008	-.081	-.170**
3. Eco-Crisis	r_s	.175**	-.062	1	-.024	.043	.120*
4. Egoistic environmental concern	r_s	.029	.008	-.024	1	.118*	.092
5. Altruistic environmental concern	r_s	.019	-.081	.043	.118*	1	.368*
6. Biospheric environmental concern	r_s	.209**	-.170**	.120*	.092	.368**	1

Note. * $p < .05$, ** $p < .001$.

Discussion and Conclusion

The results show that a 3-factor model (Rights of Nature, Eco-Crisis and Human Exemptionalism) is a more suitable structure for use in the Slovenian context than the 1-factor model of the NEP Scale for Children. Manoli et al. (2007) found a good fit for both the uni-dimensional and the three-dimensional models. Some studies in other contexts have confirmed the uni-dimensional model (e.g., Boeve-de Pauw et al., 2011; Collado et al., 2013). In the present study, the students showed the highest agreement with items in the factor Rights of Nature and the lowest with Human Exemptionalism, which is in line with previous studies (e.g., Manoli et al., 2007).

The present research aimed to better understand how environmental worldviews and concerns develop from childhood to adolescence. Årlemalm-Hagsér (2013) argue for the need for a critical discussion about sustainability education for developing environmental awareness as early as in the preschool period. As in some previous studies (e.g., Liefländer & Bogner, 2014), primary school students in the fourth grade showed higher environmental attitudes than students in the seventh grade. There was no significant improvement in their egoistic and biospheric environmental concern with age. However, there was a statistically significant change in altruistic environmental concern in favour of students in higher grades.

The findings show no significant gender difference for environmental worldviews and concerns. Regarding gender effects, Evans et al. (2007) reported that children's environmental attitudes were unrelated to gender. Torkar (2016) reported

that Slovenian female upper secondary school students were more concerned for all people and for the biosphere than male students. Schultz (2000) found that adult women scored higher than men on all three measures of environmental concern. Stern et al. (1993) found that women tend to see environmental quality as having more consequences for personal wellbeing, social welfare and the health of the biosphere. One possible explanation for these differences is the consequences of child socialisation, which become a source of gender differences in concern for the environment with age. Sociological theories of gender emphasise gender differences in the socialisation process and/or social roles and status in society (e.g., Davidson & Freudenburg, 1996; Gilligan, 1982; Xiao & McCright, 2015).

The results show that only biospheric environmental concern correlates with environmental worldviews: positively with Rights of Nature and Eco-Crisis, and negatively with the belief in Human Exemptionalism. This is an unexpected result. In past research (Schultz et al., 2004), all three environmental concerns correlated significantly with the 1-factor model for NEP: egoistic and altruistic negatively, and biospheric positively.

The present research was the first attempt to use the NEP Scale with children in Slovenia, and it provides first-hand information about how the NEP Scale worked for children in the Slovenian context. However, the research includes a very limited sample of students from 9 to 13 years of age, attending four different schools from the west of Slovenia, and could therefore be limited in representing the general population of school children in Slovenia.

As across Europe, Slovenian education policy recommends actions to improve environmental attitudes. The NEP Scale for Children has been used as a tool several times to evaluate the effectiveness of education programmes in different countries (e.g., Johnson & Manoli, 2010; Manoli et al., 2007; Pauw et al., 2011). Johnson and Manoli (2010) stressed that the development of appropriate measures with strong psychometric properties and clear theoretical frameworks is essential for the evaluation and improvement of education programmes, as are investigations of the relationships between environmental attitude and other variables. Despite some criticism of the NEP Scale for Children (e.g., Harrison, 2019; Wu, 2012), the 3-factor model (Rights of Nature, Eco-Crisis and Human Exemptionalism) showed a good fit in the Slovenian context.

Many syllabuses of primary and lower secondary school subjects in Slovenia, such as Science and Home Economics, strive to develop students' environmental worldviews. The NEP tool will enable us to determine expected changes in environmental worldview among Slovenian students participating in formal and informal environmental education programmes. Due to time constraints, the number of items is an important issue. In this respect, the 10-item NEP tool

is very practical for use. The scale is also very practical due to the simplicity of its item wording, and is therefore very useful for assessing students aged 9 to 11, whereas other commonly used instruments for measuring environmental attitudes, such as the 2-MEV scale (Bogner & Wiseman, 2006; Kibbe et al., 2014), are not so suitable. Follow-up research of the same children after completing lower secondary school is planned, allowing investigation of the long-term impact of the education programme on students' environmental worldviews and concerns.

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Appendix

Translation of questionnaire in Slovene

NEP (Nova ekološka paradigma)

Na lestvici **od 1 (zelo se ne strinjam) do 5 (zelo se strinjam)** navedite, koliko se strinjate ali ne strinjate z naslednjimi izjavami:

Izjave	1 = zelo se ne strinjam	2 = ne strinjam se	3 = neodločen	4 = strinjam se	5 = zelo se strinjam
1 Rastline in živali imajo prav toliko pravice živeti kot ljudje.	1	2	3	4	5
2 Preveč (ali skoraj preveč) je že ljudi na Zemlji.	1	2	3	4	5
3 Ljudje smo dovolj pametni da bomo ohranili Zemljo delujočo.	1	2	3	4	5
4 Ljudje moramo še vedno spoštovati zakone narave.	1	2	3	4	5
5 Ko se ljudje vmešavajo v naravo se slabo konča.	1	2	3	4	5
6 Narava je dovolj trdna, da prenese negativne vplive našega modernega načina življenja.	1	2	3	4	5
7 Ljudje naj bi vladali preostali naravi.	1	2	3	4	5
8 Ljudje slabo ravnamo z naravo.	1	2	3	4	5
9 Ljudje bomo nekoč vedeli dovolj o delovanju narave, da jo bomo lahko obvladovali.	1	2	3	4	5
10 Če se stvari ne bodo spremenile, bomo imeli zelo kmalu veliko okoljsko katastrofo.	1	2	3	4	5

Biographical note

GREGOR TORKAR, PhD, is an associate professor at the Department of Biology, Chemistry, and Home Economics at the Faculty of Education of the University of Ljubljana. His research field is biology and environmental education within the primary, secondary and undergraduate level of education. His current research focus is ecology, evolution and conservational education. He is involved in several national and international research projects on science education and nature conservation.

VANJA DEBEVEC, MSc, is a higher nature conservation consultant, employed in Experts Service of Škocjan Caves Park, Slovenia. She believes that interlinkage of nature, culture and man is the essential force of development, necessary for creation of good changes in the society. Her work includes participatory process of local communities, education programmes and public awareness activities in The Karst Biosphere Reserve. She is a coordinator of International Schools Network and Network of Universities of Škocjan Caves Park, Slovenia.

BRUCE JOHNSON, PhD, is professor of environmental learning and dean of the College of Education at University of Arizona, USA. He also serves as director of the University of Arizona Earth Education Research and Evaluation Team and as International Program Coordinator of The Institute for Earth Education. His research includes the teaching and learning of ecological concepts, development of environmental values/attitudes and actions, and curriculum development.

CONSTANTINOS C. MANOLI, PhD, is project director at Mexicayotl Academy in Nogales, Arizona, USA. His research focuses on the relationships between environmental knowledge, attitudes, and behavior and on science education.