



Changes in the environmental attitudes of secondary school students brought about by a project for sustainable development

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Abstract

Developing students' environmental attitude is being given more and more emphasis related to all generations. It was done the changes in secondary school students' environmental attitudes using the big project „Our Environment in the 21st century”. In my study my aim was to find answers to the question what effects the subprojects in the field of the environment have on shaping students' ecologically caring attitudes. There were ten sub-projects within the great project, with an environmental issue in the centre of each, such as air and soil pollution. At the beginning and end of the 12-month project the students were asked to fill in a 36-item questionnaire on attitudes. The questions belonged to one of three groups and twelve blocks. Evaluation of the answers led me to conclude that there were significant differences in several of the experimental blocks compared with the control group. As well as the control groups saw a positive change. Among the three components (emotional, behavioral, environmental) the highest means were measured in emotions, and the lowest in behaviours. Significant difference ($p < 0.05$) was observed in two cases in the experimental group. The data also shed light on the fact that students' long-term development in environmental awareness requires longer developing work.

Keywords: science education, student outcomes, learning strategies, interest in subject

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Environmental Awareness and Environment-Related Behaviour

Teachers who are heavily involved in environmental education have recognized that environmental awareness has become part and parcel of education. Environmental education has a great role in developing students' relationship with nature and their awareness of the environment and in familiarizing them with the concept of sustainability (Dopico & Garcia-Vazquez, 2011; Bonett & Williams, 1998). Results of international and Hungarian surveys suggest that school qualifications are decisive in shaping people's interest in environmental issues. Sensitivity and attention to environmental issues rise with the level of school qualifications (Valkó, 2003).

Finding the causes of the problems is not sufficient. We need environmentally conscious citizens who want to do something to solve these problems and are committed to them (Major, 2012). The most susceptible age for shaping environmental attitudes is school age. Both primary and secondary schools need to take every opportunity to make interested and extremely receptive children learn as much as possible about nature, different types of pollution, and prevention. Thus, the main aim of environmental education is to create a value system where development of environmental awareness, and eco-friendly attitudes, as well as shaping this attitude are decisive (Thiengkamol, 2011; Lükó, 2003). A very important tool of teaching eco-friendly attitude and sustainability is the title of "Eco-school". In order to win this title, the institutions need to teach serious environmental education not only in class but also in the entire institution.

Defining the concept of environmental awareness is a complex task. According to Shrum et al (1995) environmental awareness means caring for the environment, The adjective „green” suggests that a person cares about their environment (air, water), and a green consumer is a person whose consumer behaviour is affected by considerations for the environment.

Kerekes and Kindler (1997) studied environmental awareness from the point of view of consumption and consumption patterns. An eco-friendly consumer is a person who „is really interested in using environmentally-friendly products” (Kerekes & Kindler, 1997: 130). The eco-conscious shopping meets people's needs to a similar degree, with the obvious advantage that the amount of waste can be reduced, thus eco-conscious shopping contributes to lowering environmental burden.

These days more and more eco-friendly products and packaging can be found in shops, however, these are often considerably more expensive than traditional ones. In order to reduce environmental burden and the amount of waste, prices should be made affordable for everyone.

Berényi (2009) defines environmental awareness as a behaviour whereby an individual or an organisation acts in an environmentally responsible way and takes an active part in solving environmental problems. He thinks that, in addition to the issues of the

environment, those of the social and economic environment are also components of the concept of environmental awareness. From the aspect of environmental marketing, environmental awareness manifests itself in different consumer habits (shopping habits).

Environmental awareness is not only instrumental in understanding the causes of environmental damage, it also urges people to act against dangers. It integrates knowledge necessary for the understanding of relations between people and the environment. Kovács (2007) gives the following definition of environmental awareness: „It is a scientific way of thinking which combines the long-term interests in environmental issues that are most appropriate for a society and its members with a clear purpose and a behaviour based on that attitude”. Its practical aim is to create harmonious relationships between man and nature.

The increase in the spread of environmentally conscious attitudes is proved by the increase in the number of eco-conscious consumers in Hungary, too. People are beginning to recognize the importance of saving the environment, and its vulnerability, but in many cases active intention (e.g. buying more expensive environmentally-friendly products rather than cheap products) is still absent.

Domestic and international studies

In 1992, the international The Health of the Planet Survey examined environmental attitudes on the environment measured by surveys of citizens in 24 nations, including Hungary. The Hungarian Gallup Institute repeated the study in 1994 with the title „Zöldülő Magyarország” Környezeti attitűdök 1994 őszén („Greening Hungary; Environmental attitudes in autumn 1994). The results showed that Hungarian people thought that, besides social problems, the issues of the environment were also important. The first international survey authorised by the European Union targeting people’s environmental awareness took place in 1995. The researchers’ main objective was to find out about people’s knowledge about the environment, their worries and involvement. The results revealed that 80% of the population found environmental problems pressing to solve. In 2002 Eurobarometer carried out another study in the EU member states. The study showed an increase in people’s concerns especially in the fields of natural disasters and water pollution (Kovács, 2007).

A body of Hungarian research (Fischer, 1994; Kerekes & Kindler, 1994; Szirmai, 1999; Lányi, 2001; Nagy, 2012; Mayer, 2015) has investigated the characteristics of environmental awareness and environmental sensitivity (Havas, 1995; Havas & Cziboly, 2000), respectively.

In 2005, the Institute of Environmental Science of Corvinus University studied the opinions of Hungarian secondary school students and adults formed of environmental issues. The research found that those who had received education on environmental

issues showed a more positive attitude to the environment. According to the study of the "Waste Working Association" (HuMusz – Hulladék Munkaszövetség), this attitude became stronger among secondary school students and people in higher education. People with higher qualifications showed significantly greater environmental awareness (Kovács, 2007).

When examining changes in individuals' environmental attitudes we also assume that it keeps growing with age. A study performed among secondary school students in Hungary in 2004 showed interesting results: environmental attitudes of students who had received (1 year of) environmental education did not improve, in fact, they became more negative. This might have been caused by the fact that adolescents' social compliance decreases from year to year. Researchers have concluded that social desirability may determine attitudes on the environment (Gulyás & Varga, 2006).

In 2004, the Hungarian Gallup Institute investigated environmental issues on a sample of 1000 adults 18 years old or older and concluded that the majority of the population expect others to come up with solutions but are ready to make some sacrifices. Only a small proportion of the population think that, in addition to their government and local government, they, too, have a role in solving environmental problems (Kovács, 2007).

In his study Széplaki (2004) found that there was no significant difference between the scales of attitudes and knowledge on the one hand and scores of the action and emotional attitude components across eco- versus traditional schools on the other. In other words, students participating in direct environmental education do not possess significantly better attitudes and greater knowledge. This can be explained by the fact that eco-schools do not yet have a tradition in Hungary.

Examination of the older generation and the two sexes revealed (Schäfferné, 2007) that people over 40 focus more on saving energy than do younger people and that women have more pronounced eco-friendly attitudes than men.

Objective of the study

One of the objectives of the great project „Our environment in the 21st century” was to examine the extent to which children's environmentally conscious attitudes developed. The project was executed in the secondary grammar school of Diósgyőr in the academic year 2011-2012. Ten sub-projects were processed in the great project in groups of three people. Each sub-project had some kind of environmental problem as its centre (water pollution, noise pollution, waste, etc.) Students in their 11th and 12th grades worked on these issues on their own. Their teachers helped them with their work a period a week.

During the investigation we sought answers to questions like "How does a project for sustainable development affect the changes of attitudes on the environment?" Our hypothesis claims that the great project "Our environment in the 21st century" has a positive effect on the development of secondary school students' environmental

attitudes. In the course of the study the students acquire a great amount of information about the factors damaging the environment, which changes their attitudes to saving the environment. We also examined how components of environmentally conscious attitudes change.

Several theories have emerged in connection with breaking down attitudes into components. Cialdini, Petty and Cacioppo (1981) stress the „one-factor” evaluative nature of attitudes compared with their three-factor structure advocated by others. Rosenberg and Hovland (1960) claimed that there is a cognitive, an affective as well as a conative component. The cognitive component of attitudes shows the knowledge individuals have about attitude objects and how they judge those objects. The affective component covers individuals’ emotions concerning attitude objects. These emotions can be positive or negative. Emotional values (bad - good, beautiful – ugly, approval – disapproval) provide the motivation for the behaviour concerning attitude objects. The cognitive component provides us with information about how the person under investigation would behave in the presence of the object and not about how they would actually behave (Smith & Mackie, 2004). In my study I also investigated this three-factor division. Finally, I examined the effect of the great project on the changes in attitudes in the various fields.

Sample and methods

The study, including 119 students, was performed between September 2011 and June 2012. Assessment was carried out in two stages: the first at the beginning of the project, and the second, at the end of it. Of the 119 students 30 participated in the great project "Our environment in the 21st century". Figure 1. shows distribution of the responders according to their gender.

Table 1. Distribution of the sexes in the study

Sex	Experimental (N=30)	Control (N=79)
boys	13	44
girls	17	35

Project efficiency was demonstrated using longitudinal measurement, during which I made assessments at the beginning of the project (null hypothesis) and at the end of it, to demonstrate the changes. A survey containing 36 items about age-adjusted attitudes was filled in. The survey was completed in class time at school and the learners were given 45 minutes to fill it in. The 36 items were followed by options represented by numbers from which the students chose the one that best expressed their opinions. Only the study leader stayed in the classroom while the students were completing the survey. The students worked on their own but could turn to the study leader for help. The questions fell into one of three groups: 12 investigated environmentally conscious attitudes, 12 aimed at emotions and the last 12 targeted environmental awareness. The survey was based on Leeming, Dwyer and Bracken’s Environmental Attitude and Knowledge Scale (1995). Besides, the 36 items were also classified into different blocks,

each belonging to a particular topic. In order to avoid predictability of the solutions, the questions of the blocks were mixed not only within the blocks but across them, too.

Table 2. Questions of the 12 blocks

Concept of the environment, protection of the environment	1, 2, 3, 15, 22, 24, 25, 34, 35
Environmentally conscious shopping and consumption	4, 5, 6
Energy management	7, 8, 20, 23
Drinking water. water pollution, water environmental protection	9, 11, 16
Nature protection	10, 12, 13, 21, 33, 35
Air pollution	14
Healthy way of life and environment	14, 19
Waste management, waste processing, eco-toxicology	17, 18
Sustainable development	26, 27, 28, 32
Demography and sustainability	29, 31
Ecological footprint	30
Environmentally conscious architecture and transport	13, 19

The questions needed to be answered based on a five-point Likert scale, which had the following options. In the first 24 items: never; seldom; usually; often; and always. For questions 25 to 36: do not agree at all; mostly do not agree; more or less agree; partly agree; and totally agree. In all 36 items the most environmentally friendly answer was awarded with 5 points while the least environmentally friendly one received 1 point. The attitude scale contained questions where the direction of the wording was reversed and answers „never” and „do not agree at all” were given 5 points.

The three groups of questions (environmentally conscious behaviour, emotions, and environmental awareness) were covered by 12 questions each. The lowest number of points given to any one group of questions was 12 while the highest was 60. The complete attitude scale was obtained from the points awarded to the answers of all 36 questions. Statistical analysis of the data was performed using SPSS 17.0 statistical evaluation programme two-sample T-test, independent T-test.

I calculated the mean scores of the first and the second tests and their difference in the experimental group, and the significance of the difference. This was repeated in the control group, too. Then I calculated the difference of the means of the experimental and control group as well as the difference and the significance of the difference. When there was a significant difference between the scores, the component of the second assessment showed an increase in the difference between the first and second performance, it showed improvement.

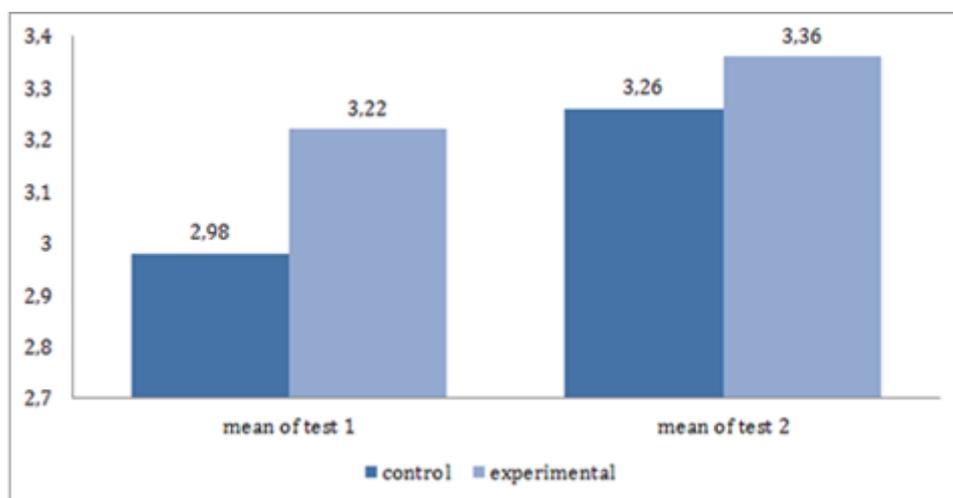
I compared the differences in the scores of the experimental and control groups in terms of the two assessments. If development in the experimental group was significantly better compared with the control group, the programme had obviously exerted a positive effect on development. (If the experimental and control groups both showed development, but the experimental group’s development was significantly weaker than that of the control group, the programme did not bring about any detectable positive change.)

Results

A body of Hungarian (Szalay & Szepesi, 2009; Balázsi et al., 2012; Török & Rausch, 2015) and international research (e.g. Leeming, Dwyer & Bracken, 1995; Rickinson, 2001) has investigated students' environmental attitudes. The examinations revealed that students' environmental attitudes were generally positive.

Comparison of the values gained from the two assessments in the experimental as well as the control group revealed that, in terms of the mean scores, both groups saw a positive change (Figure 3). It is interesting to note, though, that in the control group the change was greater (0,14 (SD 0.56) for the experimental and 0,28 (SD 0.62) for the control group). No significant difference ($p>0.05$) was revealed in the mean scores of the two assessments.

Figure 3. Changes in environmental attitudes in the experimental and control groups



In the next step, I examined the development of the emotional, behavioural and environmental awareness components of environmental attitudes. None of these showed any significant changes ($p>0.05$) brought about by the influence of the project in the experimental group. Earlier studies (Széplaki, 2004) have also pointed out a difference between the emotional and behavioural components, namely that students' emotional attitude was a great deal more significant than their behavioural attitude. Among the three components the highest means were measured in emotions, and the lowest in behaviours (Figure 4). The highest means in the experimental group belonged to emotions (3.67), which means that in the short run the most significant changes can be achieved in the fields of conceptual thinking and emotional development. In order to achieve long-term changes in behaviour longer development work is necessary. Hence we need to make sure that our students are told about the options that could make ecologically responsible behaviour more effective (Jensen & Schnack, 1994).

Figure 4. Changes in the components of emotion, behaviour and environmental awareness within environmental attitudes

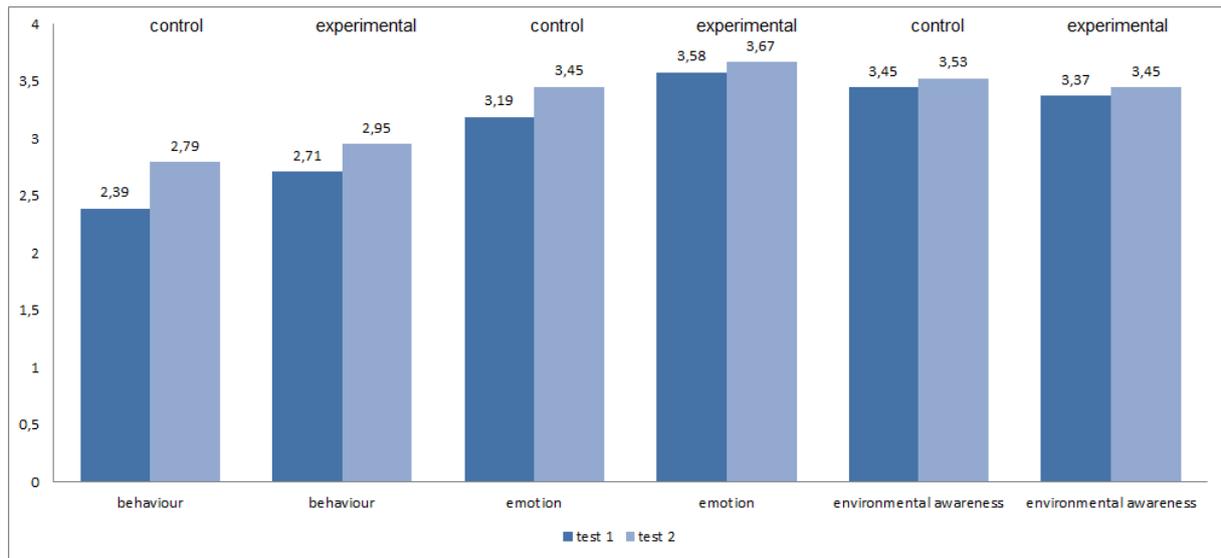
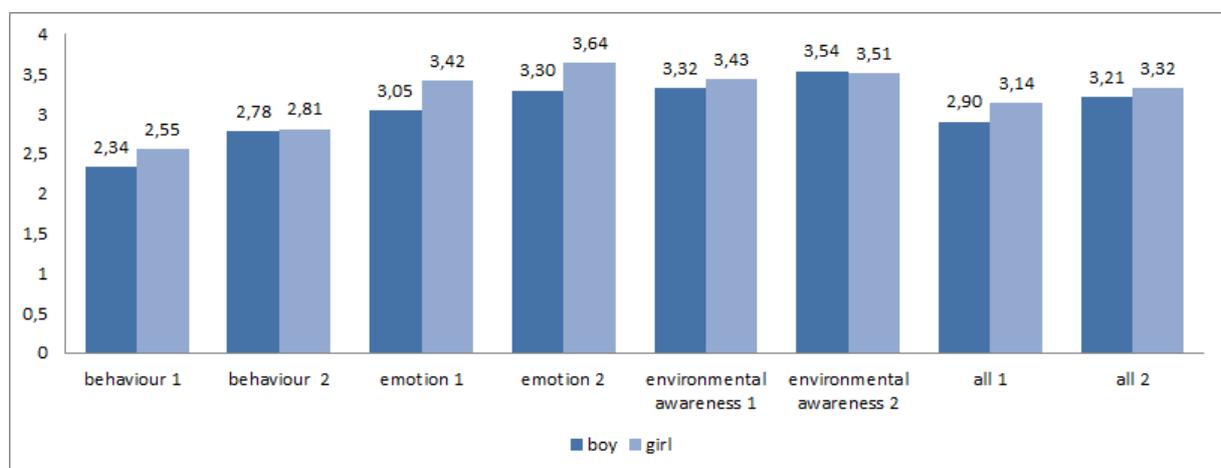


Table 1. Changes in the means of topics and their significance in the experimental and control groups

Block	group	mean of TEST 1 (SD)	mean of TEST 2 (SD)	Difference between the mean of the two TESTS (SD)	Significance of the difference	Difference between and significance of the means of the development between the two groups
Concept of the environment, protection of the environment	experimental	2,90 (0.38)	3,02 (0.44)	-,12 (0.50)	,228	0,14 p>0,05
	control	2,70 (0.44)	2,96 (0.45)	-,26 (0.65)	,002	
Environmentally conscious consumers and consumption	experimental	2,63 (0.70)	3,01 (0.64)	-,38 (0.87)	,031	0,09 p<0,05
	control	2,51 (0.80)	2,80 (0.75)	-,29 (1.05)	,028	
Energy management	experiment	3,65 (0.66)	3,57 (0.63)	,07 (0.96)	,693	0,26 p>0,05
	control	3,40 (0.77)	3,59 (0.68)	-,19 (0.95)	,123	
Drinking water, Water pollution, environmental protection of the water	experiment	3,04 (0.75)	2,96 (1.06)	,07 (1.23)	,756	0,38 p>0,05
	control	2,43 (0.93)	2,80 (0.61)	-,37 (1.18)	,015	
Environmental protection	experimental	2,53 (0.46)	2,76 (0.50)	-,23 (0.72)	,105	0,11 p>0,05
	control	2,57 (0.54)	2,91 (0.49)	-,34 (0.76)	,001	
Air pollution	experimental	3,37 (1.00)	3,22 (1.12)	,15 (1.32)	,565	0,25 p>0,05
	control	2,98 (1.22)	3,08 (1.00)	-,10 (1.48)	,611	
Healthy way of life and environment	experimental	3,33 (0.95)	3,37 (0.70)	-,04 (1.10)	,862	0,03 p>0,05
	control	3,00 (0.95)	3,07 (0.72)	-,07 (1.26)	,653	
Waste management, waste waste disposal, eco-toxicology	experimental	3,72 (1.06)	3,87 (0.83)	-,15 (1.38)	,583	0,66 p>0,05
	control	3,08 (1.09)	3,59 (0.88)	-,51 (1.33)	,004	
Sustainable development	experimental	4,12 (0.49)	4,08 (0.54)	,04 (0.69)	,784	0,22 p>0,05
	control	3,82 (0.73)	4,00 (0.63)	-,18 (1.01)	,168	
Demographics and sustainability	experimental	4,09 (0.68)	4,30 (0.74)	-,20 (0.91)	,256	0,23 p>0,05
	control	3,82 (0.93)	3,85 (0.94)	-,03 (1.17)	,830	
Ecological footprint	experimental	3,85 (1.03)	4,56 (0.97)	-,70 (1.23)	,006	0,19 p<0,05
	control	3,57 (1.21)	4,46 (0.80)	-,89 (1.43)	,000	
Eco-friendly construction	experimental	3,41 (1.18)	3,63 (0.87)	-,22 (1.36)	,404	0,01 p>0,05
	control	3,09 (1.04)	3,30 (0.89)	-,21 (1.39)	,226	

In the experimental group, improvement was observed in the means in eight out of twelve blocks. Significant difference ($p < 0.05$) observed as a consequence of the project was found in two cases in the experimental group: ecological footprint and environmentally conscious shopping and consumption (Table 1). These two fields showed the greatest development during the project. In the fields of air pollution, water pollution, and energy management there was no development over the one year of study. This suggests that more attention should be paid to these topics if we are to develop students' environmental attitudes. In the experimental group positive changes were observed in the means in eight cases whereas in four cases negative changes were observed. In the control group the means showed positive changes in all twelve blocks.

Figure 5. Distribution of means of the components of environmental attitudes by sex in the experimental group



In terms of distribution by gender positive changes were observed in the components of environmental attitudes. Examination of the sexes revealed positive changes in most cases both with boys and with girls. The means showed a decrease only in the item of environmental awareness in the boys' group. This also attests to the success of the project.

In the experimental group the boys and the girls showed significant development in fewer components compared with their counterparts in the control group (Table 2). In the experimental group the boys showed improvement in two components: ecological footprint, eco-friendly construction, while the girls showed improvement in three components: ecologically caring shopping and consumption, ecological footprint and behaviour. In these five topics the experimental group's development was significantly better than the control group's, suggesting the positive effect of the programme. The data distributed by the sexes also reflect well the categories which showed improvement in the overall sample as well. The unity of the overall sample and the values for the sexes confirms the categories that the project had positive effect on.

Table 2. Differences between and significance of the components of attitudes on the environment across girls and boys in the experimental as well as the control groups

Components	boys			girls		
	group	difference between the means of tests 1 and 2	signif. (p)	group	difference between the means of tests 1 and 2	signif. (p)
Concept of the environment, protection of the environment	experimental	-0,05	>0,05	experimental	-0,18	>0,05
	control	-0,33	<0,05	control	-0,11	>0,05
Environmentally conscious consumers and consumption	experimental	-0,45	>0,05	experimental	-0,38	<0,05
	control	-0,43	<0,05	control	-0,03	>0,05
Energy management	experimental	0,18	>0,05	experimental	-0,10	>0,05
	control	-0,18	>0,05	control	-0,15	>0,05
Drinking water, Water pollution, environmental protection of the water	experimental	-0,03	>0,05	experimental	0,07	>0,05
	control	-0,46	<0,05	control	-0,16	>0,05
Environmental protection	experimental	-0,15	>0,05	experimental	-0,29	>0,05
	control	-0,34	<0,05	control	-0,33	<0,05
Air pollution	experimental	-0,29	>0,05	experimental	0,40	>0,05
	control	-0,13	>0,05	control	0,03	>0,05
Healthy way of life and environment	experimental	-0,54	>0,05	experimental	0,27	>0,05
	control	-0,02	>0,05	control	-0,09	>0,05
Waste management, waste disposal, eco-toxicology	experimental	- 0,00	>0,05	experimental	-0,34	>0,05
	control	-0,37	>0,05	control	-0,62	<0,05
Sustainable development	experimental	0,09	>0,05	experimental	-0,02	>0,05
	control	-0,12	>0,05	control	-0,11	>0,05
Demographics and sustainability	experimental	-0,02	>0,05	experimental	-0,37	>0,05
	control	-0,01	>0,05	control	0,05	>0,05
Ecological footprint	experimental	- 0,62	<0,05	experimental	-0,8	<0,005
	control	-1,10	<0,005	control	-0,62	<0,05
Eco-friendly construction	experimental	- 0,63	<0,05	experimental	0,00	>0,05
	control	-0,13	>0,05	control	-0,26	>0,05
Behaviour	experimental	-0,16	>0,05	experimental	-0,34	<0,05
	control	-0,44	<0,005	control	-0,26	>0,05
Emotions	experimental	- 0,23	>0,05	experimental	-0,04	>0,05
	control	-0,25	>0,05	control	-0,22	>0,05
Environmental awareness	experimental	0,05	>0,05	experimental	-0,18	>0,05
	control	-0,22	>0,05	control	-0,08	>0,05
All	experimental	-0,12	>0,05	experimental	-0,18	>0,05
	control	-0,30	<0,05	control	-0,18	>0,05
All components developing as a result of the programme	experimental	2			3	
	control	7			3	

Summary

Based on our examination of the data of the great project „Our environment in the 21st century” we concluded that the 12-month-long work of the students was fruitful. The attitudes of all the secondary grammar school students (both in the experimental and

the control groups) examined showed an overall positive change. Separate examination of the components of environmental attitudes revealed that the students had formed strong emotional attachment to the environment and its problems. In contrast, in the fields of behaviour and environmentally caring consciousness there is room for improvement. Great emphasis needs to be placed on making sure that children are aware of the possibilities through which they can and want to do something to protect their environment (Jensen & Schack, 1994). The data of the various blocks reflect the fact that children do not relate to the various topics on the environment in a uniform manner. Children have a more positive approach to the topics of ecological footprint, eco-friendly shopping and consumption, as well as environmental protection. This may suggest that these fields are easier to develop. In contrast, their attitudes in the topics of air pollution, energy management, drinking water, water pollution, water protection, as well as sustainable development were extremely unfavourable. More work is needed in these topics if we are to develop more appropriate environmental attitudes in students.

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