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Changes Of Students' Environmental Perceptions After The Environmental Science And Biology Courses: VMU Case

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Abstract

Higher education is one of the actors in the whole education system providing platform for access of people from different branches of science, different views and perceptions and creating possibilities for more environmentally friendly and sustainable lifestyles and professional decisions. The aim of the study was to determine and assess the change in students' ecological attitudes and behaviour after two elective courses of Environmental Science and Biology at Vytautas Magnus University (VMU), Lithuania. Based on ecological paradigm and behaviour-related issues, survey results reveal a relatively high environmental consciousness of students and this could explain why they have chosen these particular courses. However, both negative and positive changes took place after the courses. More detailed curriculum analysis and a survey of students' attitudes selecting other courses should be carried out in order to include environmental and sustainability issues in other courses at the University.

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Keywords: Environmental attitudes, higher education, Lithuania

1. Introduction

Education and information provision are considered to be one of the most important tools for seeking sustainable development. The aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of their biological, physical, social, economic, and cultural aspects. Moreover, such education is essential in order to acquire knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems (UNESCO-UNEP, 1978). Under the direction of Agenda 21, the work of the

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UNESCO Educating for Sustainable Development (2005-2014), and the movement to "green universities", the focus of environmental education has broadened to encompass a wider agenda of education for sustainable development (Thomas, 2009).

Special courses or topics on environmental issues are of importance in a curriculum, especially when trying to reach students which are not committed to the environment (Zsóka et al., 2013). As found by Amin et al (2012), after the course of "Environment and health" students' awareness of environmental and health issues has increased. However, students' knowledge of environmental issues does not always turns into corresponding behaviour (Hiller Connell, Kozer 2012). The real causality between environmental knowledge and behaviour is rather difficult to measure. Behaviour might be determined by many other factors, including age (Zsóka et al., 2013), gender, culture, infrastructure, motivation, number of environment related subjects attended (Vicente-Molina et al., 2013), pro-environmental activities and publications (Erdogan et al., 2012), social pressure (Niaura, 2013) etc.

The aim of the study was to assess changes in students' ecological attitudes and behaviour before and after the two elective courses of Environmental Science and Biology at Vytautas Magnus University (VMU), Lithuania. During the first 2 years of studies at the University, each student has to select at least one subject from Biomedical and Physical Sciences subgroup, which provides possibilities for students from faculties of Humanities, Social and Political Sciences, Arts and Informatics to get a broader view on natural sciences. The choice of subjects includes *Biology*, *Environmental Science*, *Astronomy, and Logic for Analytical Reasoning, etc*.

2. Data collection and analysis

Based on revised ecological paradigm (Dunlap et al., 2000) and behaviour-related issues, a questionnaire was completed by students prior to and upon the courses completion which took place during two semesters in 2011–2012. Every semester approximately 150 students attended each course. In total, 806 responses from the students of Environmental Sciences and Biology courses were received. 336 replies before the course and 289 after completion of the course were included into analysis. The number of respondents included into analysis was limited due to incomplete responses. A sample of respondents after the completion of the course covers only those who attended at least some lectures (according to survey results) (Table 1). To evaluate the significance of difference in attitudes and behaviour before the course and after its completion, Wilcoxon Signed Rank was applied. Some other factors such as gender and income as well as faculty, study program were also taken into consideration. To check the influence of possible factors, χ^2 test was used.

Table 1. Profile of the respondents

Variable	Before semester	After semester
Gender		
Female	241 (71.7%)	210 (72.7%)
Male	95 (28.3%)	79 (27.3%)
Income per family member		
Up to 399 LTL	89 (26.5%)	99 (34.3%)
400 -799 LTL	123 (36.6%)	87 (30.1%)
800 – 1299 LTL	88 (26.2%)	69 (23.9%)
1300 and more LTL	36 (10.7%)	34 (11.8%)
Attendance of Science World course		
Yes	150 (44.6%)	235 (81.3%)
No	186 (55.4%)	54 (18.7%)
Attendance of lectures particular course		Not included
up to 25%		101 (34.9%)
26-50%		104 (36%)
51-75%		84 (29.1%)
more than 75%		
Subject		

Environmental Sciences	187 (55.7%)	203 (70.2%)
Biology	48 (44.3%)	86 (29.8%)

It should be noted that the study has several limitations. First, not all possible respondents took part in the survey, as not all students were attending the first lectures at the beginning of the semester. In addition, not all of them were willing to take part and fill in the questionnaire. Secondly, it was rather complicated to manage and have purely the same survey sample after the courses.

3. Results and discussion

3.1. NEP changes after completion of the courses

It is generally believed that integration of sustainability issues into university courses successfully increases students' knowledge about the environment. However, as it was noted in literature review earlier, even though students acquire more knowledge, there may not be a significant change in their attitudes. As survey results reveal, knowledge does not necessarily make an impact on students' attitudes. Moreover, even if it does, the impact is not always positive and ecological attitudes prior the courses can turn into less positive after the course completion. To illustrate, prior to taking the Environmental Science and Biology courses, 83,2% of students expressed their total agreement and agreement with the statement that *Humans are severely abusing the environment*, while this number decreased after the course and amounted to 79,6% ($Z= -10,47$, $p<0,05$) (Table 2). Similar observations were made when considering the statements *Plants and animals have as much right as humans to exist* (before the course 78,7%, after the course 76,3%; $Z= -2,16$ $p<0,05$) and *Despite our special abilities humans are still subject to the laws of nature* (79,1% and 76,8%; $Z= -2,14$, $p<0,05$). The statement stating that *The balance of nature is strong enough to cope with the impacts of modern industrial nations* is distinguished for receiving the most controversial results, for there were 17,7% of the respondents who agreed with it before the courses, and this number increased remarkably after the courses (29%; $Z= -4,64$ $p<0,05$). Therefore, respondents' attitudes have become more negative than they used to be before selecting the courses from Biomedical and Physical Sciences subgroup. This shift in attitudes can be explained by the following: having received environmental knowledge, students assessed their prior attitudes and assumptions about the environment more critically. That is, their concern about the environment prior to course selection was inadequate and only after the course they began to understand the relationship between the human and the nature better.

Nevertheless, more favourable and statistically significant changes in respondents' attitudes occur in the statement *The earth has plenty of natural resources if we just learn how to develop them* (before the course 65,4%, after the course 54,2%; $Z= -2,99$ $p<0,05$). It was also found that having completed the course of Environmental Science, the number of students who totally agreed and agreed with the statement that *When humans interfere with nature it often produces disastrous consequences* have increased from 63.2% to 71.6% (however, difference of distributions was not significant $Z= -1.29$, $p>0.05$). In comparison, the number of Biology course students who totally agreed and agreed with the same statement have decreased from 76% to 62.4% ($Z= -0.553$, $p>0.01$).

Table 2. Distribution of answers

NEP item	**Before**					**After**					
	TA*	A	PA	D	TD	TA	A	PA	D	TD	**Z****
We are approaching the limit of the number of people the earth can support	21.6 %	27.8 %	32.6 %	13.2 %	4.8 %	29.1 %	21.8 %	30.1 %	10.7 %	8.3 %	-0.194
Humans have the right to modify the natural environment to suit their	10.5 %	13.2 %	35.0 %	27.2 %	14.1 %	6.6 %	16.0 %	39.2 %	25.3 %	12.8 %	-0.489

needs											
When humans interfere with nature it often produces disastrous consequences	38.3 %	30.7 %	22.6 %	5.7 %	2.7 %	39.4 %	29.8 %	20.8 %	4.2 %	5.9 %	-0.467
Human ingenuity will insure that we do NOT make the earth unlivable	8.7 %	18.9 %	39.8 %	24.6 %	8.1 %	5.9 %	19.4 %	44.4 %	25.0 %	5.2 %	-0.721
Humans are severely abusing the environment	48.5 %	34.7 %	9.9 %	3.0 %	3.9 %	42.9 %	36.7 %	11.8 %	4.8 %	3.8 %	**-10.466**
The earth has plenty of natural resources if we just learn how to develop them	30.9 %	34.5 %	23.7 %	7.8 %	3.0 %	22.6 %	31.6 %	30.6 %	11.1 %	4.2 %	**-2.989**
Plants and animals have as much right as humans to exist	58.3 %	20.4 %	15.3 %	3.3 %	2.7 %	51.9 %	24.4 %	13.2 %	4.5 %	5.9 %	**-2.160**
The balance of nature is strong enough to cope with the impacts of modern industrial nations	4.8 %	12.9 %	29.9 %	38.3 %	14.1 %	10.0 %	19.0 %	34.9 %	28.0 %	8.0 %	**-4.640**
Despite our special abilities humans are still subject to the laws of nature	46.6 %	32.5 %	13.4 %	3.3 %	4.2 %	46.9 %	29.9 %	15.6 %	3.8 %	3.8 %	**-2,139**
The so-called “ecological crisis” facing humankind has been greatly exaggerated	3.6 %	9.3 %	26.6 %	43.9 %	16.7 %	4.5 %	11.1 %	21.5 %	43.8 %	19.1 %	-0.294
The earth is like a spaceship with very limited room and resources	14.6 %	36.4 %	31.6 %	14.3 %	3.0 %	17.6 %	35.3 %	32.9 %	9.3 %	4.8 %	-0,391
Humans were meant to rule over the rest of nature	5.1 %	6.9 %	24.8 %	37.6 %	25.7 %	5.9 %	10.7 %	24.6 %	33.6 %	25.3 %	-1.399
The balance of nature is very delicate and easily upset	33.9 %	34.8 %	22.8 %	6.6 %	1.8 %	29.0 %	39.9 %	22.4 %	5.2 %	3.5 %	-1.272
Humans will eventually learn enough about how nature works to be able to control it	5.7 %	18.0 %	44.6 %	23.1 %	8.7 %	3.5 %	23.2 %	46.4 %	20.8 %	6.2 %	-1.232
If things continue on their present course, we will soon experience a major ecological catastrophe	27.4 %	32.8 %	31.0 %	5.4 %	3.3 %	31.6 %	31.3 %	27.1 %	8.3 %	1.7 %	-1.147

*bold values are significant at p<0.05
**TA – totally agreed, A – agreed, PA – partly agreed, D – disagreed, TD – totally disagreed

3.2. Some behavioural changes and factors behind

It should be admitted that independent of differences in course curriculum, respondents of both Environmental Science and Biology began to buy ecological goods and services on a more regular basis: before taking the courses 24.5% indicated always or often buying eco-products, after the courses this number amounted to 29.3% (Z=- 0.479, p<0.05). Female students were more keen on buying eco-products (Table 3). Before and after the courses, respondents expressed high personal responsibility for the environment, respectively 77.9% and 76.3%. In both cases, before and after the courses, gender significantly influenced the perception of the relationship between personal behaviour and environmental quality. Those who attended Environmental Science course also indicated higher personal responsibility for the environment (Table 3).

Table 3. Possible factors

Question/statement	Variable	Before semester χ^2	After semester χ^2
Responsibility for environment lies on every person individually	Gender	**9.002, p<0.05***	**18.698, p<0.05**
	Income per family member	3.311, p>0.05	6.002, p>0.05
	Attendance of Science World	0.576, p>0.05	2.165, p>0.05
	Attendance of lectures of particular course	-	0.914, p>0.05
	Course	1.305, p>0.05	**5.168, p<0.05**
Buying eco-products			
	Gender	**21.669, p<0.05**	**7.755, p<0.05**
	Income per family member	12.992, p>0.05	1.682, p>0.05
	Attendance of Science World	1.081, p>0.05	1.948, p>0.05
	Attendance of lectures of particular course	-	8.222, p>0.05
	Course	7.088, p<0.1**	2.805, p>0.05

*bold values significant at p<0.05; ** marked values significant at p<0.1

4. Conclusions

In general, study reveals a relatively high environmental consciousness of the students and this could explain their decision to enrol in these courses. Although minor corrections (in most cases ranging up to 5%) in respondents' attitudes towards the environment have occurred and some negative changes took place, their environmental behaviour expressed by purchasing organic products have increased. Nevertheless, a more detailed curriculum analysis and a survey of students' attitudes choosing other courses should be done in order to reveal persisting environmental attitudes of the students. This could also help to incorporate environmental and sustainability issues into other courses at the University, as knowledge and information might not reach those students who are not so interested in environmental issues and choose to attend other courses instead.

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