Raising environmental awareness through education

Dzineta Dimante*

University of Latvia, Aspazijas Blvd. 5,
Room 522, Riga LV1050, Latvia
Email: dzineta.dimante@lu.lv
*Corresponding author

Tatjana Tambovceva

Riga Technical University, Mezha Str. 1/7,
Room 401, Riga LV1048, Latvia
Email: tatjana.tambovceva@rtu.lv

Dzintra Atstaja

BA School of Business and Finance,
Kr. Valdemara Str. 161, Riga LV 1013, Latvia
Email: dzintra.atstaja@gmail.com

Abstract: This paper presents a method for involving learners in awareness-raising and real changes in consumption. The described method is a teaching assignment comprising a self-audit of household chemicals' consumption, system thinking to find the main causes and consequences, finding solutions and taking action. Findings about students' household chemicals consumption patterns and their reactions one month and six months after the assignment are presented and analysed. We found that the students' households use considerable amounts of chemicals and in most cases do not pay attention to their health and environmental impacts when making purchasing decisions. When doing this, students were able to find good alternatives to reduce the environmental impact of their household maintenance and have changed their behaviour six months after the assignment.

Keywords: consumer behaviour; education for sustainable development; environmental awareness; ESD; household chemicals; self-audit; sustainable consumption; system thinking; teaching methods.

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Biographical notes: Dzineta Dimante is an Associate Professor at the Faculty of Economics and Management University of Latvia. Her main research areas are sustainable development, socially responsible entrepreneurship and ecosystem services valuation. She is an expert at Latvian Council of Science and Vice-Dean for Research in the Faculty of Economics and Management and has participated in organising several international and local conferences. She was awarded her Doctorate in Economics at the University of Latvia in 2007.

She is a member of Green Economics Institute, Latvian Econometricians Association and CSR Latvia.

Tatjana Tambovceva is an Associate Professor of the Faculty of Engineering Economics and Management at Riga Technical University, Latvia. Her research interests focus on environmental management and sustainable development; corporate social and environmental responsibility; green production and consumption; change of consumer behaviour; sustainable building, real estate management, project management and use of computers in many areas. She has more than 80 scientific and other publications. She has participated with presentations in more than 40 scientific and practical conferences. She is a member and expert in a number of international Societies, Councils and Foundations.

Dzintra Atstaja is a Professor at the Department of Entrepreneurship and IT in BA School of Business and Finance (Latvia), Doctor of Economics (Management Science Entrepreneurship Management). She specialises in economics and sustainable development; has expert rights at the Latvian Council of Science; more than 20 years experience in business consulting; more than 60 publications, which have been included in Thomson Reuters, EBSCO, Scopus, ISI Web of Science, AGRIS, the Library of Congress etc., a compiler or a co-author of some books.

1 Introduction

Education and raising awareness is one of the key elements in reducing the environmental impact of an ever increasing population. This paper presents a pedagogic approach, which contributes to the issue of sustainable consumption. Scientific literature concerning sustainable consumption mainly focuses on household choices regarding energy, transport, food consumption as well as waste recycling. This corresponds to OECD (2008), which identified five key areas of environmental policy: waste generation and recycling, personal transport choices, residential energy use, food consumption and domestic water use. A summary of 55 research papers which are devoted to sustainable consumption studies reveals that scholars mainly analyse household energy consumption, food, housing and transportation (Caeiro, Ramos and Huisingh, 2012). Household chemicals, such as those providing hygiene for the human body, washing, cleaning and laundry are not a well-researched consumption cluster yet. We considered this cluster as important especially in the Baltic Sea region because of the vulnerability of the Baltic Sea. Eutrophication, which is the result of nutrient enrichment mainly from agriculture and wastewaters, is perhaps the greatest threat to the Baltic Sea environment (HELCOM, 2009). Besides the implementation of EU Directives and international agreements such as the Helsinki convention, some contributions can also be made by individuals choosing substances less harmful to the environment.

The aim of this paper is to describe case study results of a teaching assignment, which involves systems thinking and real action by students in their consumer choices regarding household chemicals. The tasks for the paper were to study literature to discover the various teaching and learning methods which encourage students not only to learn theoretical issues, but to apply this knowledge in their everyday life and assess the results of such an exercise in consumer behaviour; to analyse students' reactions and obtain

results during the different stages of the assignment; to assess the impact of the assignment on students' consumption behaviour; to suggest improvements for an extension of the method.

The basic definition of sustainable consumption includes the main principles of sustainable development - "the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life-cycle, so as not to jeopardise the needs of future generations" (OECD, 2002). Sustainable consumption is a dynamic concept that can evolve as new information is available and society's long-term preferences are established (OECD, 2002). Our strong confidence is that with technology advancements alone it is not possible to considerably reduce the environmental impact of consumption because of the rebound effect. Technological solutions constraints have also been acknowledged by other authors (Briceno and Stagl, 2006; Cruz, Stahel and Max-Neef, 2009; Mont and Plepys, 2008). Social limitations also require change in consumption systems to integrate social responsibilities and promote more sustainable consumption (Briceno and Stagl, 2006). Also, consumption has social effects which consumers cannot always assess because of a lack of information. For example, by choosing local products, consumers contribute positively to local employment and reduce impacts created by long-distance transportation of products. Choosing eco-labelled detergents, which have been transported thousands of miles, can have more harmful effects than local products without an eco-label.

We used this teaching assignment and survey about household chemicals in three higher education establishments in Latvia. Economies in transition are an especially interesting case because people are often practising pro-environmental behaviour as the result of economic limitations, but do not always value it and in future would be willing to increase their consumption to follow the lifestyle of the people of industrialised countries (Brizga, Mishchuk and Golubovska-Onisimova, 2014). Regarding household chemicals use in students' households, we observed that price sensitivity is a very important obstacle when choosing environmentally friendlier products, but we cannot assess the differences in amounts consumed as there is no available data about household chemicals consumption amounts in literature. Even if some consumers are forced to consume less as a result of the economic difficulties, it does not necessarily follow that this will turn into a longer term restraint on consumption (Evans, 2011). Therefore, much attention should be devoted to information dissemination and raising environmental awareness.

One of the main aims for this assignment was that students agree to use household chemicals less and more carefully. From a psychological aspect, it should be easier to accept voluntary simplicity while people are not used to a wasteful material lifestyle. Also, different household chemicals have not only external effects on the environment but also often direct health impacts in the form of respiratory and skin problems. Therefore, reducing chemical consumption and following usage instructions can provide both direct and indirect benefits.

Literature studies show that governments mainly use administrative and economic instruments to affect producers (Mont and Plepys, 2008; Zaccai, 2012) but at the same time it is also important to influence also consumers "who make the final choice of the goods and services they consume, and their lifestyles determine how they influence sustainability practices" (Caeiro, Ramos and Huisingh, 2012). Consumers influence the environmental impacts by choosing the product and also by changing their consumption

habits. Consumers can save money and simultaneously reduce the impact on the environment using the correct amounts of the different chemicals they use. This requires sufficient consumer education and effective means to actually change consumption habits (Järvi and Paloviita, 2007). Students, being future entrepreneurs and managers as well as purchase decision-makers in their families, are an appropriate target group for such awareness-raising.

Universities all over the world play a major role in the development and dissemination of ideas on education for sustainable development (ESD). Universities that strive to improve the quality of their educational programmes must embrace the fundamental ideas of ESD and put them into practice. Hopkins, McKeown and van Ginkel (2005) state that universities "are called on to teach not only the skills required to advance successfully in a globalised world but also to nourish in their students, faculty and staff a positive attitude towards environmental issues and cultural diversity". We strongly agree with the viewpoint that ESD is a cross-disciplinary issue and should be incorporated in various subjects at all levels of education (Brundiers, Wiek and Redman, 2010; Krizek et al., 2012; Tambovceva, 2012). It is extensively discussed in the researched literature that ESD involves not only changes in the curriculum content but also the application of new pedagogical methods (Dieleman and Huisingh, 2006; Jones, Trier and Richards, 2008). In this paper, we discuss pedagogical methods in higher education institutions which we suggest using in ESD. In our academic work at three different universities of Latvia and various study courses, we have devoted a lot of attention to implementing teaching and learning methods recommended for ESD, such as problem-based learning, systems thinking, making decisions in a collaborative way and active learning (MacVaugh and Norton, 2012; Steiner and Posch, 2006). By introducing tasks which involve students' real-life choices for their families and friends, we try to introduce an open-minded, reflexive and participative process and examine students' potential for a sustainable future. This paper fills the gap of "the conceptual and empirical knowledge about approaches specifically dedicated to the cause of promoting sustainable consumption among students" as suggested by Adomßent et al. (2014). Authors in previous researches investigated the topic of sustainable consumption and analysed the environmental and positive impacts of consumption and production systems in the Baltic Sea region (Brizga, Atstāja and Dimante, 2011) and in countries in transition (Brizga, Mishchuk and Golubovska-Onisimova, 2013). In this paper, we discuss a teaching assignment with the stress not only on learning but mainly on real action.

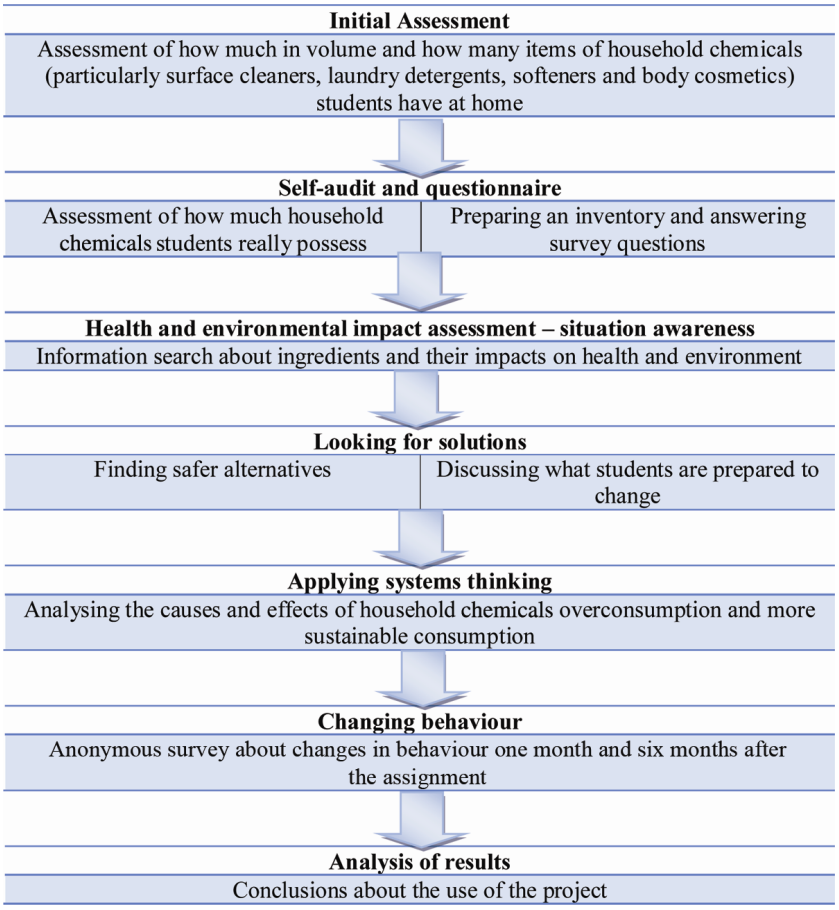
2 Methodology - case study of pedagogical method for awareness-raising

The current research involved testing and analysing the teaching method in the context of ESD. The method used was a teaching assignment for undergraduate students to perform a self-audit of consumption of various household chemicals, such as hygiene products for the human body, washing, cleaning and laundry detergents and self-reflection how sustainable a student's household consumption actually is. Self-audit and self-reflection are recognised as effective learning tools in an ESD context (Savageau, 2013; Boud, 2001) The targets for the assignment were to raise awareness of harmful impacts caused by the overconsumption of different chemicals, to analyse solutions for reducing the environmental impact and to facilitate a commitment to make real changes in consumption behaviour. Students involved in the project represented three higher

education establishments in Latvia - The University of Latvia study programmes 'Management' and 'Environmental Science'; the BA School of Business and Finance study programmes 'Business Administration', 'Finance', 'Risk Management and Insurance' and 'Innovation and Product Development in Business'; and Riga Technical University study programmes 'Entrepreneurship and Management', 'Innovations and Entrepreneurship', 'Economics', 'Total Quality Management' and 'Real Estate Management'. This provided the possibility to compare students' responses from different study fields and educational backgrounds. The method in different variations has been applied since the academic year 2011–2012.

The main objectives of this teaching assignment are to improve students' understanding about the vast range and amount of different chemicals they are exposed to in their everyday lives; to learn about the possible harmful effects of some ingredients which are not dangerous in small quantities but can have negative effects on human health, both directly and indirectly; to find solutions and reconsider students' priorities. The methodological framework of the assignment is displayed in Figure 1.

Figure 1 Methodology framework (see online version for colours)



Source: developed by the authors

The study had multilayer results - it provided an insight about household chemicals consumption patterns in Latvian households with students, it revealed a lack of interest about the composition and impacts of those products and it showed that often habits have more power than knowledge and awareness. We also observed that to some degree we have achieved certain changes in students' consumption habits.

3 Main findings about consumption of household chemicals

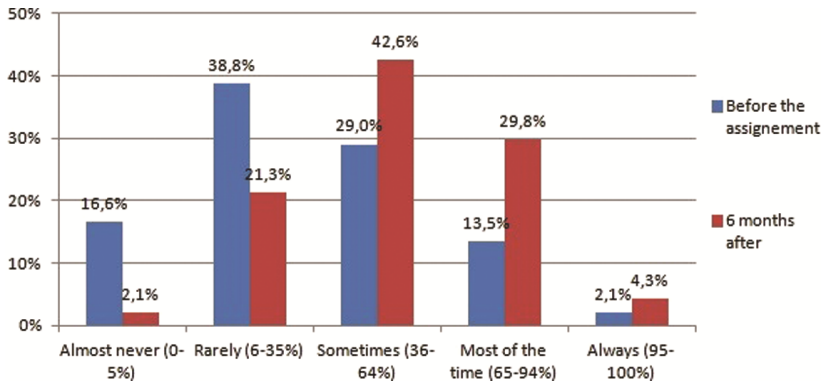
The initial assessment of the household chemical products in students' households revealed that there are, on average, 2.7 litres (3.5 items) of surface cleaners, 2.0 litres (1.8 items) of laundry detergents and 5.8 litres (25.5 items) of body cosmetics per person in the household. The results of the initial assessment and the self-audit differ considerably for the various product groups. The most precise assessment was for laundry detergents - the actual amount is only 5% more than the estimate. Students possessed approximately 28% more surface cleaners than they estimated. The difference in the amount of body cosmetics was amazing - students overestimated the volume of their cosmetics by 60%. Remarkable consumption differences can be observed between households of business and economics students and environmental science students - the latter use on average 4.8 times less household chemicals. This can be explained by the fact that people who choose to study environmental science come from families who value the environment and are conscious about consumption which causes environmental problems. Business and economics studies choose people who are going to be entrepreneurs or managers and they could pay more attention to appearance and value the first impressions they leave on others.

The students also participated in a survey, which required them to think of the main criteria when making purchase decisions and their willingness to pay for environmentally less harmful products. Their attitude was tested by the question "When you purchase household chemical products, do you pay attention to how environmentally friendly or harmful they are?" The same question was asked six months after the assignment and the differences can be seen in Figure 2.

We explained the frequencies of 'Almost never' as 0–5%, 'Rarely' as 6–35%, 'Sometimes' as 36–64% and 'Always' as 95–100% of cases. The survey results show an alarming tendency that more than 55% of households did not pay much attention to the environmental impact of the content and packaging of their household chemicals before the assignment.

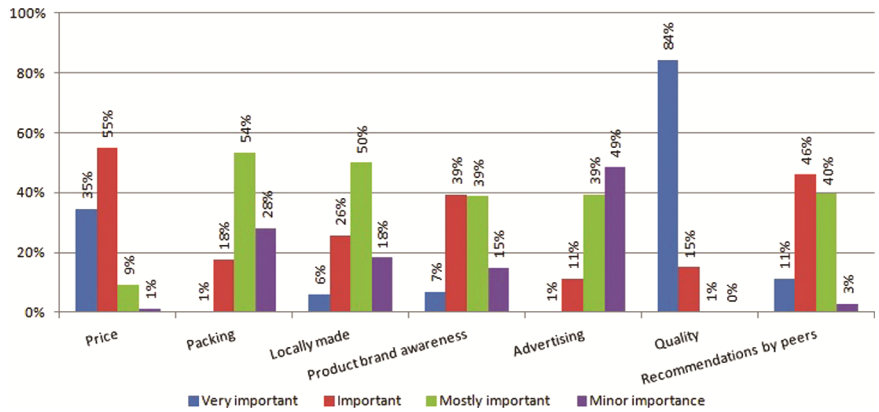
What then influences consumer choices regarding household chemicals? It appears that product quality and price are the main determinants of the choice (see Figure 3). As the previous question regarding the products' impact on environment shows that for many consumers this is not a main concern, we conclude that quality is mainly associated with the performance of products for a particular purpose - cleaning, conditioning etc. and not with their impacts on health or environment. Interestingly, some students responded that advertising was not important when choosing the products. Also, one of the most frequently mentioned causes of household chemical product overconsumption was advertising and special offers.

Figure 2 Distribution of answers for the question "When you purchase household chemical products, do you pay attention to how environmentally friendly or harmful they are?" before the assignment and six months after (see online version for colours)



Source: questionnaire (number of respondents 560 before the assignment and 47 six months after)

Figure 3 Frequency of responses for the main factors influencing household chemical products purchase decision (see online version for colours)



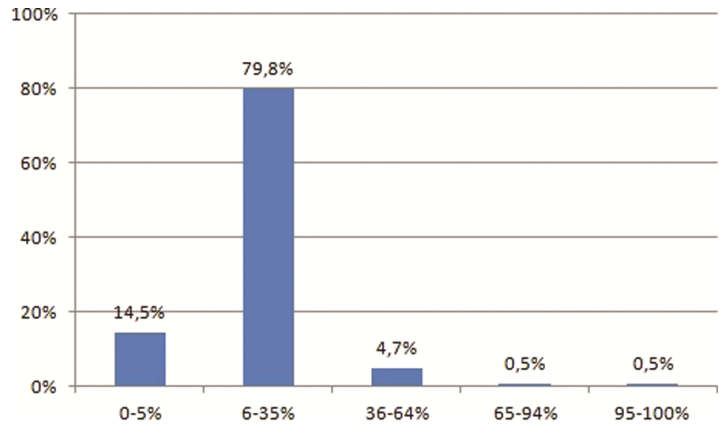
Source: questionnaire (number of respondents 560)

Discussions in groups about the composition of products and their potential health and environmental impacts revealed that students had some previous knowledge about the issue before the assignment. Students analysed the most harmful ingredients which are often used in small concentrations in different products. Usually these ingredients are not dangerous in small quantities but can cause health problems when used in large amount within different chemical products or indirectly by concentrating and polluting rivers, sea or air. Understanding the considerable amounts of different products at their and their peers' homes helped to embrace the scale of the problem.

The students were asked to find out environmentally safer alternatives, like natural cleaners, eco-labelled products, microfibre cloth, refusal to use some of the products, etc. Eco-labelled goods were stated as one of the most suitable alternatives, but they are

usually considerably more expensive. Therefore, students were asked "What percent more would you be willing to pay for the product if it had less impact on the environment?" Figure 4 demonstrates that a significant majority of respondents were willing to pay 6–35% more for environmentally friendlier products.

Figure 4 Distribution of answers for the question "What percent more would you be willing to pay for the product if it had less impact on the environment?" (see online version for colours)



Source: questionnaire (number of respondents 560)

Following this, students were then asked to apply systems thinking to analyse the reasons why manufacturers use and consumers buy products with harmful ingredients even if they are aware of possible impacts. Students drew cause and effect diagrams for their chosen product or ingredient. Lower costs, low purchasing power, society pressure, the cult of beauty, habits, stressful lifestyles, lack of interest to read labels and follow the usage instructions, disbelief in connection between the use of chemicals and health problems, advertising, education level, long-term impacts which are not obvious and the decreasing size of households were stated as the main causes for harmful product consumption. Human and ecosystem health impacts, water pollution, indoor air pollution, eutrophication and packaging waste were stated as the main effects from household chemicals in general.

Finally, students had to discuss which products they were ready to give up and to find out which environmentally safer alternatives they could use if they were not ready to give up. Students also discussed how to change consumer behaviour and what actions to take in real life - reduce consumption of harmful chemical products. As the main obstacles for changing the behaviour mentioned were parents' habits, low-income level, the opinion that producers should be controlled more strictly and consumers may not be responsible for the pollution created, disbelief that individuals can make any difference on the global scale. At an individual level, the main driver for changing the behaviour would be health problems in the family.

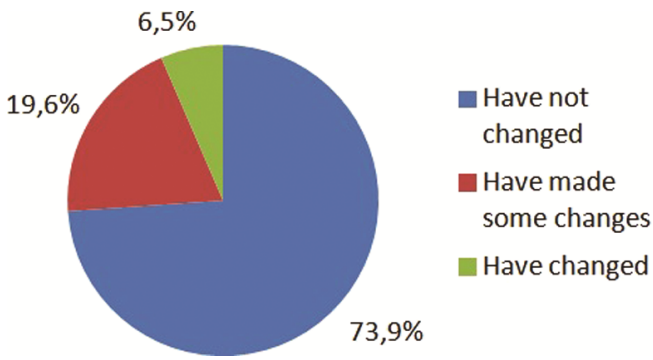
During students' group discussion, the issue of producer and consumer responsibility was argued extensively. Producers, of course, must be responsible, but without environmentally and socially conscious consumption, the severe pollution problem cannot be resolved. Also, literature studies show that sustainable consumption requires

not only a choice of environmentally friendly products but also reduced consumption (Banbury, Stinerock and Subrahmanyan, 2012; Jackson, 2009; Lorek and Fuchs, 2013; Spangenberg and Lorek, 2002). Therefore, we posed questions and stimulated discussions regarding the products which people would be ready to give up or use in reduced quantities.

4 Results

This assignment was designed not only to teach about the impacts of household chemicals but also to bring about change in students' and their families' consumption patterns. Approximately a month after the household chemicals assignment, the students gave anonymous feedback about what had changed in their consumption. The responses showed that as many as 74% had not changed their consumption. However, 23% responded that they had already been conscious about health and environmental impacts before and chose their products considering these impacts. This was not really confirmed by the inventory questionnaire results. Obviously, students overestimated their conscious consumption. Even so, around 20% responded that they had changed their habits to some extent and almost 7% confirmed that the study course assignment had made them change their habits regarding the use of household chemicals as shown in Figure 5.

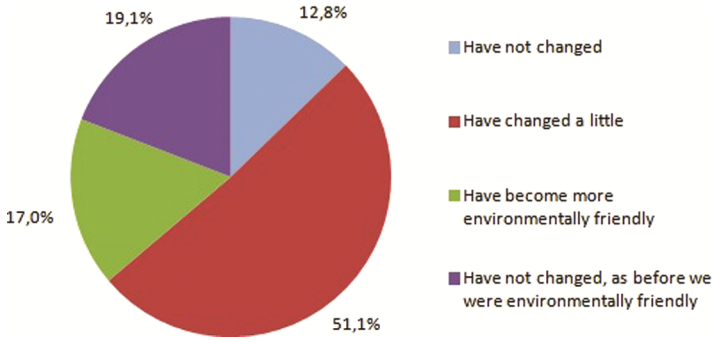
Figure 5 Distribution of answers for the question "Have you changed your consumption of household chemical products?" one month after the seminar (see online version for colours)



Source: survey a month after the project (number of respondents 230)

It is highly probable that if students had not bought any alternative product, they considered that nothing had changed. When we repeated the survey approximately six months after the assignment, the response rate was very low, we received 47 questionnaires, but they showed considerably better results (see Figure 6). Only less than 13% responded that they had not changed their consumption of household chemicals. Approximately half of respondents had changed a little and 17% have become more environmentally friendly. This survey may be too optimistic as the response rate was very low and most probably those who had changed their consumption patterns were more willing to complete the survey.

Figure 6 Distribution of answers for the question "Have you changed your consumption of household chemical products?" six month after the seminar (see online version for colours)



Source: survey six months after the project (number of respondents 47)

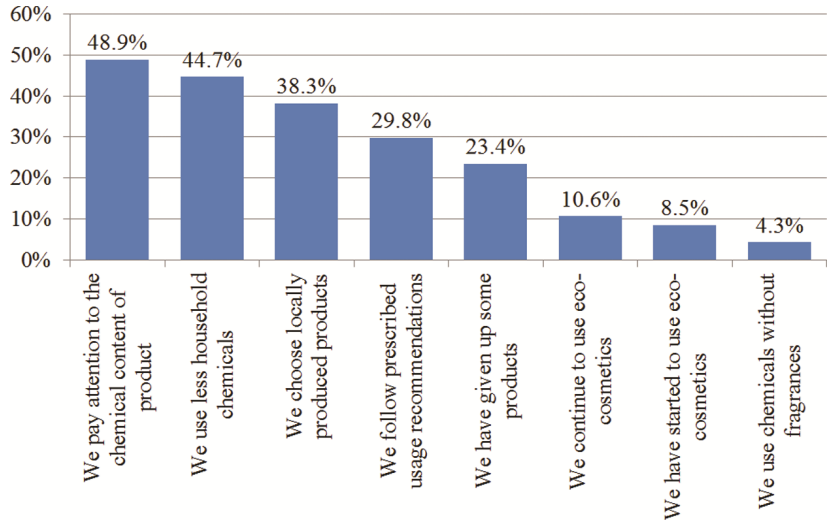
In fact, even those who responded that they had not changed their consumer behaviour in their feedback one month after seminar mentioned several particular changes. In an open ended question as main changes they stated switching to eco-cosmetics, using the prescribed amounts of cleaning materials and laundry detergents more accurately, using microfibre cloths, paying more attention to product labels and avoiding the most harmful ingredients. Less frequently mentioned changes were buying products without artificial colourants and perfumes, preparing facial masks at home, rinsing not so greasy dishes without washing-up liquids, using soap instead of shower gel, etc. Sixteen per cent of students responded that, besides themselves, their friends and families had also been involved in reconsidering how many different household chemical products they really need and what they should change. They also admitted that one month was too short a time to change their habits, but when the existing products were used up, they would most probably choose safer alternatives. Thirty-four per cent mentioned price difference as the main reason for not changing their behaviour, 42% had not used up previously bought products and 15% responded that old habits die hard.

Approximately six months after the seminar, responses about particular changes in household chemicals usage revealed that almost half of the students' households now pay attention to the chemical product content, almost 47% responded that they had reduced household chemicals consumption, 38% follow prescribed usage recommendations, 29% have given up some products (most often mentioned were fabric softeners, bleaches and strong cleansing products) and 23% now use locally produced products (see Figure 7).

As can be seen from both surveys following the assignment, a considerable number of the students have, to some extent, changed their habits of household chemicals use and more often now pay attention to the environmental impacts of the products they choose (see Figure 2). Translating this to their existing families and future families when they will raise children, even this result can bring some positive changes in society. Therefore, we consider that our aim has been achieved, but further development of pedagogical methods and behaviour changing tasks is necessary to increase the percentage of those students who could really make a difference.

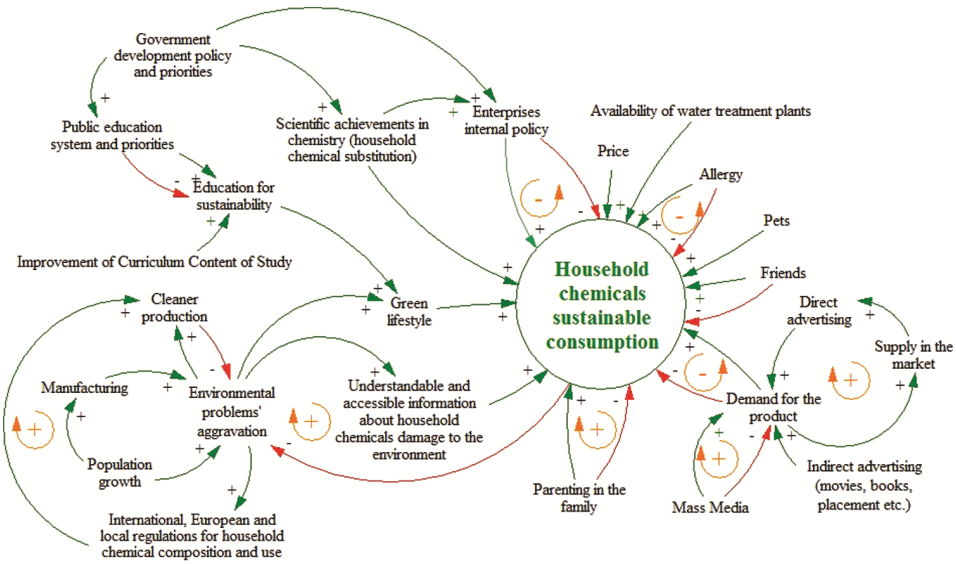
Combining cause and effect relationships suggested by students and our research, we developed a causal loop diagram for sustainable consumption of household chemicals as shown in Figure 8.

Figure 7 Distribution of answers for the question "What have you changed in your consumption of household chemical products?" six month after the seminar (see online version for colours)



Source: survey six months after the project (number of respondents 47)

Figure 8 Causal loop diagram for sustainable consumption of household chemicals (see online version for colours)



Source: developed by authors, based on the research results

This study confirms that awareness of the environmental problem and ESD alone cannot change the consumption patterns, and these processes have to go hand in hand with strict regulations for manufacturers, incentives for cleaner production, scientific research for safer ingredients and better purification facilities. Also, direct and indirect advertising, i.e., product placement plays an important role and can have a considerable impact on consumers. Society needs to find ways of promoting the advertising of sustainable and reduced consumption instead of unsustainable.

5 Conclusions and suggestions

The problem of how pedagogical methods may help reduce unsustainable consumption patterns regarding household chemicals in modern society was studied. We have developed a teaching assignment which helps students to realise the actual amounts of household chemicals which they possess and use at home; to learn about possible harmful impacts on the health of ecosystems; to analyse causes and effects; and, finally, to act according to the obtained knowledge. We found that a month after the teaching assignment only approximately one quarter of students had changed some of their household chemicals consumption patterns. In the much smaller sample six months after the assignment, only less than 13% of respondents had not changed their consumption patterns. We consider that this can have long-term impacts as these students will form families in the future and raise children.

The described method may be used at other education levels and also in different study fields, as well as regarding consumption of different products used in households. It is important to choose products with a real threat to the local environment as in such cases students could feel the consequences more directly. More practical action could be involved in the assignment, such as interviewing people, visiting production sites or wastewater treatment stations.

In addition, we obtained a fairly good outlook about the amount of household chemicals in Latvian households which would be interesting to compare with other developed countries, especially those which have not undergone the transition period. The comparison would help to understand if overconsumption of harmful chemicals is similar in all developed countries or if it is more severe in transition countries due to lower incomes and less concern about health and environment.

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