

# Integrating Sustainable Consumption into Environmental Education: A Case Study on Environmental Representations, Decision Making and Intention to Act

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During the last decades, current consumption patterns have been recurrently blamed for rendering both the environment and our lifestyles unsustainable. Young children are considered a critical group in the effort to make a shift towards sustainable consumption (environmentally friendly consumption). However, young people should be able to consider sustainable consumption as a potential venue, among their options. The present study investigates the effectiveness of an environmental education program aiming to familiarize children aged 8-12 with the notion of sustainable consumption by focusing on children's environmental representations and their intentions to act (decision-making). Findings revealed that the program employed influenced children's environmental representations into becoming more sustainable ones. In addition, the environmental program provided children with more environmental criteria, allowing children to report their intentions to act as sustainable consumers. Relating children's environmental representations to their decision-making criteria, findings indicated an emerging relationship between children's environmental representations, and their intentions to act, as reflected through the decision-making process.

*Keywords:* Sustainable consumption, environmental representations, decision-making, environmental education program.

## INTRODUCTION

During the last two decades, the global community has acknowledged the need to ensure the sustainable development of the world. One crucial aspect in the efforts of promoting sustainable development is education (UNCED, 1992). Education for Sustainable Development allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. More specifically, as Biltagy (2013) stated, the aim of Education for Sustainable Development (ESD) is to motivate students to envision alternative ways of development and to be able to participate in acting according to these alternatives.

One of these alternatives focuses on sustainable consumption which has been widely considered as a mode of consumption that is aligned with sustainable development (González-Gaudiano, 1999). More specifically, sustainable consumption has been defined as the "use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations" (UNEP, 2008, p. 19). In this context, Education for Sustainable Consumption (ESC) has become a vital aspect in the efforts of ESD and the

promotion of sustainable production and consumption (Fischer & Freund, 2012). As Biltagy (2013) argues, education is one of the most powerful venues, in terms of equipping individuals with the essential competencies in order to become responsible and sustainable consumers.

ESC seems to be of great importance since in many cases, young people are not aware of sustainable consumption (UNESCO-UNEP, 2000). Hence, without increased knowledge and awareness, these future citizens could hardly integrate this alternative of consumption into their decision-making processes. Researchers have found that young people seem to be generally uninformed about sustainable consumption since they cannot conceive that there are several alternative avenues to irresponsible consumption (McCann-Erickson, 2001). According to the same authors young people can hardly grasp the extent to which their consumption affects society and nature. However, there is a tendency, both in consumption theory as well as in research on sustainable consumption, according to which young people are usually neglected because emphasis is on adults' individual consumption attitudes and practices (Cook, 2008; Fien, Neil, & Bentley, 2008). Environmental Education Programs (EEPs) have the potential of being a catalyst in educating young people by introducing issues of sustainable consumption within the learning curriculum (Bentley, Fien, & Neil, 2004; De Young, 1996). However, despite the fact that there has been an increase in environmental education studies focusing on consumption (Rickinson, 2001), it seems that consumption is not taught explicitly in EEPs (Barratt Hacking, Barratt, & Scott, 2007). In addition, it has been argued that "effective tools for teaching and evaluating the success of educational modules, or entire curriculums devoted to consumption, yet need to be developed" (Kopnina, 2013, p. 129).

Addressing the lack of literature in this field, the present study focus on an EEP concentrating on consumption in conjunction with the natural environment, "Sustainable Consumption: 4R". This EEP deals explicitly with sustainable consumption and is grounded on the pluralistic tradition of teaching about environmental and sustainability issues (e.g. Jensen & Schnack, 1997; Jickling & Spork, 1998; Lijmbach, Margadant-van Arcken, van Koppen, & Wals, 2002). According to this tradition, the learning intervention is characterized by an effort to accommodate and give space to a set of different and contradictive views and values, whilst focusing on issues related to sustainability, rather than advocating for an eco-friendly perspective (Rudsberg & Öhman, 2010). Hence, based on these premises, in many activities of the program the children were given the opportunity to handle data from several points of view and thus, reflect on their own personal decisions and conclusions. During one of the learning activities, children were asked, for instance, to choose between four similar cups made of different material (glass, plastic, metal and paper) by taking into consideration data related to economic (e.g., cost, quantity), societal (e.g., convenience, personal use, practical aspects) and environmental (e.g., raw material, reusability) aspects. The data helped them evaluate the conflicting views and formulate their own criteria for justifying and supporting their selection. Consequently, the learning intervention did not promote a specific point of view, but it rather attempted to enforce students' autonomy, as well as to empower them to make thoughtful decisions (e.g. Jickling, 1992; Ratcliffe & Grace, 2003; Solomon & Aikenhead, 1994).

This study focuses on children's environmental representations (estimating conceptual change) and on their intentions to act, as captured by the process of decision-making, in the frame of an EEP. More specifically, environmental knowledge, has been considered as an important component of an EEP since students' knowledge and thinking about environmental issues can be limited and incomplete (Rickinson, 2001). At the same time, students' intentions to act are of high importance, since there is evidence that, in many cases, intentions are likely to influence and to define subsequent behavior (Ajzen, 1985; Fishbein & Ajzen, 1975). Relating environmental knowledge to environmental intentions, literature has indicated that when environmental knowledge is focused on an ecological behavior, rather than just ecological facts, the relationship between knowledge and action seems to be stronger (Kaiser, Wölfling, & Fuhrer, 1999). Hence, if students are persuaded that particular actions are environmentally effective, they will be more willing to undertake them (Ambusaidi, Boyes, Stanisstreet, & Taylor, 2012).

The present study seeks to investigate:

- What are children's environmental representations (estimating conceptual change) regarding the relationship of consumer and environment, before and after an EEP on sustainable consumption?
- What are children's intentions to act as consumers, before and after an EEP on sustainable consumption?
- Are there any correlations between children's environmental representations and their intentions to act as consumers, before and after an EEP on sustainable consumption?

## **Theoretical Framework**

The theoretical background framing the present study is divided into three sections. The first section focus on environmental representations, reflecting students' environmental knowledge, as well as on their conceptual change.

The second section explores on decision-making, as a process reflecting students' willingness and intention to act. Finally, the third section concentrates on the relationship between students' environmental knowledge and intention to act.

### **Environmental representations and environmental knowledge in relation to sustainable consumption**

Research on environmental representations has indicated that young consumers lack knowledge about the origin of many products, thus, are unable to trace them back to the natural resources they were derived from (Emerald, 2004). Therefore, young people cannot relate themselves as consumers, with their impact on the natural environment. A series of studies has confirmed this phenomenon since children's environmental representations, in most cases, do not include humans and their actions indicating that they usually conceive the natural environment as separate from humans (e.g. Payne, 1998; Rickinson, 2001; Shepardson, Wee, Priddy, & Harbor, 2007). Additionally, the natural environment is often conceived as an object separate to humans (Loughland, Reid, & Petocz, 2002). As a result, amongst youth, there is a big awareness gap regarding the close association of human activities and their subsequent impact on the environment (UNESCO, 1999).

Aiming to investigate children's environmental representations before and after an EEP for sustainable consumption, the present study has employed the lens of Social Representation Theory, since this theory is congruent with the theories of conceptual change (Caravita, 2001; Hovardas & Korfiatis, 2006). More specifically, a social representation could be conceptualized as a structured mental model shared by individuals within a social group, allowing for collective elaborations of social objects in their daily life (Moscovici, 2001). A social object refers to any material or symbolic entity to which individuals attribute certain qualities and therefore, are able to elaborate and to communicate by developing a "social code" and a "common sense" of what surrounds them (Wagner, 1998). Aligned with this reasoning, "environment", as a social object defined by several qualities within the frame of a specific social grouping of young students, could be considered as a specific kind of social representation, while instruction could be held as a process aiming at the transformation of this particular social representation (Christidou, Dimopoulos, & Koulaidis, 2004; Hovardas & Korfiatis, 2008).

### **Decision making and intention to act in relation to sustainable consumption**

Consumption is a process of decision-making (Autio & Wilska, 2003). In this process, young people often participate in making routine consumption decisions for the family and in many cases, they even pressure their parents to buy other products they desire (Kaur & Singh, 2006). Benn (2004) highlights the power of young people, both directly as consumers and indirectly by affecting their parents' choices. However, the majority of young consumers do not actively consider green choices in their consuming repertoire, although they may be aware of environmental problems (Autio & Wilska, 2003). Hence, students' behavioral intentions, in terms of their willingness to act as consumers, are not aligned with a willingness to act for the sustainability of the environment.

Focusing on the relation between decisions and behavioral intentions, most models of social behavior are based on the assumption that the decision to engage in a particular behavior (e.g. to purchase or not purchase a specific product) is the result of a goal-oriented process that evolves according to a logical sequence (Ajzen, 1985; Rogers, 1983). In this sequence, behavioral options are taken into account, the consequences of each option are evaluated and a decision to act or not act—a behavioral intention—is made (Pomery, Gibbons, Reis-Bergan, & Gerrard, 2009). In this context, several studies found that purchase intentions are identified with the decision-making process employed by consumers (e.g. Khan, Tauqir, & Salman, 2012). Similarly, studies derived from different research areas have employed decision-making scenarios to investigate intentions to act, given the relation between decision-making processes and behavioral intentions (e.g. Bass, Barnett, & Brown, 1999; Blais & Thompson, 2008; Jansen & Fogel, 2010).

Given that decision-making scenarios or vignettes, allow people to indicate their behavioral intentions or their most likely action (Blais & Thompson, 2008), the present study employed a decision-making scenario asking students to undertake specific actions in terms of selecting different products, both before and after the implementation of the EEP. However, according to Malandrakis, Boyes and Stanisstreet (2011): "Reporting an intention to undertake an action is not, of course, tantamount to taking that action, although the converse is likely to be true; those who state an unwillingness to undertake certain actions are unlikely to take them, unless circumstances change" (p. 958). Additionally, there is a risk, in relying too much on individuals' declared willingness to act, since intentions may not translate into actual behavior (Chhokar, Dua, Taylor, Boyes, & Stanisstreet, 2011). However, this study did not measure behaviour, rather, it focused exclusively on intention to act through a decision making procedure.

## Relation between environmental knowledge and intention to act

Early models employed for the investigation of environmental behavior became known as ‘information deficit’ models (Burgess, Harrison, & Filius, 1998). According to these models there are “relatively direct relationships between an individual’s cognitive base about environmental problems, a positive attitude towards the environment and a tendency to act in an environmentally sympathetic manner” (Chhokar et al., 2011, p. 1168). In other words, these models implied that there was a relatively direct and positive relationship between an individual’s environmental knowledge and his/her intentions to act in such a way as to reduce these problems. Other models proposed a less direct link, since they supported that both intention to act, as well as situational factors, influence behavior and actions (Hines, Hungerford, & Tomera, 1987). However, nowadays, an increasing number of studies suggest that there is no linearity in the relationship between knowledge and action (e.g. Chhokar et al., 2011; Malandrakis et al., 2011; Skamp, Boyes, & Stannistreet, 2009). Due to this complex interaction between knowledge and behavior, several researchers refer to a “gap” between cognition and action (e.g. Chhokar et al., 2011; Kollmus & Agyeman, 2002). This gap is partially attributed to the fact that behavior is influenced by a number of other factors, not just knowledge; these include beliefs, social pressures, physical facilitators and an individual’s action competence (e.g. Cialdini, Reno, & Kallgren, 1990; Corraliza & Berenguer, 2000; B. B. Jensen & Schnack, 1997; Pruneau et al., 2006).

Although there is scepticism about the link between knowledge and action (Skamp et al., 2009), some researchers believe that environmental knowledge is a prerequisite to behavioural change (e.g. Lester, Ma, Lee, & Lambert, 2006). In addition, knowledge can be considered as a precursor to meaningful discourse about policy (Robelia & Murphy, 2012). In any case, knowledge is part of a number of factors that influence intention to act (Heimlich & Ardoin, 2008) and it is a prerequisite for informed environmental decision making (Jensen, 2002). In line with the above reasoning, our research attempts to investigate whether there is a relation between students’ environmental knowledge (through environmental representations) and their intention to act (through decision-making).

## METHODOLOGY

The present study aims to explore what is the contribution of an EEP, as a mediator on children’s environmental knowledge (through children’s environmental representations) and intentions to act (through a decision-making process).

### Description of the Environmental Education Program

The EEP, *Sustainable Consumption: 4R*, was developed by the CYCERE Environmental Education Center for children aged 8-12. The program is a one-day experience that includes six scaffolded learning activities weaved into an investigation story-based scenario. In this context, the children that participate receive six missing codes, one code per activity, in order to complete the secret diagram of the *Green Cycle* (Appendix I). Each activity is about 45 minutes long (6x45) and there are two short breaks between the activities.

For the first activity, children were asked to match different natural landscapes with the raw materials and the products derived from them, aiming to scaffold the relationship of products they consume with the natural environment. The second activity introduced the first R, for *Reuse*, by asking children to propose as many ways possible of reusing an empty glass jar. The third activity introduced the second R, for *Recycle*, and entailed an amusing trash game in which children were asked to separate trash piles according to their raw material, while learning about each material’s recycling properties. The fourth activity introduced the third R, for *Refuse*, and was based on a selection process according to which children had to choose between four different cups (glass, plastic, metal and paper) taking into consideration data related to economic (e.g., cost, quantity), societal (e.g., convenience, personal use, practical aspects) and environmental (e.g., raw material, reusability) aspects. The fifth activity introduced the fourth and final R, for *Reduce*. During this activity, the children were asked to choose between a homemade and a fast-food meal, in order to compare the rubbish derived from the two types of meals and realize that, in many cases, the fast-food meals produced much more waste.

Once completing activities two to five, the children were asked to balance the four Rs criteria and to rank them according to their priority. This process intended to enable children to put the four criteria into hierarchical order: *Refuse*, *Reduce*, *Reuse* and *Recycle*. Finally, during the sixth activity children were given several raw materials and were asked to sort them as renewable or non-renewable. Through this, the children were intended to realize that as

consumers they may use raw materials wisely and whenever possible try to conserve them. Through these six activities, the children obtained the missing codes and completed the *Green Cycle*.

### Participants

Participants were 286 children, aged 8-12 years old, from five suburban elementary schools in Cyprus. Gender distribution was similar with a 45% (130) boys and 55% (156) girls ratio. The one-day program was implemented at the CYCERE Environmental Education Center. According to their teachers, the children were of diverse educational performance and socioeconomic background. Additionally, the teachers mentioned that the children had some fragmented knowledge regarding recycling and re-using within the school framework, however they had never participated in an EEP regarding sustainable consumption. Hence, this one day program was the first time these students had come across the issues of consumerism and sustainability.

## DATA COLLECTION

### Word Associations' method

In the present study, we investigated children's environmental representations by employing the method of word associations. Word associations, is one of the methods employed for the assessment of conceptual structures as well as for defining belief or attitude changes in psychology and sociology (e.g. Doise, et al., 1993; Ross, 2003). Antecedents of the method are found in psychoanalytic literature (Hoffer & Youngren, 2004). More specifically, as used by Hovardas and Korfiatis (2008), this method is founded on the idea that giving a stimulus word and prompting the learners to freely associate all of the ideas that come to their mind, provides a word reservoir that reflects the mental representation of the stimulus term. Hence, both before and after the implementation of the EEP, children were asked to record the first five words that came to their mind when thinking of the stimulus term *consumer*. Therefore, the words associations' method was employed as a process that could shed some light on children's collective representation, investigating the word reservoir derived regarding the given stimulus term (Hovardas & Korfiatis, 2006).

### Decision making instrument

Children's performance in decision-making procedure was measured through a pre- and post-intervention open-ended written test explicitly designed for this specific study. Based on the test, the decision making criteria used by the children could be extracted from their answers. How children construct their decision making criteria has been the focus of several past studies aimed at evaluating the decision making procedure, as well as in measuring children's skills in justifying their selection, both explicitly and implicitly. The construction of children's criteria for decision making received attention in several studies (Uskola, Maguregi, & María-Pilar, 2010) as a tool for evaluating the decision making process as well as measuring children's skills of justifying their selection, both explicitly and implicitly (Papadouris, 2012).

According to the test, the children had to organize a picnic and were required to:

- Make a decision on four products needed for the picnic (cup, bag, fruits and bottle): For the selection of each product, students were given alternative options: for instance, products of single and multiple use (cup, bag) and ones with different packaging characteristics (fruit container, bottle for water). This was done in order to identify if children could use criteria related to refuse, reduce, reuse and non/renewable natural resources. Additionally, children were given alternative options for products derived from natural or artificial materials (man-made material) so as to identify if they could use criteria related to recycle and decomposition. Each of the four products and their four alternative options, as well as the criteria can be seen in Table 1.
- Reflect on their decision through the question 'Why did you select this product?': In this part, children were asked to justify and support their selection. In this frame a variety of criteria were reported.

**Table 1.** The four alternative options given for the selection of each product and the possible decision making criteria.

PRODUCTS	Option A	Option B	Option C	Option D
Cup	Plastic multiple use Single / Multiple use (Reuse, Reduce, Saving natural resources) Natural or artificial material (Recycle, Decomposition)	Glass multiple use	Plastic single use	Paper single use
Bag	Cloth multiple use Single / Multiple use (Reuse, Reduce, Saving natural resources) Natural or artificial material (Recycle, Decomposition)	Paper single use	Handicraft multiple use	Plastic single use
Fruits in	Plastic bag Package (Refuse, Reduce) / Natural or Artificial material (Recycle, Decomposition)	Aluminum foil	Paper	Nothing
Bottle for water	Big plastic Package (Reduce, Reuse) / Natural or Artificial material (Recycle, Decomposition)	Personal plastic	Big glass	Personal glass

## DATA ANALYSIS

### Word Associations' method

Data analysis of the word associations was carried out through a two-step process. Taking into account that a collective mental representation is composed by four different groups, the authors (of this study)/ conducted a structural reconstruction analysis, in order to investigate the structure of these groups before and after the intervention. More specifically, employing the median value for both the frequency and the rank of each association, one can obtain the following four groups of associations: a high frequency/high rank group, corresponding to the core of the representation; a low frequency/low rank group, corresponding to the periphery; and two diffusion groups, high frequency/low rank and low frequency/ high rank (Koskinas, Papastamou, Mantoglou, Prodromitis, & Alexias, 2000).

In addition, a narrative reconstruction analysis was conducted, according to which the word associations were subjected into a hierarchical cluster analysis to define recordings of different word associations that tend to be given at the same time (Ross, 2003). Associations were represented and estimated through dendrograms, where actual distances were rescaled to numbers between 0 and 25. The smaller the distance between the linkage point of two associations, the higher the corresponding degree of relation among the two associations and vice versa. Thus, cluster analysis allowed the authors to explore if the linked words shaped meaningful groups and therefore, if the correlations that emerged among the associations reflected a coherent conceptualization of the stimulus term. In order to employ the entire word reservoir of each stimulus term, dendrograms were developed by the average linkage between groups method.

### Decision making instrument

The content of the open-ended questions was analyzed through content analysis (Krippendorff, 2004). The criteria developed by the children were categorized into the three main categories of a socio-scientific issue in the frame of sustainability - Economic, Environmental and Social - as well as in two additional categories, Practical and Personal.

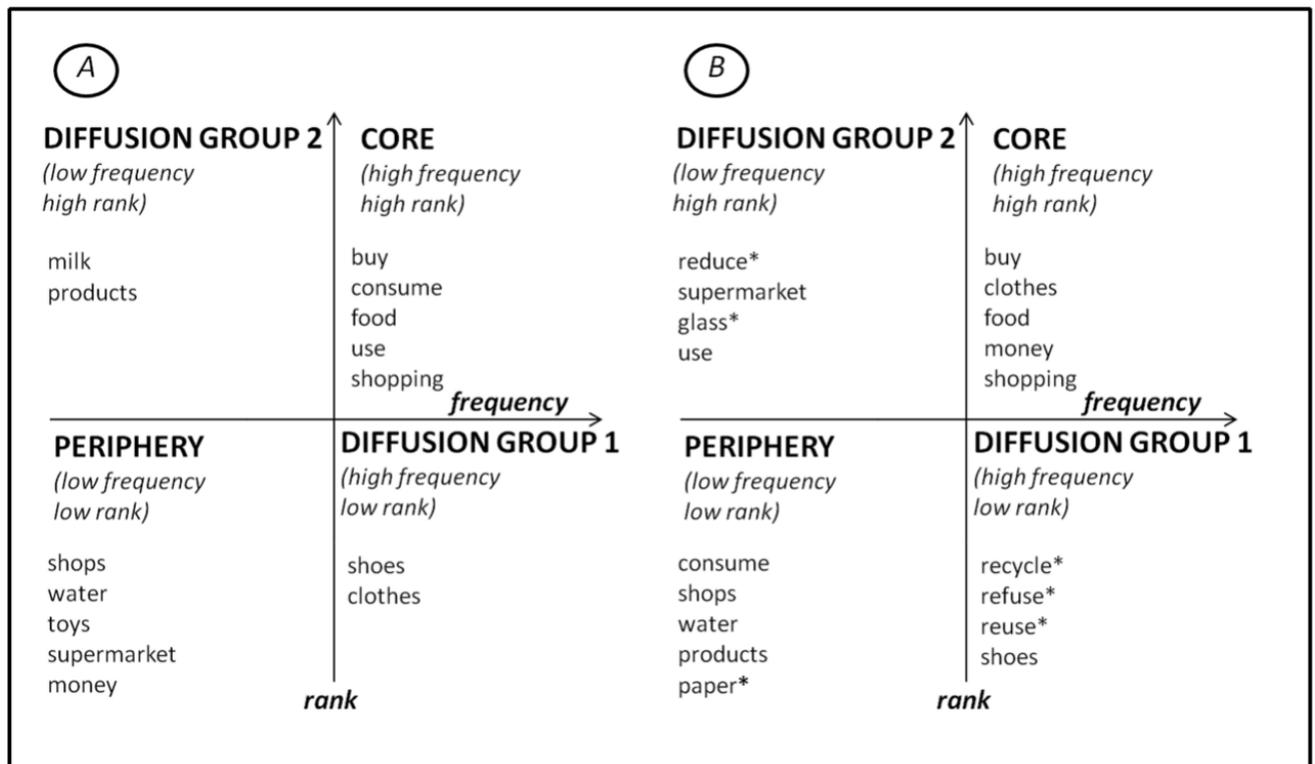
Additionally, Chi-square Crosstabs based on Fisher's Exact Test, as well as Pearson's Rank Order Correlation parametric test, were conducted in order to search for significant correlations between (i) the categories of criteria, (ii) criteria and decisions, and (iii) the criteria of decision making and the words mentioned after stimulated by the term *consumer*.

## RESULTS

### Environmental Representations

#### Structural reconstruction results

Before the implementation of the EEP, children used 14 associations referring to the stimulus term *consumer*, whereas after the intervention they used 18 associations referring to the stimulus term (see Figure 1).



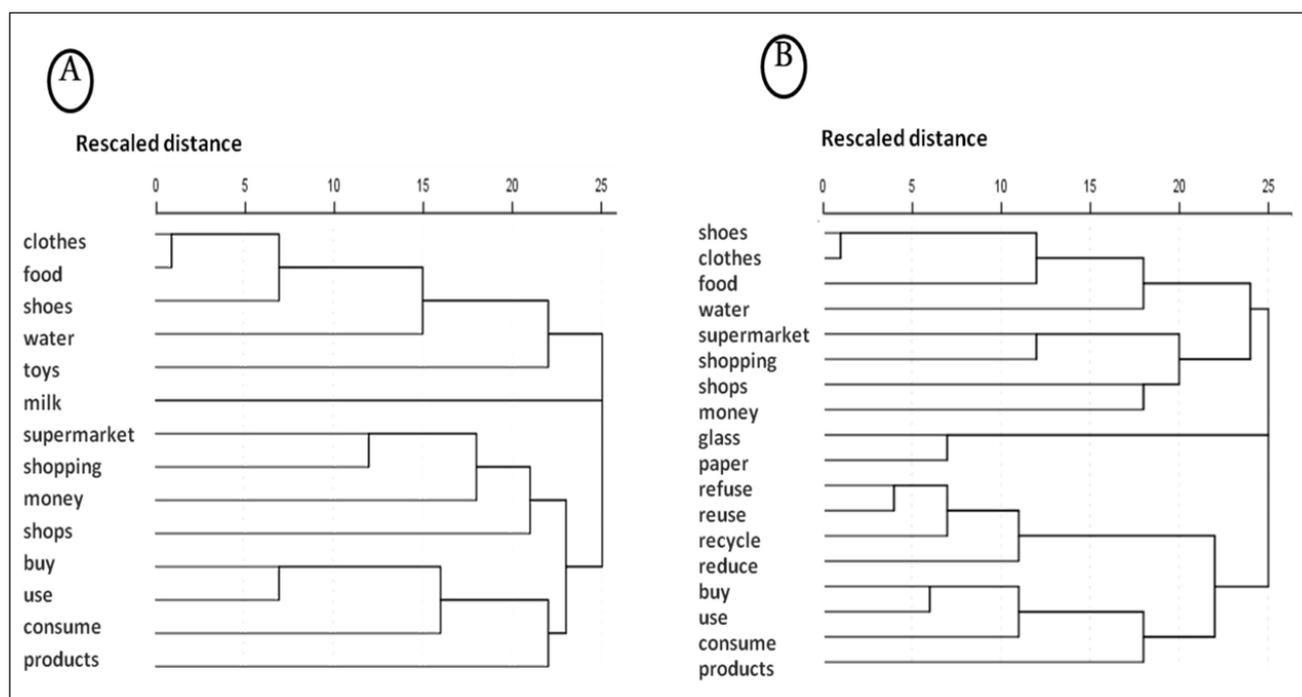
**Figure 1.** Core, diffusion and peripheral associations' groups for the stimulus term “consumer” before (A) and after (B) the implementation of the Environmental Education Program.

This increase could be attributed to the fact that after the EEP new associations enriched the children’s collective representation. More specifically, before the implementation of the EEP, children’s representation was composed by the associations: *buy, consume, use, shop, supermarket, shopping, money, products, food, milk, water, shoes, clothes* and *toys*. These pre-interventional associations outlined a consumption process in which a consumer gives an amount of money to purchase several goods in order to cover certain basic needs. This process was also captured by the core of the collective representation with the terms *buy, consume, use, shopping* and *food*.

After the EEP, the children’s representation about what it meant to be a consumer expanded and this was illustrated through the use of the terms *refuse, reduce, reuse, recycle, glass* and *paper* enriching their representational framework. It should be noted that the terms *milk* and *toys* were not used again. Hence, the process of consumption was once again captured by the core of this collective representation with the terms *buy, money, shopping, food* and *clothes*. However, according to the study’s young participants, the process of consumption was connected with and thus, was framed in a way by the 4Rs schema (Refuse, Reduce, Reuse, Recycle) that was included into the post-interventional representation. In addition, the terms *Reduce, Reuse* and *Recycle* were integrated into the Diffusion Group 1, revealing that these terms were recorded in high frequency after the teaching intervention. Finally, the integration of *glass* and *paper* into the children’s collective representation, could be attributed to the fact that during the EEP these two materials were presented as the most environmental-friendly materials compared to plastic or metal.

### Narrative reconstruction results

The narrative reconstruction of the children’s representations revealed that before the EEP the associations were classified into two main clusters (see Figure 2). The first cluster included five associations, representing 37.5% of the total associations that structured the children’s representations. This cluster focused on some of the products a consumer could obtain by associating the terms *clothes, food, shoes, water* and *toys*. The second cluster was composed by two sub-clusters, resulting in a total of eight associations, representing 57.1% of the total associations that structure children’s representations. The first sub-cluster highlighted the shopping process by associating the terms *supermarket, shops, shopping* and *money* whereas the second sub-cluster captured the process of consumption at a more general level by associating the terms *buy, use, consume* and *products*. Following this reasoning, the combination of the



**Figure 2.** Relations of consistency between words associated with the stimulus term “consumer” before (A) and after (B) the implementation of the Environmental Education Program.

two sub-clusters outlined all the stages of the consuming process in detail, having the shops as a starting and the use and consumption of the products that the consumer has purchased as an ending point.

The narrative reconstruction of the young participants’ post-interventional representations, revealed that the way children conceptualized the stimulated term *consumer* had changed. Indeed, the narrative reconstruction of the children’s representations showed that after the EEP, the associations were classified into three main clusters (see Figure 2). The first cluster was composed of two sub-clusters, resulting into a total of eight associations, representing 44.4% of the total associations structuring children’s representations. The first sub-cluster seemed to highlight the shopping process by associating the terms *supermarket*, *shops*, *shopping* and *money* whereas the second sub-cluster focused on some of the products a consumer could be supplied with by associating the terms *shoes*, *clothes*, *food* and *water*. Combining the two sub-clusters, the first main cluster that emerged seems to give emphasis on the consuming process from a micro-level perspective, since it was focused on specific products and shopping places and therefore it provided a more detailed picture of the consumption process. The second cluster was composed again of another two sub-clusters, resulting into a total of eight word associations and representing 44.4% of the total associations structuring children’s representations. The first sub-cluster seemed to capture the process of consumption at a more general level by associating the terms *buy*, *use*, *consume* and *products*. The second sub-cluster that emerged, presented an association of the 4Rs (Refuse, Reduce, Reuse, Recycle) that entered the children’s collective representation after the EEP. This co-existence and combination of the two sub-clusters seems to reveal that children within this second cluster considered the consuming process from a macro-level perspective, while at the same time framed this process using the 4Rs actions that were introduced during the EEP. Finally, the third cluster included two word associations, representing 22.2% of the total associations structuring children’s representations, where by its small displacement seems to be inversely proportional to its significance. Within this cluster, one could detect the associations between *paper* and *glass*. Taking into account that these associations had been previously presented during the intervention as the most environmentally friendly options, this cluster seems to compose an environmentally-oriented repertoire for the consumer.

### Decision Making

For the selection of each product, children incorporated several criteria in order to justify and explain their decision, both before as well as after the implementation of the EEP. As can be seen in Tables 2-5, after the EEP, the environmental criteria employed were increased, while economic, social and personal criteria as well as criteria regarding practical aspects decreased during the selection process of products.

**Table 2.** Children’s responses for the selection of a cup (Pearson’s Correlation Test).

Criteria	N of Students, %		Decisions								Words for the stimulus term “ Consumer”	
	Pre	Post	Pre				Post				Pre	Post
			A	B	C	D	A	B	C	D		
			31	10	40	19	8	79	6	6		
<b>Environmental</b>					*	**		***		**	I buy**, human*, use*, shopping	
Refuse	26,6	69,2	0,0	0,0								
Reduce	0,0	0,7										Refuse**, reduce**, money*
Reuse	6,3	32,2						***			I buy*, shopping*	Supermarket*
Recycle	18,2	7,3			**	***		*	**	**	I buy*	Consume*
Environmental friendly	0,7	18,9							**		I buy**, shops*, shopping***	Reuse*
No environmental pollution	0,0	6,2							*			
Decomposed (Nat / artf/time)	2,4	6,6						*			Human**, products***, money*	Refuse*
Natural resources saving	0,0	0,7										Paper*
Natural first material	0,0	5,2						*	**			Shops*
<b>Economic</b>	25,9	5,6			***				***			
Cost	23,4	5,5			***				***			
Use	1,0	0,0			*						Waste**	
Quantity / abundance for everyone	2,1	0,3							***		Money*	
<b>Social</b>	0,3	0,0										
Health	0,3	0,0										
<b>Personal</b>	10,5	2,1						*				
Aesthetic	7,3	1,4				*						Water*, products**
Emotional	2,0	0,3	**								Milk*, toys* Shops**, money**, Juice***	Water***, juice***
Appropriate to drink water	1,7	0,3		**		**						Recycle**
<b>Practical</b>	25,9	7,3	***	***	***	***	***	***	***			Money*** Reduce**, water*, supermarket*, fruits*
Size-Capacity	10,1	2,8	**	**		***					Shoes*, food* Products*, Waste*** shoes***, clothes*, I consume	Shops**, clothes*, products**, money*
Tolerance	9,1	1,4										
Transparent	0,3	0,3		**								Shoes**, juice***
Just drop	0,3	0,0										
<b>Just name the material</b>	5,2	8,4	*								Waste*, supermarket*	Shopping
<b>No argument / criterion</b>	11,9	5,9										

**Note.** \*\*\*  $p=0.000$ , \*\*  $p=0.001$ , \*  $p=0.05$

**Note. A:** Plastic, multiple use cup      **B:** Glass, multiple use cup      **C:** Plastic, single use cup      **D:** Paper, single use cup

Additionally, before the EEP, the majority of children’s decisions were statistically correlated to economic criteria and criteria regarding practical aspects, while for the environmental criteria, decisions were correlated mainly to the criterion of *recycle*. Personal criteria were strongly correlated to *aesthetic reasons*. After the EEP, the majority of children’s decisions were statistically correlated to the environmental criteria *refuse, reduce, reuse, recycle, natural resources*

*saving* and *decomposition*, revealing that these criteria were embedded in the children's selection repertoire. However, in some cases, decisions were statistically correlated with economic criteria and criteria regarding practical aspects, both before and after the EEP, indicating the strong dependence of decision on the cost of products, as well as on practical aspects related to everyday behavior.

The results for the selection of each of the four products are presented in detail below.

### Results for the selection of the cup

Regarding the selection of a cup (see Table 2), before the EEP, most of the children preferred the plastic-single use cup (Option C - 40%), followed by the plastic multiple-use cup (Option A - 31%), the paper single-use cup (Option D - 19%) and the glass multiple-use cup (Option B - 10%). The selection of the plastic-single use cup was statistically correlated to economic criteria as well as criteria concerning practicality, while the selection of the paper and glass cup was statistically correlated to environmental criteria and especially to the criterion of *recycle*. The selection of the plastic-multiple use cup was statistically correlated to criteria related to practical aspects.

After the implementation of the EEP, the majority of children preferred the glass multiple-use cup (Option B - 79%), followed by the plastic-multiple use cup (Option A - 8%) and almost equally by the paper single-use cup (Option D - 6%) and the plastic-single use cup (Option C - 6%). The selection of the glass multiple-use cup was statistically correlated to environmental criteria. The children selected this cup because they believed that "it can be reused", "it is recyclable", "it is more environmental friendly", "it originated from natural raw material" and therefore could be "part of the natural process of decomposition". The selection of the paper single-use cup was statistically correlated to environmental criteria and specifically to the criterion of *recycle* and *natural first material*. The selection of the plastic-multiple use cup was statistically correlated to criteria regarding practical aspects, and the selection of the plastic-single use cup was statistically correlated only to economic criteria.

### Results for the selection of the bag

Regarding the selection of a bag (see Table 3), before the EEP most of the children preferred the paper-single use bag (Option B - 34%), followed by the plastic single-use bag (Option D - 21%) the handicraft multiple-use bag (Option C - 19%) and the cloth multiple-use bag (Option A - 10%). The selection of the paper single-use bag was statistically correlated to environmental criteria (*recycle*, *quick decomposition*), while the selection of the plastic single-use bag was statistically correlated to economic criteria. The selection of the handicraft multiple-use bag was statistically correlated to environmental and personal criteria as well as criteria relating to practicality. The selection of the cloth multiple-use bag was correlated to the environmental criterion of *reuse*.

After the implementation of the EEP, many of the children selected the handicraft multiple-use bag (Option C - 53%), followed by the paper-single use bag (Option B - 23%), the cloth multiple-use bag (Option A - 16%) and the plastic-single use bag (Option D - 7%). The selection of the handicraft multiple-use bag was statistically correlated to environmental criteria. The children selected this bag because they believed that "it can be reused", "it's more environmental friendly", "it is made of natural raw material" and since "it is reusable and it could contribute to preserving natural resources". The selection of the paper single-bag was statistically correlated to environmental criteria and specifically to the criterion of *recycle* and *natural decomposition*. The selection of the cloth multiple-use bag was statistically correlated to the criteria of *refuse*, *reduce* and being environmentally friendly, while the selection of the plastic-single use bag was statistically correlated to economic criteria.

### Results for the selection of the fruit container

Regarding the selection of the fruit container (see Table 4), before the EEP, most of the children preferred the plastic bag (Option A - 54%), followed by the non-container (Option D - 20%), the paper (Option C - 17%) and the aluminum foil (Option B - 9%). The selection of the plastic bag was statistically correlated to personal criteria, especially for routine reasons, since as children explained "we usually store our fruits in plastic bags". The selection of the non-container was statistically correlated to environmental criteria such as *reduce*, *no environmental pollution* and *no harm to the environment*. The selection of the paper container was statistically correlated to environmental criteria and specifically to the criterion of *recycle*. The selection of the aluminum foil container was not correlated to any of the criteria mentioned by the children.

After the EEP, many of the children selected the non-container (Option D - 45%), followed by the plastic bag (Option A - 22%), the paper container (Option C - 21%) and the aluminum foil container (Option B - 9%). The selection of the non-container was statistically correlated to many environmental criteria (*refuse*, *reduce*, *natural*

**Table 3.** Children’s responses for the selection of a bag.(Pearson’s Correlation Test).

Criteria	No of students %		Decision								Words for the term “Consumer”	
	Pre	Post	Pre				Post				Pre	Post
			A	B	C	D	A	B	C	D		
			19	34	26	21	16	23	53	7		
<b>Environmental</b>					**		**	***	**		Buy**, consume**, food**, use**	Reuse*
Refuse	24,5	68,9										
Reduce package / litter	0,0	0,0					**					Reduce*, reuse*, money*
Reuse	7,0	27,6*		*		**		**			Clothes*, food***	Refuse*
Recycle	12,2	10,5		**				***			Consume**, shops*, use***	Refuse*, reuse*
Environmental friendly	3,1	18,1				**		**			Buy**, shops*, use***, Consume**	Refuse**, Recycle*, buy*bottle*
No environmental pollution	0,7	4,1									Human**, shops*	Shoes*
Decomposed	1,7	9,4						**			Human***	Paper**
Natural resources saving	0,3	3,5							**		Shopping*	Fruits*
Natural first material	0,0	8,7							***			Money*
<b>Economic</b>	19,9	7,3				***				***		Shopping*
Cost-profitable-expensive	19,6	6,6				***				***		
Use	0,7	0,0									Milk**	
Quantity / abundance for everyone	0,7	0,0									Toys**	
<b>Social</b>	0,7	2,8									Shoes***, food*, money*	Consume*, use**
Health	0,7	2,8						*			Shoes***, clothes*, money*	Use*, consume*
<b>Personal</b>	10,5	1,7									Toys**	
Aesthetic	7,3	1,7		*								Clothes*
Emotional	0,7	0,0										
Appropriate to drink water	2,1	0,0									Toys***, food*	
<b>Practical</b>	28,3	16,8			**			**			Recycle*, shops*	
Size-capacity	12,2	5,6										
Tolerance-not breakable-quality-best	17,1	6,2		*				*			Buy*, consume*	
Transparent	0,3	0,0									Water**	
Just drop	0,3	1,4			*						Waste***, supermarket**	Fruits*, juice*
<b>Just name the material</b>	6,3	0,3									Shops*, waste***	Buy*, money*
<b>No argument / criterion</b>	14,7	4,2										

Note. \*\*\* p=0.000, \*\* p=0.001, \* p=0.05

Note. A: Cloth, multiple use bag B: Paper, single use bag C: Handicraft, multiple use bag D: Plastic, single use bag

resources savings, energy saving). The selection of the plastic bag was statistically correlated to economic criteria as well as to personal criteria such as “I am used to it”. The selection of the paper container was statistically correlated to environmental criteria (recycle, environmental friendly, natural decomposition and natural raw material), while the selection of the aluminum foil container was statistically correlated to practical aspects e.g “better storage option”.

**Table 4.** Children’s responses for the selection of a fruit container.(Pearson’s Correlation Test).

Criteria	N of Students %		Decision				Words for the term “Consumer”					
	Pre	Post	Pre		Post		Pre	Post				
			A	B	C	D						
			52	9	17	20	22	9	21	45		
<b>Environmental</b>	<b>14,7</b>	<b>58,7</b>			***			**	***		Buy*, human*, consume*, products	Refuse*
Refuce	2,1	26,2							***		Money*	Reduce**, refuse**, recycle**, reuse*
Reduce package–reduce litter	2,7	46,1			*				***		Recycle***, money**, shopping**	Recycle*, reduce**, supermarket*
Reuse	0,7	2,8			***			***			Human*, consume**, shopping*, use*	
Recycle	8,4	8,0							***		Money*	Bottle*
Environmental friendly	0,7	9,8							***		Human***, consume**, products**	Recycle**, Shoes*
No environmental pollution	0,6	5,5			*							
Decomposed (Natural / artificial-time)	0,0	2,1							***			Refuse***, shops*Shoes*, clothes*
Natural resources saving	0,0	11,9								***		Recycle*
Natural first material	0,0	4,2							***			
Energy saving	0,0	2,8							*			
<b>Economic</b>	<b>7,0</b>	<b>4,5</b>				*					Products**	Reduce*
Cost-Profitable-Expensive Use	3,1	2,0										Products**, food**, paper***, use***
Quantity / abundance for everyone	4,2	2,4				***					Products**	Reduce***, fruits*
<b>Social</b>	<b>12,6</b>	<b>6,3</b>			*						Waste*	Money*
Health-vitamins-no microbes	12,6	6,3									Waste*	
<b>Personal</b>	<b>19,2</b>	<b>11,2**</b>				***						Water**
Aesthetic	9,8	2,8										Water**, toys**
The specific fruits	3,5	1,0									Shops*	Fruits**
I use to / routine	6,6	8,4***				***						
More simple life	0,3	0,3			*						Products*	Recycle**, refuse**, use**
<b>Practical</b>	<b>22,4</b>	<b>11,2**</b>							***		Shoes*	
Size-capacity	1,0	0,3									Shoes*, money**	
Tolerance-not breakable-quality-best	3,4	0,3										
Better storage-more fresh-clean-trans	17,4	11,1							***		Buy*, products*	
Just drop	0,3	0,0			*						Consume**, products**	
<b>Just name the material</b>	<b>9,1</b>	0,7			**			*				Recycle***, glass**, reduce**
<b>No argument / criterion</b>	<b>15,7</b>	<b>7,0</b>			*			*				

Note. \*\*\* p=0.000, \*\* p=0.001, \* p=0.05

Note. **A:** Fruits in plastic bag    **B:** Fruits in aluminum foil    **C:** Fruits in paper    **D:** Fruits in nothing

**Table 5.** Children’s responses for the selection of a water bottle.(Pearson’s Correlation Test).

	Pre Post		Pre				Post				Pre		Post	
	A	B	C	D	A	B	C	D						
	45	30	14	18	24	9	53	33						
<b>Environmental</b>	<b>12,6</b>	<b>78,7</b>							***	Recycle***, consume***, shopping				
Refuce	0,0	0,0												
Reduce package – reduce litter	1,3	50,1			***	***				Toys***		Reduce**, Refuse**, money*		
Reuse	2,1	33,9							***	Recycle**, shops*		Supermarket*		
Recycle	9,4	10,1							**	Buy**, recycle***, consume**, shopping*		Consume*		
Environmental friendly	0,0	9,8							**			Reuse*		
No environmental pollution	0,0	0,3												
Decomposed (Natur / artificial-time)	0,3	2,8							**			Refuse*		
Natural resources saving	0,0	7,7							***					
Natural first material	0,0	11,5										Shops*		
Energy saving	0,0	3,5							**					
<b>Economic</b>	<b>22,4</b>	<b>2,4*</b>												
Cost	15,7	2,4***												
Use	0,0	0,0												
Quantity / abundance for everyone	7,0	0,0								Use*				
<b>Social</b>	<b>0,0</b>	<b>0,0</b>												
<b>Personal</b>	<b>21,3</b>	<b>11,9</b>	***	**	***	*								
Aesthetic	4,5	2,1		***		*						Water*, products**		
I use to / routine	2,4	6,6				***								
More simple life	0,0	0,7										Consume*, use*		
Personal use not share	15	5,2	***	**	***	***				Human**, products***Clothes**				
<b>Practical</b>	<b>32,9</b>	<b>12,6***</b>			*									
Size-capacity	27,2	8,4**	*	**						Shops*		Reduce*, money*** Buy*, use**, Money***		
Tolerance-not breakable-best	3,1	0,0												
Better storage	0,3	0,0												
Easier transportation	2,1	0,3												
Package for many people	0,7	4,9										Reduce**, money**		
Just drop	0,3	0,0												
<b>Just name the material</b>	<b>2,1</b>	<b>0,7</b>	*	*										
<b>No argument / criterion</b>	<b>11,5</b>	<b>2,1</b>												

**Note.** \*\*\* p=0.000, \*\*p=0.001, \*p=0.05

**Note. A:** Pig plastic bottle **B:** Personal plastic bottle **C:** Big glass bottle **D:** Personal glass bottle

## Results for the selection of the bottle

Regarding the selection of the bottle (see Table 5), before the EEP, most of the children preferred the big plastic bottle (Option A - 45%), followed by the personal plastic bottle (Option B - 30%), the personal glass bottle (Option D - 18%) and the big glass bottle (Option B - 14%). The selection of the big plastic bottle was statistically correlated to economic (cost) and practical (size, unbreakable) criteria, while the selection of the personal plastic bottle was statistically correlated to personal criteria and the perception that “you do not have to share with others”. The selection of the personal glass bottle was statistically correlated to personal criteria and more specifically, to aesthetic reasons. The selection of the big glass bottle was correlated to practical aspects, especially the size.

After the EEP, many of the children selected the big glass bottle (Option B – 53 %), followed by the personal glass bottle (Option D - 33%), the big plastic bottle (Option A - 24%) and the personal plastic bottle (Option B - 9%). The selection of the big glass bottle was statistically correlated to environmental criteria (reduce, environmental friendly, natural decomposition, natural resources saving, energy saving). The selection of the personal glass bottle container was statistically correlated to environmental criteria (recycle) as well as to personal criteria (aesthetic). The selection of the big plastic bottle was statistically correlated to environmental criteria and specifically to the criterion *reduce* and practical aspects (big size, not breakable), while the selection of the personal plastic bottle was statistically correlated to personal aspects and specifically to routine and personal use i.e.-not sharing.

## Correlation between Environmental Representations and Decision Making

Correlation analysis between the decision making criteria mentioned by the children and the words mentioned for the stimulus term *consumer* revealed differentiated results before and after the learning intervention (Tables 2-5). In the pre-test, the decision making criteria (environmental, economic, social, personal, practical) employed regarding the selection of objects (cup, bag, fruit container and bottle) were correlated to words like *consume*, *buy*, *shops*, *human* and several specific products (e.g. milk, juice, clothes, shoes). In the post-test, environmental decision criteria were correlated to words related to environmentally responsible behavior like *refuse*, *reduce*, *reuse*, *recycle*, etc. integrating the 4Rs introduced during the EEP. For some products, environmentally responsible intended behavior was further correlated with personal and practical criteria (e.g. for the selection of a cup: the word *recycle* was correlated with the decision making criterion appropriate to drink, reduce-size), with economic criteria (e.g. for selection of fruit container: the word *reduce* was correlated with the decision making criterion *quantity*), as well as with criteria of practical aspects (e.g. for the selection of a bottle: the word *reduce* was correlated with the criterion *packaging for many people*).

In the case of bag selection, the final decision was also statistically correlated to words based on the 4Rs. For example, in the post-test, the decision of selecting a paper bag was correlated to the words *recycle* and *reuse*, while the selection of the plastic single-use bag was correlated to the word *shopping*.

## CONCLUSIONS AND DISCUSSION

The present study explored the contribution of an EEP regarding sustainable consumption on children’s environmental representations (estimating conceptual change) and intentions to act (through a decision-making process) within the framework of consumerism and sustainability.

### Environmental representations and environmental knowledge in relation to sustainable consumption

Contemporary citizens, starting from their childhood, seem to separate gradually from the natural world and develop a sense of alienation (Phenice & Griffiore, 2003). Within this framework, several researchers have argued that the phenomenon of human-nature disconnection is obvious within children’s representations since, in most cases, children exclude human and human-nature relationship from their environmental conceptualizations (Loughland et al., 2002; Rickinson, 2001; Shepardson et al., 2007). A social representation could be considered as a structured mental model (Moscovici, 2001) the alteration of which gives insights for the estimation of conceptual change (Hovardas & Korfiatis, 2008). Based on our findings, it seems that initially (pre social representation) young children could not realize that a consumer’s actions are interrelated with the natural environment and have a negative impact on it, since a *consumer* was represented only as an agent trying to fulfill his/her needs. This is in aligned with the findings of previous studies (Shepardson et al., 2007). Such psychological separation from nature could be considered as one of the main causes leading to unlimited consumerism (Durning, 1995; Kanner & Gomes, 1995).

Michaelis (2000) has proposed that the “greatest challenges in developing an ethic of sustainable consumption is to recreate an awareness of our link to nature, of the impacts of our consumption choices on it, of the need and responsibility to nurture our environment” (p.22). Based on the findings of this study it seems that the EEP employed successfully encountered these challenges. More specifically, children’s post- representation included a more comprehensive social representation about *consumer*, since the *consumer* was not only related to the process of consumption but also to the natural environment. Indeed, within the frame of their final representation, children presented the *consumer* not only as an agent that buys and uses several products, but at the same time, integrated and grouped the 4R’s intentions (Refuse, Reduce, Reuse, Recycle). This highlights that pupils have assimilated the message from the learning material of the specific EEP.

Even though, a more comprehensive representation was derived after the intervention, several other issues could be further incorporated in children’s representations of a *consumer*, including dimensions related to health, animal rights and poverty. Based on Bentley et al.(2004), “If a clear link between shopping behaviour and environmental, health, animal rights and poverty issues can be established, young people will be able to realise a desire to help by making smarter personal consumption choices, and recycling and reusing where possible” (p.38).

### Decision making and intention to act in relation to sustainable consumption

Students decision making criteria formulate their intention to act towards a specific option, since most models of social behavior are based on the assumption that the decision to engage in a particular behavior reveal a behavioral intention (Pomery et al., 2009). Based on the results, after the implementation of the EEP, the decision making criteria for the 4Rs were consistent with children’s repertoire of selection in all four products. In contrast, in the pre-test, children’s decisions were statistically correlated to economic criteria and criteria related to practical aspects, while environmental criteria decisions were mainly correlated to recycling. However, even though recycling aims at reducing solid waste in landfill sites and conserve natural resources, it is also likely to be driven by different factors such as convenience, knowledge and access to a kerbside scheme (Tonglet, Phillips, & Bates, 2004). In contrast, *waste minimization (refuse and reduce)* behavior and *reuse* behavior, are more likely to be driven by knowledge and concern about environmental issues and concern about the consequences of waste disposal (Barr, Gilg, & Ford, 2001).

At the same time, the results revealed that in some cases decisions were statistically correlated to criteria of *personal and practical aspects*, both before and after the intervention (e.g. selecting the personal small plastic bottle for drinking water instead of the big family bottle), indicating the strong dependence of decisions on practical aspects related to everyday behavior and social norms. These decision criteria of *personal and practical aspects* are more or less stable because they may not be the result of a conscious decision but rather of habit and automatism. Hence, according to Carida (2011), habits, routines and automaticity play an important role in the cognitive effort required to function effectively and undermine our best intentions to change. Therefore, the promotion of lifestyle changes is not an easy task, it requires large sacrifices (Robins & Roberts, 2006) and special creative campaigning (Szerényi, Ágnes, & Anna, 2011). In the frame of the Sustainable Consumption Program, additional activities are proposed to be carried out at schools and home and therefore students are encouraged to do so. In this manner, the long-term impact of the program could be increased.

In a few cases, decisions were statistically correlated to *economic criteria*, before and after the intervention, and it seems that these individuals will be more difficult to become sustainable consumers since they base their purchasing decisions solely on economic factors. Our findings also provide support to the proposition of Fan and Xiao (1998) that this type of consumer is looking for good prices and he/she is concerned about getting the best value for his/her money. However, if these consumers become more environmentally conscious, this could help them to become sustainable consumers since their willingness to purchase more expensive yet environmentally friendly products would be more influenced by their environmental consciousness rather than their financial state.

After the learning intervention, children’s environmental criteria increased, while economic, social and personal criteria, as well as criteria related to practical aspects, were decreased in the selection of all products. It seemed that the EEP empowered children to relate decision making criteria to *recycle*, waste minimization (*refuse, reduce*) and *reuse*, and also facilitated in making them more concerned about the origin of the products. The most important aspect was that the EEP enabled them to realize the conflicting interests between those criteria.

### Relation between environmental knowledge and intention to act

During the past two decades, several studies (e.g. Shepardson et al., 2007) highlighted the need to investigate the relationship between children’s mental models with their decision-making. Shepardson and his colleagues

formulated the hypothesis that children's conceptualizations of the environment may shape the ways in which they conceptualize an environmental issue and direct their actions. Focusing on young children's representations, our findings reveal that children who used more environmental decision criteria in the post-test, also mentioned words such as *refuse, reduce, reuse, and recycle*, revealing their intention to act in more environmental friendly manner through their decisions. Taking into account that children's post-test environmental criteria were correlated to their representational associations regarding sustainable consumption, the study's findings support empirically Shepardson's et al. (2007) hypothesis and maintain that there is correlation between representations and decision-making criteria.

Findings of the current study exemplified those of Bang, Medin and Atran (2007) as well as Atran, Medin and Ross (2005) who focused on cultural mental models and investigated how people conceptualize nature and how they may intend to act in it. The two studies which explored the hypothesis that differences in subjective distance from nature affects environmental decision making, found that populations which demonstrated a closer relationship with nature, in terms of their conceptualizations, as well as in their daily lives, demonstrated a more ecological orientation in their decision making. Therefore, based on the findings of this study, one can claim that young people's collective representations play an important role in decision making and are related to the ways in which they may then intend to act.

The results of the present study generate useful insights for the hypothesis that there is a relation between students' environmental knowledge (through environmental representations) and intention to act (through decision-making). This was supported by other studies as well. For example Lee (2011) found that concrete environmental knowledge among adolescents was a significant predictor of behavioral intentions associated with 'green purchasing'. Also, McEachern and Warnaby (2008) found that product knowledge positively affected purchase intention. Additionally, Kang, Liu and Kim (2013) suggested that once consumers have accumulated more information about environmental sustainable products and have more experiences with them, they would develop positive perceptions and attitudes towards consumption, which would lead them to having stronger intentions towards exhibiting environmental friendly purchasing behavior. However, many other factors influence children's intention to act including beliefs, social pressures, physical facilitators, and individual's action competence which will finally define whether an intention to act will be implemented (e.g. Cialdini et al., 1990; Corraliza & Berenguer, 2000; B. B. Jensen & Schnack, 1997; Pruneau et al., 2006). Educating youth about how they can contribute to sustainability, by using their purchasing power and by promoting conscious consumerism is central to progressing towards a more sustainable future.

## **LIMITATIONS AND FUTURE RESEARCH**

Given that the evaluation of the intervention took place right after the completion of the EEP, according to Engels and Jacobson (2007), such a relatively short frame between the intervention and the evaluation could help control for any confounding variables and thus, could ensure the validity of the measured effects. However, according to Carleton-Hug and Hug (2010) studies investigating the effectiveness of an EEP should also evaluate the long-term effects of such an intervention in order to monitor whether the impact of the program will be sustained beyond students' initial involvement. Considering this limitation, our future work will expand in order to investigate whether the effects of the EEP employed are sustained through time.

Despite the effectiveness of the one-day program, its short duration is a limitation. Dettmann-Easler and Pease (1999) reported that residential EEPs are considered more effective since students spend much more time in the natural environment, while at the same time, there is more available time for instruction. Hence, research has indicated that there is a need for longer EEPs or repeated interventions over a longer time period in order to increase the possibility that program effects will be sustained (Knapp & Benton, 2006; Powers, 2004).

Finally, it should be noted that even though the EEP employed gave emphasis on the inclusion of an action-component by focusing on the 4Rs, as possible actions supporting sustainable consumption, the influence of the EEP on students' activities, when returning back to their schools and homes is an issue that has not received any further exploration. Students were not assigned to bring back action plans that their parents signed, regarding their reuse behaviors (e.g. Redman, 2013). Additionally the household members were not interviewed in order to investigate students' motivations and barriers to change and this is a limitation. Besides, according to Malandrakis et al. (2011), expressing an intention is rather different than undertaking the corresponding action. Fröhlich, Sellmann and Bogner, (2013), who investigated the effectiveness of a short educational program for sustainable consumption, concluded that despite the fact that after the program students were more willing to act as environmentally friendlier consumers, their intentions did not persist over time and did not lead to corresponding behaviors, probably due to the short duration of the program. Hence, given the short duration and lack of explicit evaluations of students'

behaviours, the results must be used with caution when assuming that intentions to act will translate into pro-environmental behaviours. Considering this limitation, our future plans include the employment of post program data collection methods, focusing on the investigation and measurement of students' intentions to act in combination with the actions undertaken in the long term.

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