School of Social Sciences

ArtZero intervention: an art-based proposal to promote Zero Waste

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RESUMO

O plástico é o material mais produzido no planeta e as embalagens deste material representam cerca de metade dos resíduos plásticos no mundo. Como a maior parte não é biodegradável surgem vários problemas quando o plástico termina no meio ambiente. Diversos estudos sugerem que muitos problemas ambientais, incluindo a questão dos resíduos e do plástico, estão ligados ao comportamento humano. Por sua vez, é possível desenvolver intervenções que visam potenciar o comportamento pró-ambiental. Contudo, várias críticas têm sido feitas aos modelos tradicionais de educação ambiental e de promoção do comportamento pró-ambiental. Com base numa revisão da literatura sobre métodos de educação ambiental e do papel dos conhecimentos, preocupações, atitudes e comportamentos ambientais, um novo tipo de intervenção foi desenvolvido. A intervenção - chamada ArtZero - inclui conversas sobre sustentabilidade, estratégias de redução de desperdício e arte, uma limpeza de praia e uma competição artística em que só se pode usar "lixo" para criar as peças de arte.

A intervenção teve a duração de 4 semanas. 34 pessoas inscreveram na intervenção, contudo apenas 19 participaram em todas as fases do programa. Para a recolha de dados, optou-se por uma metodologia mista, em que os participantes tinham que preencher um questionário online antes e depois da intervenção, com perguntas abertas e fechadas. Para além disso, no final de cada sessão os participantes avaliavam a sessão. De forma complementar, conduziu-se observação participante e notas de registo foram criadas. A análise das respostas demonstrou que as pessoas que se inscreveram no programa ArtZero tendem a ter níveis elevados de conhecimentos, atitudes e comportamentos pró-ambientais em relação ao consumo consciente e à produção de resíduos. Adicionalmente, os resultados indicam que a intervenção ArtZero - como método de educação ambiental não tradicional - contribui para a um aumento significativo de comportamentos pró-ambientais nos participantes, nomeadamente nos comportamentos relacionados com o consumo. Por último, com base na observação participante e na avaliação por parte dos participantes conclui-se que estes tipos de intervenções são avaliados positivamente pelos participantes, permitem o seu envolvimento ativo e potenciam o empoderamento dos participantes.

Com base nisso, discute-se as potencialidades da aplicação de programas de educação ambiental que tenham como base metodologias de aprendizagem não-tradicionais e experienciais. Mais estudos são necessários no sentido de identificar fatores que

influenciam a eficácia dessas mudanças de comportamento de forma continuada e sustentada. **Palavras-chave**: comportamento pró-ambiental, educação ambiental, participação ativa, arte, ArtZero.

ABSTRACT

Plastic is the most produced material on the planet and plastic packaging represent about half of the plastic waste in the world. Because most of it does not biodegrade or decompose, problems arise when it finishes in the environment. Research has shown that many environmental problems, including the waste and plastic issue, are connected to human behavior, which could be adjusted to reduce the impact on the environment. This study aims to determine how environmental education can influence and empower individuals to act. Building on existing work on non-traditional environmental education, it asks: How can art and active participation, as alternative environmental education methods, contribute to the creation of pro-environmental behaviors?

Based on a review of the literature on environmental education methods, and environmental knowledge, concerns, attitudes and behaviors, a new type of intervention was created. 34 people registered, but only 19 participated in all phases of the program. An online questionnaire was distributed to the participants and paper-based questionnaires were also administered during the 4-weeks intervention. Results showed that people who registered in ArtZero tend to have high levels of pro-environmental knowledge, attitudes and behaviors with regards to conscious consumption and waste production. Additionally, they indicated that ArtZero contributes to a significant increase in the participants of pro-environmental behaviors related to consumption.

On this basis, it is recommended that non-traditional and experiential learning are used in environmental education programs. Further research is needed to identify other factors that could influence the effectiveness of these behavior changes in a sustained manner.

Keywords: pro-environmental behaviors, environmental education, active participation, art, ArtZero

Table of Contents

List of Tables

List of figures

ACRONYMS

AC Action Research

AEE Art-Based Environmental Education

DSP Dominant Social Paradigm

ISSP International Social Survey Program

EE Environmental Education

HEP Human Exemptionalist Paradigm

NEP New Ecological Paradigm

NEP New Environmental Paradigm

PAR Participatory Action Research

PEB Pro-Environmental Behavior

TTM Transtheoretical Model

UNEP United Nation Environmental Programme

ZWIA Zero Waste International Alliance

CHAPTER I – INTRODUCTION

Since the 1950s, plastic quickly became the most produced material on the planet and it has transformed many aspects of our everyday life (Al-Salem, Lettieri & Baeyens, 2009). It is strong and durable, inexpensive and versatile, making it widely used in many different areas (Thompson, Moore, vom Saal & Swan, 2009). Its production is largely reliant on the use of finite resources - fossil fuels - and the World Economic Forum (2016) stated that if the growth in plastic production continues at the current rate, by 2050 the plastic industry may account for 20% of the world's total oil consumption.

At present time, plastic packaging represent about half of the plastic waste in the world and because most of it does not biodegrade or decompose, problems arise at its end-of–life phase. While recycling is considered as an ecological waste-management strategy - in which there is no waste but only products (Frosch & Gallopoulos 1989; McDonough & Braungart 2002) - to reduce environmental impact and resource depletion, recent estimates show that 79% of the plastic waste ever produced now sits in landfills, dumps or in the environment, about 12% has been incinerated and only 9% of the nine billion tonnes of plastic the world has ever produced has been recycled (Geyer, Jambeck & Law, 2017). Waste in landfills represents an environmental problem because of gas emissions and the risk of leaching of hazardous substances into the soils that may eventually be carried into streams, rivers and finally to the sea (BIO Intelligence Service, 2011).

Every year between 4.6-12.7 million tonnes of plastic finish in the oceans and seas, adding to the 150 million tonnes that has already accumulated (Jambeck et al., 2015) and by 2050 there may be more plastic than fish in the ocean by weight (World Economic Forum, 2016). Marine litter is considered to be one of the greatest and growing environmental problems and challenges we face today (Sundt, Schulze & Syversen, 2014) and while cleaning the oceans and lands is crucial for the health of the environment, the solution to the waste and plastic problem is to tackle the issue at its source and reduce overall consumption.

Reducing the production and consumption of plastic has become a global challenge and, as industrial solutions might not be enough to curb this environmental problem, a change in human behaviors is needed (Heidbreder, Bablok, Drews & Menzel, 2019).

Information about plastic pollution and its effects on the environment is easily accessible and many people have knowledge about the environmental problems related to it. Nevertheless,

most individuals show apathy, denial and indifference towards this topic instead of being actively engaged in trying to reduce the negative impact it is causing (Hubert, 2019).

It is commonly believed that learning about environmental issues and changes in attitude would lead to environment-friendly behaviors (Ajzen & Fishbein, 2005; Kollmuss & Agyeman, 2002). However, the link between awareness and pro-environmental behavior (PEB) is not entirely direct and much research demonstrates that increases in awareness and attitudes are insufficient to spur actions (Heimlich & Ardoin, 2008; Thompson, 2008).

Bywater (2014) explains that traditional Environmental Education (EE) continues to focus on enhancing the ecological knowledge of people, with the assumption that once informed about environmental problems, they will adopt sustainable and environment-friendly behaviors, but this has been largely unsuccessful. Traditionally, EE addresses environmental issues through formal programs in a scientific and objective perspective which is shown in various research that it arises indifference among individuals instead of inspiring them to adopt different behaviors (Jensen, 2002; Robottom & Sauvé, 2003).

An essential measure on the path to sustainability is to find new methods and interventions to spur people into environmental action. Studying which strategies have a greater influence in the adoption of PEB is relevant for researchers and strategy makers exploring solutions to environmental problems that require a change in behavior (Clark et al., 2003) as well as for the academic community.

Various research show that experiential learning and action-oriented activities are fundamental to spur PEB (Moble, Vagais & Deward, 2010; Jensen, 2002; Martin & Horst, 2009). However, relatively little research has been conducted to identify which non-traditional EE method has a more meaningful influence on them. Hence, there is a need for more studies documenting the relevance of alternative EE methods in the adoption of PEB. It is the objective of this thesis to contribute filling this gap.

The broad objective of our research is to explore the relation between non-traditional EE methods and the adoption of PEB and to investigate whether a community-based intervention focused on Art and Active Participation increases environment-friendly attitudes and behaviors.

In line with this objective, the research question is:

How can Art and Active Participation, as alternative Environmental Education methods, increase Pro-Environmental Behaviors?

To realize the research question, we create ArtZero, an intervention based on art and active participation which included an art competition in which participants created art pieces from waste and three events, theoretical and practical, about sustainability, waste reduction and art. What follows is how the rest of the thesis is organized. In chapter II, an in-depth literature review is conducted with the aim of finding knowledge that could help to answer the research question. The literature review is divided into four sections and it begins with an overview of waste and plastic as an environmental problem. In the second section, we introduce the literature on PEB presenting the possibilities of a behavioral spillover. In the third one the literature on Environmental Education, followed by a focus on Active Participation, Action Research and the Arts as education methods. In chapter III, we present a broad outline of a new intervention model and in chapter IV we describe the methodology used. In chapter V, we present the results in five sections: in the first one our observations and reflection on the process, in the second section we present the participants' evaluation and feedbacks collected through the open-ended questionnaires, in the third section we display the results for participants' knowledge and concerns, in the fourth their attitudes and behaviors and lastly, in the fifth we present the change in attitudes and behaviors after the intervention. In chapter VI conclusions are drawn.

CHAPTER II – LITERATURE REVIEW

2.1 WASTE AND PLASTIC

Single-use plastics, or disposable plastics, are products made with a very durable and resistant material, and they are designed to be used only once and then thrown away or recycled. The production process of plastic contributes to air pollution and global warming (Verghese, Jollands & Allan, 2006; Ellis, Kantner, Saab & Watson, 2005) and when this material is dispersed in the environment, it represents harmful effects which include harm and death of animals (Gregory, 2009; Verghese et al., 2006), degradation of the habitat's natural beauty (Adane & Muleta, 2011) and the obstruction of sewerage systems which may contribute to the spreading of many contagious diseases (Ellis et al., 2005).

It is estimated that almost 10 million plastic bags are consumed per minutes (Assadourian et al., 2004) and due to their very light weight and balloon form, they can easily be blown away by the wind, ending up either on land or in the ocean, contaminating the environment and threatening wildlife. In fact, as previously mentioned, plastic materials, particularly plastic bags, have been dangerous for animals that get in contact with them through ingestion, choking or entanglement (Jambeck et al., 2015; Cole et al., 2011). Jambeck and colleagues (2015) also show that, when the plastic is eaten by an animal, the toxic chemicals that are added during the production process transfer into the animals' tissues and eventually enter the food chain.

More threats caused by plastic are described in the United Nation Environmental Programme (UNEP) research on single-use plastic (2018) as follows: "Plastic bags can block waterways and exacerbate natural disasters. By clogging sewers and providing breeding grounds for mosquitoes and pests, plastic bags can increase the transmission of vector-borne diseases like malaria. High concentrations of plastic materials, particularly plastic bags, have been found blocking the airways and stomachs of hundreds of species. Plastic bags are often ingested by turtles and dolphins who mistake them for food. There is evidence that the toxic chemicals added during the manufacture of plastic transfer to animal tissue, eventually entering the human food chain. Styrofoam products, which contain carcinogenic chemicals like styrene and benzene, are highly toxic if ingested, damaging the nervous systems, lungs and reproductive organs. The toxins in Styrofoam containers can leach into food and drinks. In poor countries, plastic waste is often burned for heat or cooking, exposing people to toxic emissions.

Disposing of plastic waste by burning it in open-air pits releases harmful gases like furan and dioxin" (p.vii).

But health and environment are not the only reasons to act on the problem of plastic. Plastic waste causes economic damages too and studies show that the total economic damage to the world's marine ecosystem caused by this material amounts to at least $13 billion every year (UNEP, 2018). On the European Commission website it is also stated that marine litter represents losses for coastal communities, tourism, shipping and fishing, causing serious economic damage (2018).

The most common single-use plastic items found in the environment are, in order of magnitude: cigarette butts, plastic drinking bottles, plastic bottle caps, food wrappers, plastic grocery bags, plastic lids, straws and stirrers, other types of plastic bags and foam take-away containers (UNEP, 2018). None of the commonly used plastics, such as the mentioned ones, biodegrade or decompose, leading to their accumulation in landfills or the natural environment (Barnes, Galgani, Thompson & Barlaz, 2009). In fact, plastic breaks down over the years into smaller particles (<5 mm) known as microplastics which represent a notable source of marine pollution. Due to their size, microplastics are very challenging to treat, spot and remove from the ocean and the environment (Jambeck et al., 2015; Wu, Zhang, Huang, Liu, 2016).

Microplastics derive from two principal sources:

- Microbeads, which are the tiny particles found in many products such as toothpastes, facial cleansers and scrubs. Due to the size, they escape the wastewater treatment of fresh water and end up in the ocean.
- The degradation of plastic debris due to biological, physical and chemical factors. This disintegration into smaller pieces most commonly occurs on land because of high UV irradiation and by the abrasion by waves, when the plastic is located on beaches. When plastic material finishes in the ocean, it takes much more time to fragmentate because of the low temperatures and reduced UV exposure (GESAMP, 2015).

The impact that microplastics have on the environment lies in their ability to absorb toxic hydrophobic compounds and, once in the ocean or land, represent a danger to wildlife (Xanthos & Walker, 2017; Wu et al., 2016).

Since the 1950s, plastic quickly became the most produced material on the planet, surpassing most other man-made materials, and its largest market is packaging (Geyer et al., 2017). At present time, plastic packaging represents about half of the plastic waste in the world and most

of it is produced in Asia, while America, Japan and the European Union are the world's largest producers of plastic packaging waste per capita (Geyer et al., 2017).

The World Economic Forum (2016) stated that if the growth in plastic production continues at the current rate, by 2050 the plastic industry may account for 20% of the world's total oil consumption.

While we keep producing more and more of this material, its disposal is not as effective.

The end of most plastic products and packaging is in landfills, dumps, incinerated or dispersed in the environment. Recent estimates (Geyer et al., 2017) show that 79% of the plastic waste ever produced now sits in landfills, dumps or in the environment, about 12% has been incinerated and only 9% of the nine billion tonnes of plastic the world has ever produced has been recycled. It is predicted that if we do not change our consumption habits and waste management practices, by 2050 there will be around 12 billion tonnes of plastic litter in landfills and the environment (Geyer et al., 2017). Plastic waste in the marine environment has been recently recognized as a global threat (Eriksen, Mason, Wilson, Box, Zellers & Edwards, 2013) and marine litter is considered to be one of the greatest and growing environmental problems and challenges we face today, with 75% of the marine waste in the world constituted by plastic (Norwegian Environment Agency, 2014). 70% of this plastic litter sinks to the seabed, 15% floats on the surface, and 15% is washed up on shore all over the world (Sundt et al., 2014).

Several governments around the world are tackling this issue and are introducing some limitations such as bans and levies on disposable plastic waste. So far, more than 60 countries are focusing on plastic bags and styrofoam which represent the most visible form of plastic pollution in urban and natural settings (UNEP, 2018).

Many environmental problems, including the waste and plastic issue, are connected to human behavior (Gardner & Stern, 2002; DuNann Winter & Koger, 2004; Vlek & Steg, 2007) which could be adjusted to reduce the impact on the environment.

2.2 PRO-ENVIRONMENTAL BEHAVIOR

PEBs, also known as environmental responsible behaviors, conservation behaviors or environment-friendly behaviors, refer to those behaviors that are consciously adopted to minimize the harm of an action to the environment, or even benefit it (Kollmuss & Agyman, 2002; Steg & Vlek, 2009).

PEBs can be manifested in several different ways according to the extent of visibility: environmental activism in the public-sphere, non-activist political behaviors also occurring publicly (such as supporting certain policy initiatives), private environmentalism (such as purchasing decisions) and behaviors that originate in organizations to which an individual may belong (Stern, 2000).

Hungerford and Volk (1990) talk about responsible citizenship and for their research they created a multilevel model of environmental behavior that incorporates three levels of variables that ultimately impact them. The first variables are entry-level variables that would "enhance a person's decision-making, once an action is undertaken" (p.11), such as knowledge of ecology or environmental sensitivity. The second level variables are ownership variables, enhanced through in-depth knowledge and personal investment, which create in individuals a sense of ownership about a specific environmental issue. The third level variables are empowerment variables that provide the sense of empowerment about a specific environmental issue, and makes individuals feel like they can make a difference. Zimmerman (2000) associates an empowering outcome with the stage in which an individual gain a perception of control, skills and proactive behaviors; empowered individuals see themselves as being capable to act and create change.

Ten years after Hungerford and Volk, Stern (2000) distinguished between four sets of causal variables that could influence PEBs: attitudinal factors, contextual forces, personal capabilities and habit or routine. More predictors of PEBs, identified by other investigations, include moral responsibility, self-efficacy, participation in environmental networks and behavioral intention (Steg & Vlek, 2009; Dietz, Stern, & Guagnano, 1998; Olli, Grendstad & Wollebaek, 2001). The level of education is also a variable that could influence PEBs: Weaver (2002) shows that individuals with low levels of general environmental knowledge are less sympathetic to environmental problems and less likely to engage in PEBs.

A positive ecological worldview has commonly been measured with the New Environmental Paradigm (NEP) (Dunlap & Van Liere, 1978), whereas the Dominant Social Paradigm (DSP) refers to a more anthropocentric worldview with little concern for nature, which is resource exploitative, growth-oriented and more materialistic (Milbrath, 1985). Environmental concerns have been proven to decrease when one's belief in the DSP increases (Kilbourne, Beckmann & Thelen, 2002), and Ogunbode (2013) reports that a less positive ecological worldview is a reflection of a lack of environmental knowledge.

Environmental knowledge is the general awareness of facts, concepts and relationships regarding the surrounding environment and its ecosystems (Fryxell & Lo, 2003) and it involves the understanding of what could cause an impact on this surrounding environment (Mostafa, 2007). It has a significant influence on environmental concerns and it is assumed that individuals with higher levels of environmental knowledge and concerns tend to have more optimistic and positive attitudes towards the environment (Arcury, 1990; Van Birgelen, Semeijn, & Behrens, 2011; Lu & Shon 2012; Lee, 2011).

The relation between environmental knowledge, concern, attitudes and behaviors has been widely studied and there is still disagreement with regards to the connection between attitudes and behaviors. Researchers such as Kraus (1995), Bamberg and Moser (2007), Sultan (2013), and Davison, Littleford and Ryley (2014) suggest that PEBs and attitudes are aligned with each other, while others such as Cottrell (2003), Abdollahzadehgan, Gohary and Amini (2013), and Chen (2013) disagree.

Even if previous research shows that knowledge is an important pre-requisite for PEBs, the link between knowledge and environment-friendly actions is not entirely direct. Much research demonstrates that simple awareness of environmental problems is insufficient to spur environmental behaviors (Hungerford & Volk, 1990; Magnus, Martinez & Pedauye, 1997; Pooley & O'Connor, 2000; Heimlich & Ardoin, 2008).

Every day, in schools, universities, television and other media we are bombarded with information about plastic, its effects on the oceans harming marine wildlife and entering the food chain and the environmental problems related to it but still, most people show apathy and indifference towards this topic. When great issues such as environmental problems cause most individuals to feel small and useless, different methods to engage them in creating change are required, for example adopting an empowerment perspective which could make them feel powerful and productive (Heuscher, 2012).

Sustainability-focused events are another mean to promote pro-environmental behaviors, and a way to explore this possibility is by using the Transtheoretical Model (TTM) (Halpern, Bates, Beales & Heathfield, 2004; Prochaska & DiClemente, 1983; Mair & Laing, 2013)

The TTM, also known as the "Stages of Change" model, suggests that people go through a sequence of five stages as they adopt voluntary changes in their life: pre-contemplation, contemplation, preparation, action and maintenance (Prochaska, 1979). Individuals in the pre-contemplation stage do not intend to take action and change their behaviors in the foreseeable future and are not even aware that there is a problem that may need attention; they are often unmotivated and not ready for help. Traditional programs are usually not designed to meet the needs of the individuals in this stage. Those in the contemplation stage, intend to begin to change behaviors and are aware of the pros and cons of this action, but are not ready for traditional action-oriented programs that require participants to act immediately. Individuals in the preparation stage are ready to take action and make the change; they are the ones who should be recruited for action-oriented interventions. Those in the action stage have made changes in their lifestyle and might require support and encouragement to continue. Lastly, maintenance is the stage in which individuals are focusing on preventing relapse (Prochaska, 1979). A casual and relaxed atmosphere in a sustainability-focused event may put participants in the mood for learning about something new and it may help to facilitate the processes of behavior change (Anderton, 2009; Laing & Frost, 2010; Sharpe, 2008).

Once PEBs are adopted, there is a chance for "behavioral spillover" (Thøgersen, 1999) which occurs when one PEB leads to another one or more than one. This possibility has been studied by various scholars in recent years (Evans, Maio, Corner, Hodgetts, Ahmed & Hahn, 2013; Whitmarsh & O'Neill, 2010; Thøgersen & Crompton, 2009) and there is much empirical evidence that suggests the correlation in practice between different PEBs (Thøgersen & Olander, 2006; Whitmarsh & O'Neill, 2010).

Acting in an environment-friendly way might change, by increasing or decreasing, an individual's likelihood to adopt one or more other PEB. Most of the data in the reviewed literature suggests that PEBs can positively spill over from one realm to another (Maiteny, 2002; Frey, 1993) and the likelihood of this happening depends on how similar the behaviors are perceived in a person's mind (Olander & Thøgersen, 2003). In fact, behaviors are gathered in categories that reflect the same underlying disposition (Ajzen & Fishbein, 1980), for example recycling, energy conservation and purchase of organic products and, as previously mentioned, behavioral spillovers are more likely to occur between behaviors in the same category (a consumer that buys organic eggs for a while and starts buying organic fruits)

because they are perceived as similar (Thøgersen, 2004). Another aspect that may influence a behavioral spillover is the presence in individuals of ethical norms regarding the environment (Thøgersen & Olander, 2003)

Behavioral change and eventual spillovers need a long time to occur and there is no consensus about how long it might take. An example for this is Poortinga and colleagues (2013) research on possible spillover effects of a carrier bag charge, which showed no change in behaviors in individuals but their environmental identity was strengthened, which in the long run, the authors hypothesized it could lead to a spillover in other PEBs.

An interesting example showing a positive behavioral spillover in an environmental setting is Evans and colleagues research (2013) showing that recycling rates were higher after the participants of two experiments received environmental information about car-sharing in the USA, meanwhile the rates did not change when the participants received financial information.

2.3 ENVIRONMENTAL EDUCATION

Environmental Education (EE) represents a key role in the face of environmental problems and it can provide not only theoretical knowledge, but also practical skills to find solutions and tackle these issues. It should be integrated into all levels of the whole system of formal education to enable people and nations to understand the need to adapt humans' activities to the environment and to develop in a sustainable and harmonious way (UNESCO-UNEP, 1977). In accordance to what was discussed in the first Intergovernmental Conference on Environmental Education of 1977 (UNESCO-UNEP), the modern world is characterized by an economic, social, political, and ecological interdependence and being aware of this relation represents a prerequisite for tackling global environmental problems (such as ocean related issues) and it may reinforce a spirit of responsibility and solidarity between communities. On the other hand, EE should also address those problems that are familiar to the learners in order for them to relate and acquire knowledge, values and attitudes that will help them to solve the problems closer to them, protecting and improving the environment. Much research also defines EE as a tool to not only enhance people's environmental knowledge, awareness and attitudes but also to create new patterns of skills and behaviors towards the environment, namely PEBs (Stapp et al, 1969; Hungerford & Volk, 1990; Magnus et al., 1997; Pooley & O'Connor, 2000; Heimlich & Ardoin, 2008; UNESCO-UNEP, 1977; Jurin & Fortner, 2002).

In his article regarding EE in schools, Stevenson (2007) shows a clear discrepancy between schools' practices and EE. Schools' practices emphasize passive assimilation of simplistic factual knowledge and its reproduction, whereas EE is commonly characterized by problem-solving and action-oriented approaches. Jensen (2002) writes that EE in school tends to pass on the knowledge about the environment in a traditional and lecture-based manner, and students do not have the possibility to actively internalize the information. The main obstacles perceived by teachers to include active-oriented EE in school curricula are: low priority of environmental education, over-crowded curriculum, lack of resources, limited access to the outdoors and student apathy to environmental issues (Tan & Pedretti, 2010). As a result, in most cases EE is taught in a traditional, objective and passive manner, focusing exclusively on enhancing the ecological knowledge of people, with the assumption that once informed about environmental problems, they will adopt sustainable and eco-friendly behaviors (Bywater, 2014). Knowledge on environmental issues does not necessarily lead to positive environmental attitudes (Kollmuss & Agyeman, 2002; Kempton, Boster & Hartley, 1995; Eagly & Kulesa, 1997), which represent one of the most important prerequisite in the adoption of PEBs (Kraus, 1995).

Traditional EE addresses environmental issues through formal programs in a scientific and objective perspective which is shown in various research that it arises indifference among individuals instead of inspiring them to adopt different behaviors (Jensen, 2002; Robottom & Sauvé, 2003). Many researchers demonstrated this limitation of traditional EE which can lead to defense mechanisms such as apathy and "action paralysis", making people feel like environmental problems are too big for them to handle (Jensen, 2002; Lertzman, 2009; Norgaard, 2009; Hawthorne & Alabaster, 1999; Uzzell, 1999; Mobley, Vagais, & Deward, 2010). This result is counterproductive to the same aim of EE which is to enhance people's environmental knowledge and to encourage them to act and adopt PEBs (Stapp et al, 1969; Hungerford & Volk, 1990; Magnus et al., 1997; Pooley & O'Connor, 2000; Jurin & Fortner, 2002; Heimlich & Ardoin, 2008).

Principally, traditional EE reflects the Human Exemptionalist Paradigm (HEP), seeing humans and society in a different sphere compared to the environment instead of considering everything as a whole (Catton & Dunlap,1978; Buttel, 1987). HEP separates the environment from humans, justifying the latter from exploiting environmental resources (Freudenberg et al, 1995) and opting for "greener" alternatives instead of reducing consumption in order to create a real environmental sustainable society (Gould et al, 2004; Pellow, 2007). Bywater (2014) makes an example of this when saying that to change the economic and political systems that caused

environmental destruction and poor human health we do not have to buy green alternatives like hybrid cars instead of conventional cars, but we have to decrease our consumption, demand that governments improve public transportation, change energy-intensive manufacturing processes or alter our dependence on individual vehicles (p.922).

Besides traditional and theoretical EE, non-traditional education - such as active, hands-on and experiential learning with field work and community involvement - play a key role in creating awareness and understanding, personally affecting the students and leaving a more lasting impression (Stelljes & Allen-Gil, 2009; UNESCO-UNEP, 1977). Various research shows that experiential learning is as fundamental as theoretical knowledge to spur PEBs: Jensen (2002) and Martin and Horst (2009) show the importance of using problem-based and action-oriented activities, whereas Mobley and colleagues (2010) recommend teaching students not only environmental literacy, but also ecological foundations, conceptual awareness, action skills, and investigation and evaluation skills.

With this regard, the following chapters will focus on alternative EE methods - more in particular on active participation and art - that can provide a hands-on and participatory approach to environmental issues and learning.

2.3.1 ACTIVE PARTICIPATION AND ACTION RESEARCH

Traditional EE is not the only possible way to provide knowledge and motivate individuals to change behaviors: informal education and formative experiences can also be considered a way to raise awareness about environmental issues and, potentially, shape PEBs.

Increasing the action competence of people is an overall aim of EE and active participation is a key element in this process (Jensen, 2002). Various studies show the influence of active participation on the environmental behaviors of students: Asch and Shore (1975) compared the behaviors of a control group with the behaviors of a test group that received environmentally oriented teaching and that was visiting a nature conservation center, the latter group showing a more protective behavior; Brody and Ryu (2006) compared the environmental footprint of a control group with the one of a group of pupils self-recording it engaging in a problem-oriented approach, the latter reporting a significant difference; Schneller (2008) compared the effect of conventional teaching with hands-on projects on PEB of students, noting positive effects for the latter; lastly, the effect of action-training on PEB has been studied by various researchers

(Ramsey, Hungerford & Tomera, 1981; Ramsey & Hungerford, 1989; Ramsey, 1993) showing a positive change compared to the behaviors of the pupils in the control group.

Active participation can develop through Action Research (AR), which is a methodological approach applied in the field of educational research, based on participation, collaboration and critical-reflection (Kemmis & McTaggart, 1988).

"How can we improve this situation?" is the question spurring most AR to start: these researches are usually guided by personal commitments to human flourishing and issue solving in a community (Reason & Bradbury, 2008). Reason and Bradbury (2008) describe this family of inquiry practices as both a participatory process that links action and reflection in the pursuit of improving a specific situation, and as a set of practices that is values-oriented and that helps individuals to act creatively towards an issue that is present and pressing in their lives, communities and wider ecology. The goal of AR is to create a positive change on both small and large scale, produce practical knowledge, that is useful to individuals in their everyday lives, and affect communities and people by increasing their well-being and creating an "equitable and sustainable relationship with the wider ecology of the planet of which we are an intrinsic part" (Reason & Bradbury, 2008; p.4).

Being participation a central dimension in human life, in nature and between humans and non-humans (Fricke, 1983; Heron & Reason, 1997), including participation in a research makes the relation between researcher and participants more natural, collaborative and not passive (Heron, 1996; Reason & Bradbury, 2001).

Katsenou, Flogaitis and Liarakou (2015) used AR to encourage students in Greece to participate actively in their schools with regards to sustainable waste management. This method promoted open communication between all team members which subsequently facilitated the active participation of the students: they were encouraged to feel more comfortable, to rely on their strengths, to take initiative and to collaborate. The AR in question promoted small changes at a time with a slow and gradual application of participatory activities, based on Breiting's work (2008) which shows how small steps in the right direction can be more effective than great and ambitious plans.

AR can also be used to make participants gain a sense of empowerment (Katsenou et al, 2012; Herr, 1995) as well as assisting them to create change in their own environment (Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009).

2.3.2 ART AND ENVIRONMENT

The great environmental challenges that present and future generation will face, will have to be handled and solved through awareness, positive attitudes, collaboration, creativity and innovation (Stoll, Sørmo & Gårdvik, 2018).

In the early 1990s a new form of environmental education based on artistic practice was conceived in Finland and it was called Art-Based Environmental Education (AEE) (Mantere, 1995). Finnish art educator Meri-Helga Mantere (1995) believes that environmental knowledge and responsibility can be developed by using artistic methods to express personal environmental experiences and thoughts and by becoming more receptive to sense perceptions and observations. She explains that artistic experiences and activities enhance the individual's ability to see, know and understand. Flowers (2012) studied the effects of an art-based environmental education program on the environmental perceptions of children, reporting that the children who participated in both the traditional and the art-based EE programs were more likely to take part in conservation activities and presented an increased knowledge and understanding of nature, greater environmental awareness and positive environmental attitudes.

The arts have been used many times to raise awareness about environmental issues and create social change (Lovett, 2004; Nadkarni, 2008; Clover, 2000; Curtis, 2011). The arts represent a valuable tool for EE and when they are associated to the sciences, they turn the latter into more accessible and favorable topics of study (Tyler & Likova, 2012).

As previously mentioned, a common response to environmental challenges is psychic numbing and apathy but art can help individuals to cope with this overwhelming "idea of crisis" (van Boeckel, 2009). The arts can, in fact, be considered as much more than just a creative product made to create emotional impact: they have the ability to simplify and transfer complex ecological or scientific information making it more interesting and easier to remember (Curtis, 2011) and they can be a mean to generate knowledge, personal empowerment and enhance self-esteem and growth (Fox, 2015).

The arts as an educative method can accommodate the various learning styles of people (Butler, 1995) and they make individuals receptive to new information which may not necessarily be internalized through other forms because it reaches the sensory, emotional, perceptual, cognitive, symbolic and creative levels of people (Rauhala, 2003). With regards to learning about nature and the environment, art allows individuals to approach environmental topics

afresh instead of thorough a pre-designed body of knowledge of traditional EE (van Boeckel, 2009).

An example of art in research is the photovoice method, which includes the participants in the research by providing them with cameras to take photographs. This enables them to record and reflect on what concerns them personally in their community through photography (Hergenrather, Rhodes, Cowan, Bardhoshi & Pula, 2009). By choosing exactly what images to capture and show, participants share understanding and ownership of the research process and of its outputs (Castleden & Garvin, 2008). According to Wang and Burris (1997), that first introduced photovoice in the early 1990s, through this method individuals can identify, represent, and enhance their community. Coppoolse (2015) used photovoice in her research to study the "visuality" of waste in Hong Kong, collaborating with various workers of the streets of Hong Kong and Hong Kong-based artists that use waste for their pieces.

Waste materials have gained a new outlook thanks to what Herminia Din (2013) calls "the recycle-based art movement". This movement represents a way of combining creativeness and artistic elements with the raising of awareness of human relationship to the environment. Din believes that following principles of hands-on experience-based learning (Dewey, 1934) and engaging students in community-based art education with a focus on global issues - such as environmental problems - enhances the responsibility of both the artist and the educator.

The environmental problems and challenges we are facing are complex and multidimensional and a holistic mean, such as art, should be used to confront them (Hicks & King, 2007).

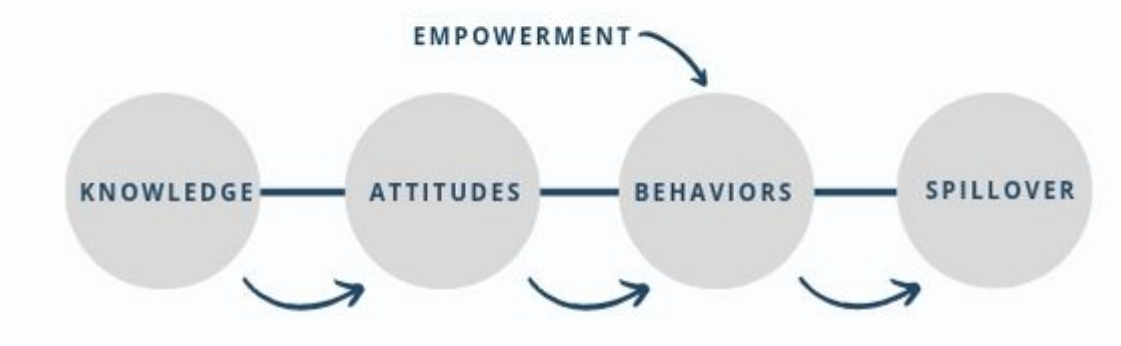
To gain new understanding of humans in nature and create lasting relationships with the natural world, it is fundamental for people to have first-hand experiences in the natural environments that are closer to them and it is important as educators to create these opportunities (Hicks, 2007). The arts can help to create awareness in people about nature and its relation with humans: first-hand experiences should be held not only in natural places such as forests, streams and seashores but also in those places that have been affected by humans, for example a polluted river.

Based on the theoretical review a need to improve the type of environmental interventions was identified and with that in mind a proposal of an intervention based on art and active participation, called ArtZero, was created. It included a first-hand experience in a polluted beach, the creation of art from waste materials and talks on sustainability and art.

CHAPTER III – ARTZERO INTERVENTION

The focus of the intervention for this research was on waste reduction and conscious consumption, with the objective of changing purchasing behaviors, which generally represents a greater environmental benefit than reusing or recycling available products (Gardner & Stern, 2002).

Our aim with the intervention, called ArtZero, was to investigate the relation between the environmental knowledge and attitudes of the participants, and the change in their behaviors, as well as the possibility of a spillover across behavioral categories and the influence of a feeling of empowerment in the increase of PEBs.



Knowledge and attitudes are some of the most important prerequisite in the adoption of PEBs (Kraus, 1995) but knowledge, although necessary, is shown to be not sufficient to generate the behavior in question (DiClemente, 1989; Fisher & Fisher, 1992; Ajzen, Joyce, Sheikh & Cote, 2011). In addition to the required informational foundation, attitudes, intentions and motivation towards the desired behavior are fundamental for its performance (Ajzen et al., 2011).

An important variable for motivation and behavioral change is empowerment, which Mechanic (1991) describes as a process in which people learn to see a closer correspondence between their objectives and a sense of how to achieve them, as well as a connection between their efforts and life outcomes. An empowering approach can be used in interventions with the aim to create social change, giving an active role in the change process to the participants (Zimmerman, 2000).

ArtZero was designed to increase the environmental knowledge of the participants and to promote pro-environmental attitudes and behaviors, in order to explore the possible lead to a behavioral change and spillover effect. It combined more theoretical moments, such as talks

about sustainability and waste reduction, with a collective action – a beach clean-up – and a second hands-on activity – an art creation. We designed the active experiences based on Zimmerman's suggestion that participation in collective action is one of the main behavioral component for psychological empowerment (2000) and on Martin and Horst's study (2009) showing how experiential and problem-based learning is rare and valued by people and is considered important in the creation of PEBs. Based on the TTM, ArtZero was intended for individuals in the preparation stage, who are ready to take action and change aspects of their lifestyle, for those in the action stage, who have already made changes but might need some support and encouragement to continue, and for individuals in the maintenance stage, focused on preventing relapse.

The intervention was inspired by the principles of Action Research and of Art-based Environmental Education. Based on previous studies (Kemmis & McTaggart, 1988; Reason & Bradbury, 2008; Katsenou et al., 2012; Herr, 1995; Fox, 2015; Flowers, 2012), the intervention was designed to create positive change in the community, using art, participation and hands-on activities as means to generate knowledge and personal empowerment.

Other inspirations for ArtZero were the works of three Portuguese artists that raise awareness about the waste issues through their work: Bordalo II (Artur Bordalo), Plasticus Maritimus (Ana Pêgo) and Xico Gaivota (Ricardo Ramos). Bordalo II uses end-of-life material to produce art with the goal of creating sustainability, ecological and social awareness. He says on his website: "I belong to a generation that is extremely consumerist, materialist and greedy. With the production of things at its highest, the production of "waste" and unused objects is also at its highest. "Waste" is quoted because of its abstract definition: 'one man's trash is another man's treasure'". Ana Pêgo collects pieces of plastic from beaches to make art. She gave the name *Plasticus Maritimus* to this new invading species and through her project she wants to raise awareness about this environmental issue and promote a more conscious use of plastics. Xico Gaivota also makes art pieces with plastic material he finds on beaches trying to help the ocean that, as he says, is desperately trying to get rid of what does not belong in it.

There are many other examples of art being used to bring science and environmental issues to a wider public. Some of the following ones were created in a participatory way, to draw attention to the problem of waste and to inspire efforts at finding solutions.

- *Natural Plasticity* - installation by Jana Cruder and Matthew LaPenta representing huge single-use plastic cups and bottles placed in a park and urban setting with the goal of changing the way people think about plastic and influence consumers' behavior.
- *River Cubes* - public sculptures made by Bob Johnson with discarded junk removed from public waterways. The project draws attention to the waterways and to the way we treat them.
- *Drifters Project* - series of works by professor, artist and activist Pam Longobardi made with ocean plastics she collected from beaches with the goal of raising awareness about global consumption and the impact of plastic objects on the world's places and creatures.
- *Washed Ashore* - project that includes the collection of trash from beaches through volunteer community cleanups and the creation of sculpture through collaborations between team members, volunteers and students.
- *Plastic Planet* - series of animal sculptures made by artist Calder Kamin using plastic bags collected from friends and family. In her website she talks about the impact that humans have on nature and how with her project she managed to divert thousands of plastic bags from the environment.
- *Kenny Scharf: BLOX and BAX* - artist Scharf uses plastic, electrical appliances, paint, beads and decorations to raise awareness about the over-abundance of waste and plastic, with the objective to not only talk about this environmental issue, but also to spread a message of hope, optimism and joy which he considers to be essential.

A pilot study for ArtZero was carried out before the intervention to identify potential problems and test sample recruitment strategies and data collection instruments. On the 24th of September 2018, registrations opened for the community of ISCTE-IUL university in Lisbon. Participation was open to students, professors and employees individually or for groups in which at least one of the participants had to be part of the academic community. The pilot study focused on an upcycling art competition and it did not include other events such as the beach clean-up and talks of the second edition. In the art competition, participants could only use the material we had previously collected in ISCTE-IUL: disposable plastic and cans from the three cafés of the campus and discarded cardboard and styrofoam from the architecture department. The first prize (see figure 1) consisted in 300€ donated by the Sustainability Director, Catarina

Roseta Palma, and the Public Choice Award, voted through Facebook, was a 50€ coupon for the Almedina bookshop.
49 people filled out the registration form but only 23 participated until the end: 6 groups made out of 20 participants and 3 individuals and, to have their art piece evaluated, all participants had to fill out an online questionnaire before and after the intervention.
This pilot research helped us to identify some aspects to improve in the questionnaire and it gave us an idea of what to expect and how to create, communicate and manage ArtZero.
We wanted the intervention to be larger than the pilot edition and we collaborated with various groups and people that believed in the impact of this research and that helped in the different phases of ArtZero. Each contribution will be described in the following paragraphs.

ArtZero was scheduled the following way:

- 30 March 2019: first meeting with the participants, two sessions with guest speakers, distribution of the material for the competition
- 31 March 2019: beach-clean up
- 6 April 2019: two sessions with guest speakers
- 13 April 2019: submission of the art pieces
- 27 April 2019: final awards event

The website for ArtZero was created by the cooperative Arte Viral and it included all the details of the events and the link to the registration form.
The talks and the exposition of the art pieces were held in the *Mercado de Arroios*, a local and typical market in the neighbourhood of Arroios, in Lisbon. This venue was made available thanks to a collaboration with the *Junta de Freguesia de Arroios* and it was selected to emphasize the beauty of grocery shopping in a traditional environment and the importance of choosing local products sold without any packaging, while at the same time supporting the community and local economy. All the events in the market took place on Saturdays between 11 am and 2 pm, in order to meet the availability of the participants and the opening hours of the market.
During February and March, we collaborated with Altis Hotels and the dance school Little Big Apple to obtain material for the art competition. Altis Hotels provided 25-litres empty and clean plastic containers they had previously purchased for detergent and 2 big bags of caps and

Little Big Apple provided plastic water bottles earlier consumed by the dancers. A few days before the first event we collected hundreds of unused straws from Club I, a restaurant in the campus of ISCTE-IUL University.

FIRST EVENT - *conscious consumption and sustainability*

The first event on the 30th of March took place in the *Mercado de Arroios* and started with a presentation of the project. We reminded the participants that, being ArtZero not a simple art competition but a research project, the attendance of the three events was mandatory in order to have their pieces running for the prizes.
Following a general overview of ArtZero we presented the first guest speaker, Filipa Jordão of the blog *A Face Verde*, who talked about her zero-waste lifestyle in an urban setting for about 45 minutes. She prepared a table with all the alternatives she uses instead of disposable plastics or other disposable materials. The objectives of this session were for the participants to:

- be informed about strategies and day to day things they can do to personally make a difference
- see the zero-waste lifestyle as something simple that everyone can do
- be informed about the many alternatives to disposable items

The second guest speaker was Eunice Maia, the co-founder of "Maria Granel", the first grocery shop in Portugal to exclusively sell products in bulk. She talked for around 45 minutes about the importance of shopping organic and package-free. The objectives of this session were for the participants to:

- be informed about the impact that packaging has on the environment (production, disposal - landfills, incineration, recycling - and consequences in oceans and lands)
- be informed that there are alternative to packaged food: bulk food in specialized shops like Maria Granel and some basic foods in markets and smaller shops.
- be informed about the importance of choosing organic products to avoid pesticides that end up in the atmosphere, lands and waters as well as being harmful for our health.

Lastly, we gave more information about the art competition. The original idea was for the participants to exclusively use plastic materials: the ones distributed by me, the ones collected during the beach clean-up and the ones they produced at home during the following weeks.

During one of the conversations with the participants, we decided to allow the use of any kind of material, as long as it was something being discarded and not newly purchased.

SECOND EVENT - *beach clean-up*

On Sunday 31st, in the beach of Santo Amaro in the outskirts of Lisbon, the beach clean-up event took place, between 3 pm and 6 pm. This specific hands-on and collective action was organized as the main component for psychological empowerment throughout ArtZero. This event was made possible thanks to the collaboration with Route Portugal - project that organizes beach clean-ups in Portugal, Brasil, USA and Indonesia - and *É p'ra Amanhã* - a documentary being filmed in 2019 in Portugal to show initiatives focused on sustainability in the field of Education, Fashion, Agriculture, Forest and Energy. More collaborators for this event were Biatakí - movement to reduce the pollution created by cigarette butts, who provided special backpacks to collect the cigarette butts and learn approximately how many have been collected - Movimento Claro Oeiras - project that raises awareness about the problem of plastic in the ocean - and Prema Yoga - yoga school that guided a 20-minutes class before the clean-up to warm up the body and awaken the mind.

The objectives of this session were for the participants to:

- learn about the problem of plastic in the ocean and the negative impact on the environment and wildlife
- feel empowered by acting on an environmental problem

THIRD EVENT - *re-use of materials in art*

The third event on the 6th of April took place in the *Mercado de Arroios* and started with a brief recap of the previous two events.
The first guest speaker was Ricardo Ramos, artist known as *Xico Gaivota*, who only uses plastic he finds on the beach to make art. He shared his personal story and gave insights on his artistic process for about 45 minutes. The objectives of this session were for the participants to:

- learn about artistic ways of reusing discarded material and feel inspired and empowered by the artist's personal story.

The second guest speaker was Rui Dias, the winner of the pilot edition of ArtZero. He described his experience in the first edition of the competition and shared some suggestions based on his personal creative process. The objectives of this session were for the participants to:

- see another example of upcycling and learn about the process behind the piece, from having the idea to choosing the materials and working with them.

Lastly on this last day of intervention, more clarifications were given about the art submission and the final award event.

On Saturday the 13th of April, the participants submitted the art pieces that were later displayed in the central part of the *Mercado de Arroios* and the vote was opened online for the Public Choice Award. Pictures of the pieces and their descriptions got uploaded on the Facebook page of ArtZero and people could vote for their favorite artwork by liking the respective picture. The voting closed officially on the 26th of April and the winner of the Public Choice Award was announced during the final event on the 27th.

Along with the winner chosen by the public, two winners were chosen by a jury, which was composed as follows. Eunice Maia, co-founder of the first Portuguese bulk shop *Maria Granel,* Ricardo Ramos, renowned Portuguese artist known as *Xico Gaivota* whose works are solely made of plastic found on beaches, Ana Salcedo, co-founder of the association *Zero Waste Lab*, Emanuel França Gouveia, of the organization *Route Portugal*, Ana Pêgo, Portuguese artist founder of *Plasticus Maritimus* whose pieces are made of plastic found on beaches, and Anna Masiello as the creator of ArtZero and the project Hero to 0.

The Public Choice Award (see figure 2) consisted in a zero-waste kit gifted by *Maria Granel* and it included many useful items to live a more sustainable life with less waste. The prizes for the first and second winner chosen by the jury (see figures 3 and 4) consisted in 500€ and 300€ respectively. The idea originally consisted in arranging a sponsorship that would cover the money prizes; this proposal was not successful and the money was raised in 20 days through a crowdfunding campaign on the Portuguese platform PPL thanks to the support of 44 donors.
With the final award event on the 27th of April 2019, we terminated the second edition of ArtZero, the three winners were announced and each participant had a few moments to show the art piece and share the message behind their work, as well as the material and technique

used to create it, with the audience. It is worth to mention that during the award event, Rodrigo Sabatini and Pål Mårtensson, of the board of the Zero Waste International Alliance (ZWIA) were present.

The participants were also informed that they might be contacted in the future for opportunities to exhibit their art piece. At the time of the final event, two opportunities were already offered to them: one in May for a Green Week event in Lisbon and one in October for the Zero Waste Cities event in Lisbon and Cascais.

Figure 1 Winner piece of the pilot edition of ArtZero

Figure 2 Piece that won the Public Choice Award

Figure 3 Winner piece of ArtZero

Figure 4 Piece that won the second prize

Figure 5 Special backpack to collect the cigarette butts

Figure 6 Some of the participants sorting waste

Figure 7 The warm up session before the beach clean-up

Figure 8 Image on the page of the National Geographic Portugal

Figure 9 List of the materials found on the beach

CHAPTER IV – METHOD

4.1 PARTICIPANTS

Participants were recruited in March 2019 via social media and online articles among Lisbon's residents. The recruiting message invited people to take part in an art competition with the possibility of winning money prizes and it asked about their willingness to participate in a study on environmental behaviors, which included the participation in the art competition, in three events and in the filling out of an online questionnaire before and after the intervention.
33 registration forms were filled out, 28 by individuals and 5 by groups made up of two to four people. Both the first and final questionnaires were to be filled out individually: 34 participants entirely filled out the first online questionnaire and 19 participants filled out the final online questionnaire. Before the first event, some people already had to be dropped from the analysis because they did not fill out the first questionnaire or they knew they could not be present in all three events. During the intervention 3 of the participants either did not participate in one of the three events or did not create an art piece. 2 of the participants did not fill out the final questionnaire after having submitted the art piece. The sample from the first questionnaire consists of 34 people from 17 to 57 years old, with a mean age of 28.35. 19 are from Portugal, 5 from Brazil, 4 from Italy, 2 from Germany and more from Venezuela, Namibia, Macedonia and Lithuania. The gender composition is 21 female, 12 male and 1 no gender. 9 are students and 15 either work or study in an area related to the arts. 8 participants have a secondary educational qualification or its equivalent, 11 have a Bachelor Degree, 14 a Master Degree and 1 a PhD. 9 people (26.5%) were born in a rural area and all currently live in an urban area.
Both the first and the final questionnaire were completed by 19 participants and the data collected was compared and analyzed using descriptive statistics to summarize and describe the data and the non-parametric Wilcoxon signed-rank test to explore the possibility of creation of PEBs throughout the intervention.

4.2 PROCEDURE

After filling out the registration form, participants received an e-mail instructing to follow a link to complete the first online questionnaire using Qualtrics - Online Survey Software & Insight Platform.

Most of the questionnaire was developed in English and then translated to Portuguese, with the exception of the NEP scale that had already been translated by Ribeiro (2013) and the new scales created by us. The questionnaire was pre-tested during the pilot research in order to check the clarity of the questions and avoid confusion, ambiguities and time excess for completion.

The questionnaire was anonymous and besides demographic questions, it contained questions regarding the person's general knowledge on environmental issues and plastic, on their attitudes and behaviors with regards to environmental concerns, on their performance of 15 PEBs and on the obstacles they perceive in their daily life with regards to adopting eco-friendly behaviors. The list included behaviors from different categories in order to verify the possibility of eco-friendly conduct spillover across behavioral categories.

Along with the online questionnaires, printed open-ended questionnaires were filled out by the participants at the end of each event to evaluate if the respective goals were met.

The link to a second online questionnaire was e-mailed to the participants before the final awards event. The comparison of the first and second online questionnaire, which had questions in common, allowed us to gain insights into the effects of the intervention and possible spillover between environmental behaviors.

A research diary was kept to record observations, perceptions and thoughts and the content was used in the "observation and reflection on the process" section of this thesis.

4.3 MEASURES

For this research, online questionnaires and paper-based open-ended questionnaires were administered to the participants before, during and after the intervention spread out in 4 weeks.

The first online questionnaire was divided into 3 main sections - knowledge and concerns, attitudes, and behaviors - and each section covered the topics of plastic and environment. Lastly, the questionnaire included a list of eight demographic questions that were used to learn the participants' age, level of education, job or study course, gender, nationality and whether they grew up and currently live in a rural or urban context.

The final online questionnaire focused solely on attitudes and behaviors and replicated the questions of the attitudes and behaviors section of the first questionnaire, along with two of the open questions of the plastic pollution knowledge section.

4.3.1 KNOWLEDGE AND CONCERNS

The environmental concerns of participants were tested using the measures developed by Dunlap and colleagues in 2000, called New Ecological Paradigm (NEP). The NEP scale, also known as the revised NEP, is the result of alterations of the New Environmental Paradigm, also referred to as the original NEP (Dunlap, 1978) which was an instrument created to measure where a group of people was in its transition from the anthropocentric Dominant Social Paradigm (DSP) to a new and more environmentally conscious worldview.
The revised NEP is widely used in environmental education and pro-environmental behaviors studies (Atav, Altunoğlub & Sönmezc, 2015; Grúňová, Sanéa, Cincera, Kroufek & Hejcmanová, 2018; Ntanos, Kyriakopoulos, Skordoulis, Chalikias & Arabatzis, 2019; Taskin, 2009; Putrawan, 2015; Ogunbode, 2013) and it consists of a 15-item questionnaire designed to measure the environmental concern of a population through the indication of the strength of agreement or disagreement with each statement. In case of agreement, eight items represent the endorsement of a pro-ecological worldview, while the other seven, in case of disagreement, reflect a pro-ecological view (Dunlap et al., 2000)
The revised version wanted to broaden the content of the original scale and, to the initial three facets - balance of nature, limits to growth, and antianthropocentrism - it added new items to tap rejection of exemptionalism facets and the possibility of an ecocrisis facets.
The Portuguese version was taken from Ribeiro (2013) and the items were evaluated on a Likert scale, between 1 (totally disagree) and 5 (totally agree).

To evaluate the knowledge of the participants about the environmental and health impacts of plastic we used part of the measure created by Hammami and colleagues (2017) for his study on awareness and attitudes of secondary school students regarding plastic pollution. Hammami et al. (2017) created a 34-question questionnaire, divided into three sections, to assess the level of awareness, attitudes and behaviors of secondary school students in the city of Sharjah, UAE, with regards to plastic pollution. In their questionnaire, the first section of the questionnaire presents demographics and background of the respondents. The second section measures the

knowledge of the participants concerning different aspects of plastic pollution and the third section focuses on their attitudes and practices.

For the second section of the ArtZero questionnaire - plastic pollution knowledge - we used the second section of Hammami and colleagues' questionnaire with some modifications.

The original section on his questionnaire includes three open questions about plastic consumption and disposal and eight yes or no questions, a general one about the impact of plastic on the environment and seven about the effects of plastic pollution on humans' health. For the ArtZero questionnaire, two yes or no questions have been added and only two of the three open questions have been used.

4.3.2 ATTITUDES

To measure the attitudes of the participants with regards to environmental concerns, we used part of the International Social Survey Program (ISSP) of 2010. This questionnaire is the third one of the Environment module after the version of 1993 and 2000 and it is made up of questions from the previous versions as well as new ones.

The 2010 ISSP - Environment III includes 22 questions, most of which comprise multiple items, and it covered the following topics: salience of environmental issues, left-right dimension, postmaterialism, social and political trust, environmental knowledge, attitudes towards environment, science and nature, respondent's behavior and environmental protection, environmental efficacy and scepticism, dangers of specific environmental problems, environmental policy, and the role of different nations in tackling environmental problems (ISSP, 2010). The items adapted for this section of the ArtZero questionnaire were 4 to measure the willingness of the participants to make trade-offs for environment from the section "respondent's behaviour and environmental protection", 4 from "attitudes towards environment, science and nature" and 1 item from "environmental efficacy, scepticism". The item *It is just too difficult for someone like me to do much about the environment.* was reversed so the higher mean would mean higher environmental efficacy.

The variable willingness to make trade off had a good internal consistency (Cronbach's $\alpha = .71$). Reliability analysis suggested that the item *In order to protect the environment the country needs economic growth* should be eliminated, so the variable "willingness to make trade-offs" was composed by 3 items (Cronbach's $\alpha = .74$).

To evaluate the attitudes of the participants with regards to the decrease of plastic pollution, we used the third section of the previously mentioned measure created by Hammami et al. (2017) and added a new question about the perceived obstacles in the performance of environment friendly activities. This part, made up of four original questions plus one new one, determines the willingness of the participants to act on specific issues related with the reduction of plastic and it is evaluated on a Likert scale between 1 (not willing) and 5 (very willing). All the scores of the items regarding environmental attitudes towards the reduction of plastic were summed and a new variable was created (Cronbach's α =.66).

4.3.3 BEHAVIORS

To measure general behaviors regarding environmental concerns we created a 3-section scale that would allow us to learn how often the participants act on specific issues and what is their perceived degree of difficulty.

The participants were asked how frequently they purchase second-hand articles and recycle and reuse materials on a Likert scale between 1 (never) and 5 (always). For each item, they were asked how they find these actions on a Likert scale between 1 (very difficult) and 5 (very simple).

To measure the PEBs of the participants with regards to conscious consumption and waste production and to assess possible spillover to other eco-friendly behaviors, we adapted a list of 15 behaviors and the participants were asked how often they perform each behavior, using a 5-point Likert scale ranging from 1 (never) to 5 (always). The list of behaviors covered the domains of green and package-free purchasing - for the conscious consumption and waste production section - and resources conservation, transportation and alimentation, for the spillover section. Six items were created ad hoc and they concern actions individuals can take to reduce their waste production, following certain "Rs" of the zero-waste concept (Johnson, 2013). Six items cover the domains of resources conservation, transportation and organic products and they were inspired by the study on behavioral spillover in the environmental domain of Lanzini and Thøgersen (2014). Three items concern alimentation and energy conservation and were inspired by previous definitions of pro-environmental behaviors (e.g, Stern, 2000; Steg & Vlek, 2009). Two inclusive variables were created. The first gather the eight items related do conscious consumption (Cronbach's α =.88) and the second represent the seven spillover behaviors (Cronbach's α =.66)

4.3.4 PARTICIPANTS' EVALUATION

Paper open-ended questionnaires were given to the participants to be filled out after the two events in the market to get specific data regarding the two talks and the beach clean-up. The participants were asked about their opinion regarding the events and about what they learnt with each guest speaker and what they found most interesting and impactful for each activity.

CHAPTER V – RESULTS AND DISCUSSION

In this chapter we present the findings in five sections: in the first one our observations and reflection on the process, in the second section we present the participants' evaluation and feedbacks collected through the open-ended questionnaires, in the third section we display the results for participants' knowledge and concerns, in the fourth their attitudes and behaviors and lastly, in the fifth we present the change in the attitudes and behaviors of the participants after the intervention.

5.1 OBSERVATIONS AND REFLECTION ON THE PROCESS

The idea for ArtZero was for it to be a community-based project designed to create an impact and inspire people to adopt more eco-friendly behaviors. Because most common behaviors tend to be quite constant over time (Thøgersen, 2006; Thøgersen & Olander, 2003), we did not expect major changes in behavior to develop over the one month time-span of the intervention, but this expectation was not confirmed.

The outcome of ArtZero exceeded our personal expectations. The art competition and the three events were a success, with immediate positive feedbacks both from the participants and from the co-organizers and guest speakers.

In each event, we were able to identify some participants who did not engage actively, at times showing disinterest, but in general nearly all of them seemed sincerely involved and curious.

FIRST EVENT - *conscious consumption and sustainability*

The main topic of the first event in the *Mercado de Arroios* was zero-waste practices, with a secondary focus on the importance of consuming local and organic products. With this first event, we wanted the participants to feel inspired and learn about the many ways each person can reduce their waste production and impact on the environment.

Due to an over-booking of the space, the first event did not take place in the central part of the market like it was planned, but we had to position the chairs for the public in another area on the side wing of the market. The market itself was slightly loud, but we had taken this aspect into account when deciding the location; we thought a local market well represented the message of conscious consumption we wanted to pass to the participants. However, the first

thirty minutes approximately were unexpectedly loud because of the other event (a circus performance with music) occurring in the central part of the market.

FIRST SESSION - Filipa Jordão of *A Face Verde* - "Talk about zero waste lifestyle in an urban setting"

Filipa, the first guest speaker, prepared a table in front of the public with all the objects and reusable items she uses in order to have a life without any waste. She started by introducing herself and her job with music and children, which we believe made her more approachable to the participants. One item after the other, Filipa showed all the steps people can take to eliminate plastic and waste from their lives. The presented items included kitchen tools, toiletries, reusable objects and even waste-free school and office supplies. She shared some recipes for homemade and biodegradable laundry detergent and perfume and highlighted the importance of buying local products and supporting small businesses and artisans, focusing on the fact that we can all be conscious consumers in our everyday purchases.
The selection of items Filipa had with her were more and better than we were expecting, and her knowledge and approach to environmental problems was positive and inspiring.
Most participants were engaged and clearly curious, asking questions, writing on their notepads and taking pictures. Some of them were already familiar with some of the products or practices and shared their experiences with the rest, contributing to the creation of an informal and relaxed environment.

SECOND SESSION - Eunice Maia of *Maria Granel* - "Talk about organic and package-free options: waste reduction and sustainability"

At this point in the event, we decided to move the chairs into a circle in order for all the participants to better hear the guest speakers.
Eunice started by introducing herself and the shop she founded with her husband in 2015. *Maria Granel* is the first shop in Portugal where everything is organic and sold in bulk: customers can bring their own bags and containers or use the paper bags that are provided at the shop. The mission of *Maria Granel* is to promote healthy eating and conscious consumption, with the goal of reducing waste and contributing to a sustainable planet. Eunice shared her story with the participants, explaining the process behind the opening of the shop.

She covered various points in a personal way, making the information accessible and relatable. The participants showed interest in her story and asked questions during and after her talk.

SECOND EVENT - *beach clean-up*

For the second event of ArtZero we wanted the participants to have an active experience being directly involved with the topic of research: waste and plastic.
Beach clean-ups have been a popular activity all over the world for the last several years and because the intervention took place in a coastal city, a beach clean-up seemed like an appropriate type of event.
With this activity, our goal was for the participants to gain knowledge about the problem of plastic in the ocean and its negative impact on the environment and wildlife and to feel inspired and empowered by personally acting on an environmental problem.
We co-organized the event with the Route Portugal project and later on we had the opportunity to transform it in a Trashtag Challenge thanks to a collaboration with the team of the documentary *É p'ra Amanhã*. The organization process went smoothly from beginning to end and the final result was extraordinary. In the beach of Santo Amaro we were able to unite approximately 120 people, eager to spend their free time helping the environment. The energy was high and positive throughout the clean-up participants (see figure 4), from the initial yoga class to the final sorting phase. Most of the people in ArtZero showed enthusiasm, initiative and even leadership, with some specific individual being less engaged.
The trash pick-up part lasted approximately 30 minutes and it occurred in different areas: the seashore (area assigned especially to the children), the rest of the beach, the bike path and the park nearby the beach. We personally filled up two tote bags with all kind of discarded material and once all the participants gathered back together on the beach, we emptied all the bags and started the sorting phase. This part was clearly the one that shocked and created more awareness between the people. Some ArtZero participants took on leadership roles, while encouraging the others to count all the collected material and making sure it was sorted properly, whereas a few of them left before the sorting phase was over.

This event participated in the worldwide "Trashtag Challenge" and appeared on the Facebook page of the National Geographic Portugal.

THIRD EVENT - *re-use of materials in art*

The third and last event of the intervention took place in the *Mercado de Arroios* and it focused on examples of "green" art made from discarded material. With this event, we wanted to provide some guidance to the participants with regards to the creation of their art piece, while inspiring them with specific examples of sustainable art. One of our goals for this third event was for the participants to see value in trash and realize its potential.
The chairs were positioned in the central part of the market and there was no over-booking of the area, yet the environment was particularly loud, this time because of the heavy rain beating on the roof. Overall, the guest speakers were clear and the event ran smoothly.

FIRST SESSION - Ricardo Ramos of *Xico Gaivota* - *talk about the collection and the re-using of marine plastic for art*

Ricardo shared his personal story and described the relation he has with the sea. He has a wide knowledge about the ocean, currents and tides also due to his previous job and he transmitted the information very well. We found his way of describing environmental problems and solutions somewhat straightforward and pessimistic - defined by a perception of modern society being beyond the point of no return - but not less inspiring. In fact, most participants wrote on the open-ended questionnaire that this session was extremely impactful and stimulating. The reaction he created in the audience was strong and empowering.
Hearing the stories of a person who changed his life to start an artistic project that would help reduce plastic waste was very interesting and the participants were in awe, at times asking questions but mainly carefully listening.

SECOND SESSION - Rui Dias, winner of the first edition of ArtZero - *talk about his creative process*

Rui focused on his personal creative process and shared some suggestions about time managing, message and technique. His piece *Microplastics in Plate* won the first pilot edition of ArtZero in 2018 and what most impressed the audience and the jury was the meaning behind the piece. In fact, during the talk Rui stressed that a strong message in an art piece is fundamental to generate impact.

We believe that the fact of him being a student helped to make him more relatable, yet only a few participants were engaging in the conversation.

5.2 PARTICIPANTS' EVALUATION AND FEEDBACKS

In agreement with previous studies (Jensen 2002; Martin & Horst 2009) the answers to the open-ended questions regarding the first session - which was based on practical examples - confirm the importance of experiential learning in the adoption of PEBs.

I learnt many things. Not only strategies on how to manage the waste we produce in our everyday life, but also how to begin to create a different, healthier and more ecological lifestyle. INSPIRING!

I learnt about products and practical things that help reduce our impact on the environment. I did not think about them this way and some I did not know at all.

Other recurrent answers align with Breiting's study (2008), showing that the participants began to feel empowered and to believe that each individual can make a difference, once they learnt that change can be more effective when it is the result of many small steps taken in our own time in the right direction.

I learnt about the importance of changing our habits through small steps.

Small changes of habits create a big impact. Her personal example is incredible.

Lastly, some of the participants wrote about what they learnt with regards to the importance of supporting small local businesses, even if at times it can be pricier.

I started to see that fact of spending more money for an eco-friendly product as a donation towards the artisans and local producers.

The answers to the open-ended questions regarding session two, show that they found her personal story particularly inspiring. Some answers refer to the fact that Eunice is a professor

of Portuguese language and literature with no background in environmental studies or sustainability, nevertheless she created a business, rose awareness about environmental issues and create a strong feeling of community in Portugal through various collaborations.

It is an excellent example of how ecological projects can be created,
even with no previous experience in this area.

I admire the way she changed her lifestyle and decided to inspire others in doing the same.

Some participants noted about the importance of supporting local producers and about the importance of changing consumerist habits.

I learnt that it is never too late to change consumerist habits.

I agree that it is so important to buy local and seasonal.

In the "feedback" section of the open-ended questionnaire nearly all participants congratulated and thanked the organizers for this first phase of ArtZero. Most participants showed signs of feeling empowered (Zimmerman, 2000) expressing excitement for the next activities and wishing for more similar events in the future.

I understood that change is possible and that we are all responsible for it.
We can all make a difference.

The answers to the open-ended questions regarding the beach clean-up are in agreement with previous research showing that active and hands-on learning play a key role in creating awareness and understanding (Stelljes & Allen-Gil, 2009; Jensen 2002; Martin and Horst; 2009). Results show that this event was effective in the change of the participants' perspective about plastic pollution in the environment and most answers described the feeling of empowerment and of perceived change in their behaviors - aligning with the work of Hungerford and Volk (1990) showing that a sense of empowerment is a variable that impacts behaviors. Some of the answers highlighted the fact that through this community action they were also able to impact the people who were present at the beach without having knowledge

of the clean-up; one of the participants shared in the questionnaire that he was approached by some people curiously asking what they were doing. Other recurring answers were about the power of community engagement and group effort, confirming the importance of community involvement for EE (Stelljes & Allen-Gil, 2009; UNESCO-UNEP, 1977).

Participating in this event has been extremely important to open my eyes even more about the HUGE impact each small action has. I promised to myself that every time I will go to the beach I will leave the it cleaner than how I found it.

I really liked the event. I was shocked with the amount of trash we found in 35 minutes, especially microplastics and cigarette butts. It had a very strong impact on me and on my day to day life. I look at the ground being more aware of the amount of things we actually throw out.

It is important to have clean-ups, but what is more important is to have better education and raising awareness in order to not have any more trash getting to the beaches.

The answers to the open-ended questions regarding the third session show that the participants got mostly inspired by the subject of "coherence": Ricardo explained how much he thinks it is important to be consistent with our beliefs. Participants indicated as an example that he does not cut the plastic pieces he finds on the beach in order to avoid producing microplastics, nor he uses paint or glue to limit the environmental impact of his art pieces. Some participants wrote about how this can be perceived both as a limitation and as new creative opportunities.

His commitment and coherence are very inspiring, as well as the fact that he considers himself being negative with regards to improving this environmental problem.

I found very interesting the idea of not breaking the pieces found on the beach. It limits, and at the same time opens creative possibilities.

Lastly, some of the participants wrote that they learnt that people become responsible for the trash they collect and that it is important to be selective in what a person takes home to re-use and upcycle into art.

The answers to the open-ended questions regarding Rui Dias' talk show that the participants found particularly interesting the fact that Rui made his art piece inspired by an issue that was concerning him in his everyday life and that he felt that by including a personal part of him in the piece, it would turn it into a starting point for reflection for the audience and it would help to raise awareness about this problem. Some answers mention the fact that he noticed a change in his attitudes after ArtZero and most answers refer to the powerful message of his art piece.

I found interesting that Rui changed some things in his everyday life after participating in ArtZero and I like that he created a piece keeping in mind what he found impactful in his own life: fish dying with plastic in the stomach.

Rui demonstrated that it is really important to exteriorize parts of us into the art piece. It is important to make something that makes sense to us and that reflects our experience, in order to be a starting point for reflection for the audience.

The online questionnaire sent to the participants at the end of the intervention included one question about their overall experience using a 5-point scale ranging from 1 (very negative) to 5 (very positive) and two open questions inviting them to share their opinion about ArtZero and what they would change about it.
Two participants did not fill out the questionnaire, sixteen considered the experience very positive, one selected 3 in the 5-point scale and two selected 4. The overall satisfaction with the experience was very high (M= 4.79; SD=.535).

Extremely positive. The moments together with the other participants and the "speakers" were not only inspiring for the shared experiences, but also for seeing so many interested, dedicated, passionate people about the environment, which left me, even in the most difficult moments (for example when we were surrounded by plastic in the rocks at the beach), with a strong hope that we can still make it.

With regards to the "construction" of the work of art, it was a fantastic process. Being able to put together the stimulating creative part, the willingness to try to convey the message of concern, need for change, and hope for as much people as possible, as I looked every day at

my own waste with a closer (and sometimes embarrassed) look. I felt empowered, every time realizing how important/impactful my small actions are.

I think it is a very interesting initiative to raise awareness about environmental and social issues through art. The talks with people already related to the environment and the beach clean-up are, in my opinion, important for the environmental education of the participants, and the people who already had this notion, had a chance to deepen their knowledge, to discover new ways to reduce waste and to gain awareness about the amount of micro-plastics, cigarette butts and garbage that exists in a place that at first glance seems relatively clean. I continue to congratulate the initiative.

All participants liked the project and several wrote about it being inspiring and an excellent form to raise awareness and create impact. More answers given, mention it being a unique and interesting project that should be shared also with people that do not have an artistic flair, that it can help to become aware of the great amount of waste produced in the household and that some of the things that are usually thrown away can still be reused.
Some suggestions that the participants gave are to change the location to an outdoor area in nature, to provide a space to create the art piece, to offer better prizes and be more transparent about them, to send a list with all the useful facts and information given during the event, to have more participants thanks to better promotion and communication, to have more time to create the art piece and to work with art galleries, schools or associations to eventually collaborate with in the future. Some of the participants with an artistic background wrote that it was a great way to push them to make their pieces in a more ecological way and that it influenced the way they make art and take decisions in their everyday life.

5.3 PARTICIPANTS' KNOWLEDGE AND CONCERNS

The results of the descriptive analysis (see Table 1), show that there was a tendency for respondents to endorse pro-ecological beliefs, regardless of gender or place where they grew up. The eight odd-numbered items of the scale were presented so that agreement indicated a pro-ecological view and the seven even-numbered items were worded so that disagreement indicated a pro-ecological worldview. The highest mean representing a pro-ecological view was of 4.79; SD=.479 for the item *Humans are severely abusing the environment* and the lowest

mean representing a pro-ecological view was of 1.24; SD=.606 for the item *Humans were meant to rule over the rest of nature.* The highest mean showing an anti-NEP position was of 3.44; SD=1.307 for the item *The earth has plenty of natural resources if we just learn how to develop them* (the reality of limits of growth).

Table 1. Responses to NEP Items

	M	SD
We are approaching the limit of the number of people the earth can support.	4.41	0.988
Humans have the right to modify the natural environment to suit their needs.	2.35	1.125
When humans interfere with nature it often produces disastrous consequences.	4.65	0.884
Human ingenuity will insure that we do NOT make the earth unlivable.	2.79	1.067
Humans are severely abusing the environment	4.79	0.479
The earth has plenty of natural resources if we just learn how to develop them.	3.44	1.307
Plants and animals have as much right as humans to exist.	4.71	0.719
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	1.85	0.989
Despite our special abilities humans are still subject to the laws of nature.	4.32	1.249
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	1.71	1.194
The earth is like a spaceship with very limited room and resources.	4.35	0.849
Humans were meant to rule over the rest of nature.	1.24	0.606
The balance of nature is very delicate and easily upset.	3.85	1.282
Humans will eventually learn enough about how nature works to be able to control it.	2.24	1.182

Based on the results of the first questionnaire regarding the knowledge of different aspects of plastic pollution (Table 2), all participants considered plastic waste to be harmful to the environment and to animals and one participant did not consider it to be a risk for the health of

humans. The items *Does plastic pollution lead to growth and maturation problems?* and *Does plastic pollution lead to negative effects on brain functions?* – the only two items which correct answers were negative - had the lowest percentage of knowledge.

Most of the participants believe that nearly all plastic products end up in landfills, incinerated or in the environment after their disposal and only 3 participants think that most of the plastic materials are recycled.

Table 2. Responses on the knowledge questions about different aspects of plastic pollution

	Correctly answered
Do you think plastic waste can harm the environment? (Yes)	100%
Do you think plastic wastes can harm the health of humans? (Yes)	97.1%
Do you think plastic wastes can harm the health of animals? (Yes)	100%
Does plastic pollution lead to lung problems? (Yes)	85.7%
Does plastic pollution lead to skin problems? (Yes)	77.1%
Does plastic pollution lead to reproductive problems? (Yes)	80%
Does plastic pollution lead to negative effects on brain functions? (No)	22.9%
Does plastic pollution lead to heart problems? (Yes)	60%
Does plastic pollution lead to cancers? (Yes)	88.6%
Does plastic pollution lead to growth and maturation problems? (No)	20%

5.4 PARTICIPANTS' ATTITUDES AND BEHAVIORS

When measuring the behaviors regarding recycling, reusing and buying second-hand items and the perception of difficulty in carrying out these actions of the 34 participants that entirely filled out the first online questionnaire, the results were as follows.

Most participants always recycle plastic (64.7%), paper (70.6%), glass (70.7%) and metals (61.8%) and they perceive the recycling of these materials as a very simple action (41.2% for plastic, 42.9% for paper, 50% for glass and 35.3% for metals). The exception is food waste which is always recycled only by 11.8% of the participants and it is perceived as a very difficult and difficult action by respectively 20.6% and 26.5% of the participants.

Most participants often reuse paper (52.9%), glass bottles and jars (38.2%), textile (38.2%) and 41.2% only few times reuse plastic packaging and containers. 14.7% never reuse textile and 21.2% perceive it as a difficult action.

The action perceived as the simplest is the reusing of glass bottles and jars, whereas the perceived as most difficult is the reusing of plastic packaging and containers.

Most participants often buy the following products second-hand: 35.3% of them buy books, 26.5% clothes, 20.6% household appliances, 26.5% furniture and 14.7% electronics.

11.8% never buy books second-hand, 20.6% clothes, 14.7% household appliances, 20.6% furniture and 29.4% electronics. Most participants perceive buying these second-hand products as a very simple action.

With regards to the behaviors related to conscious consumption and waste production the mean was of M=3.56; SD=0.703 and the sum of the scores of the behaviors regarding resources conservation, transportation and alimentation - representing the spillover section - had a mean of M=3.56; SD=0.703.

We could note that people who participated in ArtZero already had high attitudes towards the reduction of plastic (M= 4.43; SD=.43), confirming previous studies which show that individuals with higher levels of environmental knowledge and concerns tend to have more optimistic and positive attitudes towards the environment (Arcury, 1990; Van Birgelen et al. 2011; Lu & Shon 2012; Lee, 2011) and that individuals already concerned with environmental action seek to participate in events related to the environment.

The attitudes of the participants with regards to environmental concerns were divided into three variables for analysis: the mean for the willingness of the participants to make trade-offs for environment was of M=3.91; SD=0.65, for the attitudes towards environment, science and nature was of M=1.85; SD=0.70 and for environmental efficacy (single item) was of M=4.53; SD=0.90.

5.5 PARTICIPANTS' ATTITUDES AND BEHAVIOR CHANGE

To measure the change in attitudes and behavior towards conscious consumption and waste and plastic production of the 19 participants that filled out both the first and the final questionnaire, we compare the scores of the two questionnaires of each participant for the items regarding attitudes and behaviors, using the non-parametric Wilcoxon signed-rank test

(Wilcoxon, 1945, cit. in Field, 2009). The results showed that attitudes remained unvaried, whereas behaviors were significantly higher, confirming previous studies showing that non-traditional education methods, focusing on art and active aarticipation, can influence environmental behaviors (Asch & Shore, 1975; Brody & Ryu, 2006; Schneller, 2008; Ramsey, Hungerford & Tomera, 1981; Ramsey & Hungerford, 1989; Ramsey, 1993).

As Wilcoxon signed-rank test suggests, the changes of the mean of all attitudes variables where not significant. The attitudes towards plastic and waste reduction had a mean before the intervention of M=4.43; SD=.43 and of M=4.41; SD=.63 after the intervention, z = -.07, p = .93. The mean of the willingness of the participants to make trade-offs for environment was of M=3.98; SD=.66 before the intervention and of M=3.94; SD=.59 after the intervention, z = -.36, p = .7, for the attitudes towards environment, science and nature the mean was of M=1.67; SD=0.70 before the intervention and of M=1.78; SD=.70, z = -1.04 after the intervention, p = .29 and for the single item of environmental efficacy the mean was of M=4.52; SD=0.90 before the intervention and of M=4.3; SD=1.10 after the intervention, z = -1.08, p = .27.

The scores of all the items regarding conscious consumption and waste production behaviors were significantly higher after the intervention, with a mean before the intervention of M=3.5; SD=.7 and of M=4.1; SD=.6 after the intervention, z = -2.98, p = .003. In disagreement with previous studies (Evans et al., 2013; Poortinga et al., 2013) pro-environmental behaviors did not transfer to the other areas in question: the spillover items were not significantly higher at the end of ArtZero, z = 1.68, p = .092, with means of 3.5; SD=.7 in the first questionnaire and of 3.7; SD=.7 in the last one.

CHAPTER VI – CONCLUSION

In this dissertation, we proposed a new type of environmental intervention, called ArtZero, including talks about sustainability, waste reduction practices and art, a beach clean-up event opened to the public and an art competition in which the participants were only allowed to use waste materials to create art pieces.

The aim of this thesis was to explore the relation between non-traditional environmental education methods and the adoption of pro-environmental behaviors. The study focused on art and active participation – in a community-based intervention - as means to promote Zero Waste. This led to the formulation of the research question "How can Art and Active Participation, as alternative Environmental Education methods, increase Pro-Environmental Behaviors?". ArtZero was inspired by the principles of Action Research and of Art-based Environmental Education. Based on previous studies (Kemmis & McTaggart, 1988; Reason & Bradbury, 2008; Katsenou et al., 2012; Herr, 1995; Fox, 2015; Flowers, 2012, Zimmerman, 2000), the intervention was designed to create positive change in the community, using art, participation and collective action as means to generate knowledge and psychological empowerment. It was expected that experiential learning and action-oriented activities promote environmental attitudes and behaviors (Jensen, 2002; Brody & Ryu, 2006; Schneller, 2008; Ramsey, Hungerford & Tomera, 1981; Ramsey & Hungerford, 1989; Ramsey, 1993) and that the arts increase environmental perceptions, concerns and responsibility (Mantere, 1995; Flowers, 2012).

Online questionnaires were developed to measure variables regarding knowledge and concerns, attitudes and behaviors towards the environment and towards the issue of plastic waste, and they were administered before and after the intervention. Paper-based open-ended questionnaires to measure the impact of the intervention activities were filled out by the participants after each event. Data from N=34 participants, with ages ranging from 17 to 57 years old, was used to describe the levels of environmental and plastic knowledge, attitudes and behaviors of those participating in ArtZero, and data from N=19 was used to see the attitudes and behaviors changes. After the data collection, the data of the online questionnaires was compared and analyzed using descriptive statistics to summarize and describe the data and the non-parametric Wilcoxon signed-rank test to explore the possibility of creation of PEBs throughout the intervention. The results of our research indicate that participants adopted pro-environmental behaviors throughout the four-weeks intervention and, within this area of

application, no gender differentiated approach seems necessary. Attitudes towards waste and plastic production remained unvaried whereas the behaviors were significantly higher, confirming previous studies showing that non-traditional education methods, such as art and active participation, can increase pro-environmental behaviors - in this case behaviors regarding conscious consumption and waste production (Asch & Shore, 1975; Brody & Ryu, 2006; Schneller, 2008; Ramsey, Hungerford & Tomera, 1981; Ramsey & Hungerford, 1989; Ramsey, 1993). However, pro-environmental behaviors did not transfer to the areas of resources conservation, transportation and alimentation - comprising the spillover section. The answers to the open-ended questionnaires showed the creation of a feeling of empowerment in the participants which according to Zimmerman (2000) is when individuals gain a perception of control, skills and proactive behaviors. Participants shared that the events of ArtZero were important to realize how important and impactful small actions are and how working together towards improving an environmental problem can give hope and inspire into further action. Some participants shared that thanks to ArtZero they see themselves as being capable to act and create change, which is how Zimmerman (2000) describe empowered individuals.

Normally, environmental issues are addressed through formal programs in a scientific and objective perspective which can create apathy and arise indifference among individuals instead of inspiring them to act (Jensen, 2002; Lertzman, 2009; Norgaard, 2009; Hawthorne & Alabaster, 1999; Uzzell, 1999; Mobley et al., 2010). Various research show that experiential learning and action-oriented activities are fundamental to spur PEB (Moble, Vagais & Deward, 2010; Jensen, 2002; Martin & Horst, 2009). However, relatively little research has been conducted so far to identify which non-traditional environmental education method has a more meaningful influence on them. This study contributed to the documentation of the relevance of alternative environmental education methods in the adoption of pro-environmental behavior. Our research identified an effective intervention - based on art and active participation - that influences individuals in the adoption of environment-friendly behaviors.

Based on the TTM, ArtZero was intended for individuals in the preparation stage, who are ready to take action and change aspects of their lifestyle, for those in the action stage, who have already made changes but might need some support and encouragement to continue, and for individuals in the maintenance stage, focused on preventing relapse. The answers to the open-ended questionnaire confirmed that some participants were in the preparation stage and that ArtZero was helpful for them to be more aware and to start changing some aspects of their lifestyle. Participants' behaviors and attitudes were already high before the intervention, which makes us believe that many of them were in the action and in the maintenance stage when

starting ArtZero. Some shared that the events were useful to deepen their knowledge and to discover new ways to reduce waste, encouraging them to continue performing pro-environmental behaviors. None described ArtZero as being helpful in preventing relapse.

It can be concluded that non-formal learning and hands-on activities are important factors to consider when designing environmental education programs that aim to create new patterns of skills and behaviors towards the environment (Mair & Laing, 2013).

There are some main limitations in this study that could be addressed in future research. First, the sample did not reflect the general population because all participants already had very high environmental attitudes before the intervention, confirming studies showing that sustainable events are most likely to attract individuals who are already engaged in sustainable behaviour. Results with a more diverse and varied sample (with different levels of environmental knowledge, concerns and attitudes) may differ, with a possible increase in environmental attitudes, as well as behaviors. Second, the intervention was designed for the city of Lisbon, with local guest speakers and artists, and a hands-on activity in a polluted natural area of the city. We assume that the results of an edition of ArtZero carried out in a different setting from the research setting may vary. Third, the data collection methods could improve with some adjustments. Some of the scales in the questionnaire were not relevant for the research and for some we noticed some differences in understanding and interpretation. Nevertheless, the open-ended questionnaires helped to fill some of the gaps. Lastly, ArtZero occurred during a brief period of time and results may differ if the same intervention were to be carried out over a longer period of time, with the possibility of a stronger increase in attitudes and behaviors, and of a transfer of pro-environmental behavior to different areas.

Future work on this topic could focus on the following aspects:

i. Choosing a sample that is more representative of the population;
ii. Carrying out the intervention over a longer period of time;
iii. Performing follow up tests to investigate the long-term effect of such intervention and the longevity of the newly adopted behaviors;
iv. Adapt the intervention program, which was designed to promote Zero Waste and conscious consumption, in order to test the reach to different areas of pro-environmental behaviors.

Waste, and more in specific plastic material, represents a considerable environmental problem, polluting the environment and representing a threat to wildlife and humans' health. As other environmental problems, the issue of waste and plastic is connected to human behavior

(Gardner & Stern, 2002; DuNann Winter & Koger, 2004; Vlek & Steg, 2007) which can be adjusted to reduce human impact on the environment. With this study, we want to contribute to the promotion of the adoption of Zero Waste, which is a set of principles focused on waste prevention, with the aim to conserve "[…] all resources by means of responsible production, consumption, reuse, and recovery of all products, packaging, and materials, without burning them, and without discharges to land, water, or air that threaten the environment or human health." (ZWIA, 2018).

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APPENDIX

ArtZero online questionnaire

Para cada uma das seguintes afirmações, por favor indique o seu nível de concordância, tendo em conta que 1 corresponde ao nível máximo de discordância, e 5 o nível máximo de concordância.

	Discordo totalmente 1	2	3	4	Concordo totalmente 5
Estamos aproximar-nos do limite do planeta Terra para suportar os seres humanos que nele vivem.	○	○	○	○	○
O ser humano tem o direito de modificar a natureza de acordo com as suas necessidades.	○	○	○	○	○
As intervenções humanas sobre a natureza têm muitas vezes consequências desastrosas.	○	○	○	○	○
A capacidade inventiva do ser humano será suficiente para que a vida na Terra não se torne inviável.	○	○	○	○	○
A humanidade está a exceder-se no uso abusivo do ambiente e da natureza.	○	○	○	○	○
O planeta Terra será sempre abundante em recursos naturais se soubermos utilizá-los bem.	○	○	○	○	○

Tal como a espécie humana, todas as espécies animais e vegetais têm o mesmo direito de existir.	○	○	○	○	○
O equilíbrio da Natureza é suficientemente forte para superar os efeitos negativos das modernas sociedades industriais.	○	○	○	○	○
Apesar de terem capacidades excepcionais, os seres humanos não escapam às leis da natureza.	○	○	○	○	○
Algumas pessoas têm exagerado muito a ideia de que a humanidade enfrenta uma "crise ecológica".	○	○	○	○	○
O planeta Terra pode ser visto como uma nave espacial com espaço e recursos limitados.	○	○	○	○	○
A humanidade foi "criada" para governar a natureza.	○	○	○	○	○

O equilíbrio da natureza é muito frágil e facilmente perturbável.	○	○	○	○	○
A humanidade acabará por conhecer as leis da natureza, conseguindo assim controlá-la.	○	○	○	○	○

Relativamente aos resíduos plásticos e à poluição plástica, considere as seguintes afirmações.

	Sim (1)	Não (2)
Prejudicam o meio ambiente. (1)	○	○
Prejudicam a saúde dos seres humanos. (2)	○	○
Prejudicam a saúde de animais não humanos (ex: animais marinhos). (4)	○	○
Originam problemas pulmonares. (6)	○	○
Originam problemas de pele. (11)	○	○
Levam a problemas reprodutivos. (12)	○	○
Têm efeitos negativos nas funções cerebrais. (13)	○	○
São responsáveis por problemas cardíacos. (14)	○	○
Originam cancro. (15)	○	○
São responsáveis por alguns problemas relacionados com o crescimento humano. (16)	○	○

De seguida, indique o seu nível de concordância com as seguintes afirmações, tendo em conta que 1 indica o nível máximo de discordância e 5 o nível máximo de concordância.

	Discordo totalmente 1	2	3	4	Concordo totalmente 5
Estou disposto/a a fazer o que está certo para o meio ambiente, mesmo que isso implique ter que gastar mais dinheiro ou levar mais tempo.	○	○	○	○	○
Estou disposto/a a aceitar uma perda no meu nível de vida (ex: nível financeiro, conforto, acesso a bens e materiais) para proteger o meio ambiente.	○	○	○	○	○
Estou disposto/a a pagar preços muito mais altos para proteger o meio ambiente.	○	○	○	○	○
Estou disposto/a a pagar impostos muito mais altos para proteger o meio ambiente.	○	○	○	○	○

A ciência vai encontrar respostas para os nossos problemas ambientais, pelo que não vamos ter que mudar o nosso estilo de vida.	○	○	○	○	○
As pessoas preocupam-se demasiado com o impacto prejudicial que o progresso tem no meio ambiente.	○	○	○	○	○
Preocupamo-nos demasiado com o futuro do meio ambiente e pouco com os empregos e o aumento de preços.	○	○	○	○	○
É muito difícil, para alguém como eu, fazer algo de significativo pelo meio ambiente.	○	○	○	○	○
Para proteger o meio ambiente, o país precisa de crescimento económico.	○	○	○	○	○

Relativamente aos seguintes materiais:

	Com que frequência recicla:					Qual o grau de dificuldade que sente na reciclagem:				
	Nunca	Poucas vezes	Às vezes	Muitas vezes	Sempre	Muito difícil	2	3	4	Muito fácil
Plástico	○	○	○	○	○	○	○	○	○	○
Papel	○	○	○	○	○	○	○	○	○	○
Vidro	○	○	○	○	○	○	○	○	○	○
Metais	○	○	○	○	○	○	○	○	○	○
Comida	○	○	○	○	○	○	○	○	○	○

Relativamente aos seguintes produtos:

	Com que frequência reutiliza:					Qual o grau de dificuldade na reutilização:				
	Nunca	Poucas vezes	Às vezes	Muitas vezes	Sempre	Muito difícil	2	3	4	Muito fácil
Papel	○	○	○	○	○	○	○	○	○	○
Garrafas de vidro e frascos	○	○	○	○	○	○	○	○	○	○
Recipientes de plástico antigos (ex: pacotes de margarina)	○	○	○	○	○	○	○	○	○	○
Têxteis (ex: tecidos)	○	○	○	○	○	○	○	○	○	○

Agora considere os seguintes itens:

	Com que frequência compra itens/produtos em segunda mão:					Qual o grau de dificuldade na compra de produtos/itens em segunda mão:				
	Nunca	Poucas vezes	Às vezes	Muitas vezes	Sempre	Muito difícil	2	3	4	Muito fácil
Livros	○	○	○	○	○	○				○
Roupa	○	○	○	○	○	○				○
Eletrodomésticos	○	○	○	○	○	○				○
Móveis	○	○	○	○	○	○				○
Eletrónicos	○	○	○	○	○	○				○

No seu dia-a-dia, quais os principais obstáculos sentidos na realização de atividades "amigas do ambiente"?

_____

Na sua opinião, o que é que acontece à maior parte do plástico, depois de ser deitado fora?

_____

Na sua opinião, qual a tendência de utilização de material plástico em produtos diários?

_____

Considerando que 1 é "nada" e 5 é "muito", em que medida estaria disposto/a a:

	Nada 1	2	3	4	Muito 5
Partilhar informação acerca da poluição de plástico com amigos e familiares.	○	○	○	○	○
Reutilizar e levar os seus próprios sacos quando vai às compras.	○	○	○	○	○
Utilizar produtos reutilizáveis (garrafas de água, copos e chávenas, palhinhas…).	○	○	○	○	○
Apoiar uma campanha ambiental através de donativos monetários.	○	○	○	○	○
Iniciar uma campanha/projeto para proteger o ambiente.	○	○	○	○	○

Com que frequência realiza as seguintes atividades:

	Nunca 1	2	3	4	Sempre 5
Compro produtos com o mínimo de embalagem possível.	○	○	○	○	○
Levo os meus próprios sacos quando vou às compras.	○	○	○	○	○
Procuro embalagens que possam ser facilmente reutilizados ou reciclados.	○	○	○	○	○
Compro produtos biológicos.	○	○	○	○	○
Compro frutas e legumes não embalados..	○	○	○	○	○
Compro produtos que possam ser usados mais do que uma vez, em vez de produtos descartáveis.	○	○	○	○	○
Tento arranjar as coisas que tenho, antes de optar por novos itens.	○	○	○	○	○
Uso transporte público para ir a escola/trabalho.	○	○	○	○	○
Ando de bicicleta para a escola/trabalho.	○	○	○	○	○
Desligo a luz quando saio de um quarto/casa/gabinete.	○	○	○	○	○
Leio documentos digitalmente em vez de imprimi-los.	○	○	○	○	○

Fecho a torneira enquanto escovo os dentes.	○	○	○	○	○
Evito o uso de aquecedores e/ou ar condicionado para não usar energia.	○	○	○	○	○
Não como carne nem peixe.	○	○	○	○	○
Não como produtos de origem animal.	○	○	○	○	○

Para terminar, gostaríamos de saber algumas informações sobre si.

Quantos anos tem?

_____

Qual o seu nível de escolaridade?

- ○ Nenhum ou primária incompleta (1)
- ○ Ensino básico (1º e 2º ciclo) ou equivalente (2)
- ○ Ensino básico (3º ciclo) ou equivalente (3)
- ○ Ensino secundário ou equivalente (4)
- ○ Formação técnico-profissional de nível médio ou superior (5)
- ○ Bacharelato (6)
- ○ Licenciatura pré-bolonha (7)
- ○ Licenciatura (8)
- ○ Mestrado (9)
- ○ Doutoramento (10)

Qual a sua profissão?

_____

Se é estudante, que curso está a frequentar?

_____

Qual o género com o qual se identifica?

_____

Qual a sua nacionalidade?

_____

Como descreve o local onde cresceu?

- ○ Rural (4) _____
- ○ Urbano (5) _____

Agora, considere o local onde vive atualmente.

- ○ Rural (1) _____
- ○ Urbano (2) _____