Title of Thesis

Design and evaluation of a primary school environmental education programme: fostering environmentally responsible behaviour through intergenerational learning

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Abstract

This study investigates the potential for children to influence their parents' environmentally responsible behaviours following their involvement in a month long environmental education programme (EEP). The locus of interest has been approached from two different views, parents and children, applying a mixed methods approach for data collection and analysis. The use of children's diaries and pre and post programme parent questionnaires formed a crucial part of the study to gauge the existence of influence from children to parents and the environmentally responsible behaviours which followed as a consequence. These results suggest the existence of a relationship dynamic between parents and children that is influencing their beliefs and behaviours. Interestingly, parents engaged in a significantly greater frequency of environmentally responsible behaviours after the EEP. This relationship between environmental beliefs and behaviours of parents and children warrants further research to better understand the roots, dynamics and directionality of the influence. A deeper understanding of this relationship will help refine intergenerational environmental education programs that aim to transfer environmental knowledge between students and their parents. This study also uncovered a variety of strategies use by children to engage their parents. The use of a 'green diary' offers a potential vehicle for engaging parents in the EEP outside the school classroom. The use of intergenerational practises deigned to be embedded within programmes, offer opportunities for environmental messages to go beyond the initial audience and into the family home to promote environmentally responsible behaviours.

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Chapter 1. Introduction

1.1 Background

Reliable and durable interventions for the development of environmental concern and in turn, the entrenchment of Environmentally Responsible Behaviour (ERB), have become a matter of urgency if humans are to prevent irreparable damage to the earth's life support systems and a consequent deterioration in human quality of life (De Wet 2007). The participation of school children in environmental education programmes has become an increasingly popular method of achieving this goal, and in some instances, it is a required aspect of the curriculum (Duvall & Zint 2007). Significant human and financial resources, spread across numerous organisations, are dedicated each year to the development and delivery of programs that teach about the environmental challenges society faces today (Liu & Kaplan, 2006). Most educators hope that the children participating in these programmes will emerge with a deeper environmental consciousness, and there is optimism that these children will be influential in developing future policy and environmental practice. However, the students are as yet too young to have voter power and direct influence in issues that concern the environment (Duvall & Zint, 2007; Sutherland & Ham, 1992). Many existing environmental education programmes and interventions attempt to engender care for the environment. Programme providers look to continuously improve on their mandates, deepening and widening the impact of their messages, despite the limited growth on budgets (Liu & Kaplan 2006). Many of the existing interventions are also palliative and do not teach people about the root cause of the environmental crisis (De West 2007). Since the crisis has been caused by human behaviour, the source of the solution is a change in human behaviour, and interventions must focus on human actions to make a significant difference to the status quo.

The overwhelming majority of environmental education programmes are directed at children and youth, and there are very few interventions accessible to adults. Since adults are the people most likely to be causing significant environmental impact through their lifestyle in the present, and make lifestyle decisions on behalf of their children and others, this is a substantive gap (Uzzel 1999).

Many environmental challenges will require decisions to be made long before children are in a position to act on a policy or economic level. As Uzzell (1999) asserts, "It is adults who need to institute and engage in changed behaviours, adults who are parents but also consumers, industrialists, community leaders, educators and policy and decision makers in all walks of life". Hence the need for programs that target adults has been identified within the environmental education community (Duvall & Zint, 2007). However, many barriers to adult education exist, such as the limited amount of time that adults have available, the need to develop appropriate adult communication methods in environmental education and limited funding for resource development and delivery of adult education (Ballantyne, Connell, & Fien, 1998). Adults generally learn about environmental issues through the media which, while successful at increasing knowledge, does very little to move individuals from awareness to action (Ballantyne, et al. 2001) The challenge is to find and/or develop, interventions that will communicate to adults and provide significant experiences which, over a short period of time, will provide the necessary catalyst for behavioural change. Thus, in an age perceived by some to be of imminent environmental crisis, the question remains, how can environmental educators reach today's adult population, when the greatest focus of 'environmental messaging' has been on children?

Child-to-adult influence is a relatively new way of considering the dynamics in the family relationship. The commonly held view is that parents teach their children, inculcating their knowledge, values and beliefs. However a growing body of literature provides evidence for bi-directional influence between parents and children (Ambert 1992, Knafo and Galansky 2008).

Studies into the impact of children on parent's environmental knowledge, attitudes and behaviours however remain limited and inconclusive (Duvall and Zint 2007). More analysis must be conducted surrounding the communication processes children use to influence or inspire their parents to change behaviours (Ballantyne, et al. 1998). Ballantyne et al. have identified areas where further research is required including describing the nature of the interactions between young people and their parents, the factors affecting the process of intergenerational influence and the development of a method for measuring the flow of communication between child and parent (1998).

The recognition and inclusion of intergenerational influence in environmental education offers numerous potential benefits to stakeholders. Strengthening and supporting child, parent and community relations by encouraging action is another possible result of intergenerational interaction (Ballantyne, et al. 1998). A greater understanding of the effect of environmental education programs on family communication will allow programme creators to include activities that promote strong family communication.

1.1.2 Key Concepts

Key terms and concepts used in the study are outlined below:

Environmental Concern: indicates "the degree to which people are aware of problems regarding the environment and support efforts to solve them and or indicate the willingness to contribute personally to their solution" (Dunlap et al, 2000).

Environmentally responsible behaviour or ERB is such behaviour which is generally judged in the context of the considered society as a protective way of environmental behaviour or a tribute to the healthy environment. It is a behaviour of individual persons that is beneficial or benign towards the earth's ecosystem and supports a sustainable society (Monroe, 2003). ERB occurs at different

levels. At the household or individual level, it includes energy and fuel saving, reduction in water use, waste minimisation and recycling, and changes to sustainable food sources. At the level of governance, it includes actions such as policy making that incorporates elements of environmental concern. This study concentrates on the household and individual level.

Environmental Education or EE: Davis and Elliot (2003) identifies three levels of environmental education. The first level imparts knowledge about environmental science, natural history and wilderness skills. The focus here is on teaching ecology and environmental sensitivity. The second level, focuses on using the outdoors for personal and psychological growth in areas such as improving self-esteem, confidence and leadership abilities. The third level comprises of wilderness rites of passage which focuses on building knowledge of the natural world, personal growth and development. This study centres around the first form of environmental education.

Environmental Education Programme or EEP: Rather than being just the presentation of information, environmental education programmes help learners achieve environmental literacy, which has attitude and behaviour components in addition to a knowledge component. Elements of effective environmental education programs:(1) are relevant to the mission of the organisation/charity and to the educational objectives of the audience;(2)present ideas in ways that are relevant to learners;(3) involve stakeholders in all stages of the program;(4) empower learners with skills to address environmental issues and a sense of personal and social responsibility;(5)are accurate and balanced, incorporating multiple perspectives and interdisciplinary aspects;(6) are instructionally sound, using "best practices" in education; and (7) are evaluated with appropriate tools. All of these can be combined

Sustainable development: Definitions of sustainable development have been contested and debated since the appearance of the original definition in WCED (1987) the Brundlant Report *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*

1.1.3 Rationale

The ultimate goal of environmental education is environmentally responsible behavior, a causal pathway that is complex, especially when considering environmental education for children that is intended to also influence parental behavior.

This research aims in essence to identify and better understand the link or dynamic between environmental education at school, children's values of the environment and sustainability, children's impact on their parents' environmental values and thus behaviour. Considering the bigger picture therefore, it is suggested that creating this 'vehicle' through education at grassroots level, individuals who will one day become parents, leaders, policy makers and so on, our future on Earth stands a far greater chance of survival.

There are a range of reasons for these gaps in research, not least because conducting robust research is resource intensive and provision does not usually include sufficient funding to collect and analyse data in a systematic and rigorous way. There is evidence that family learning programmes provide a catalyst for long-term changes in the aspirations, confidence and life chances of children and adults and this is one of the main driver for this research.

1.2 Aims and Objectives

This study was carried out to establish whether a specifically designed EEP would cause the necessary trigger of child to adult interactions based around the environment, which in turn would progress into a positive change in ERB. In other words, will a specifically designed EEP begin the process of developing intergenerational influence (from child to adult), for adults to develop a greater awareness of environmental issues and in turn cause a change in ERB? Evidence of child-parent relationship is an integral component of environmental attitudes and behaviours, the existence of intergenerational learning within this EEP would validate current research and warrants future research on intergenerational education programs as a means of promoting environmental stewardship. Additionally, future research into the process of the relationship would provide added insight into the most effective ways to promote ERBs through education and policy.

It is hoped that deeper insights might emerge from the findings regarding not only whether children might be a catalyst to the development of environmental concern and ultimately the adoption of ERB, but also how this process of catalysis works and what its essential element are. It may then be possible to influence the manner in which EEP are designed and facilitated.

The aim of this research is to explore the potential of a school-based environmental education programme to influence both child and parental environmental attitudes and environmentally responsible behaviours through in-the-home child-to-parent communication. Specifically, the research seeks to understand if child participants have an influence on their parents' environmental behaviours and if the parents are aware that their own knowledge and actions are influenced by their children. The following research questions address the project's aim:

1. Do the children report that their participation in an environmental education program influenced their environmental knowledge and behaviour?
2. Is there evidence of child-adult influence during and/or after the EEP?
3. Is there an increase in environmental conversation between children and their parents after the EEP?
4. Have parents of children involved in the EEP c made any household changes in respect to the environment as a consequence of their child's involvement in the EEP?
5. Do parents report that their understandings of environmental issues and actions towards good environmental practices have changed since the start of the EEP?

To explore the aim of the study, the following objectives were used:

1.) providing a series of workshops for primary school pupils so that they could learn about the environmental.

2.) giving the pupils the skills and support to carry out ERB's at home

4.) evaluating the existence of intergeneration influence between adults and child by the use of questionnaires and diaries.

5.) evaluating the project.

These research questions will help explore the relationship between those who have engaged in environmental conversations as a family and any consequent changes in environmental attitude and environmentally responsible behaviour carried out at home. The research will examine pre and post test data to highlight evidence of increased child-parent influence and examine whether children can be used as 'green champions' to take home key environmental messages to their parents as a way of promoting environmentally responsible behaviour.

1.3 Thesis structure

This thesis consist of six chapters. Chapter two, describes in detail the theoretical back ground and framework. Chapter three is the methodology where the research design is explained and the main research gaps that this study tries to fill in are addressed. Chapter four is the findings chapter.

Chapter five addresses the results and discusses where the findings are organised into themes and concepts and ideas that have emerged from the study. The last chapter is the conclusion which brings the thesis to a close, summaries the most important elements of the study.

Chapter 2. Literature Review

2.1 Sustainable development and sustainability

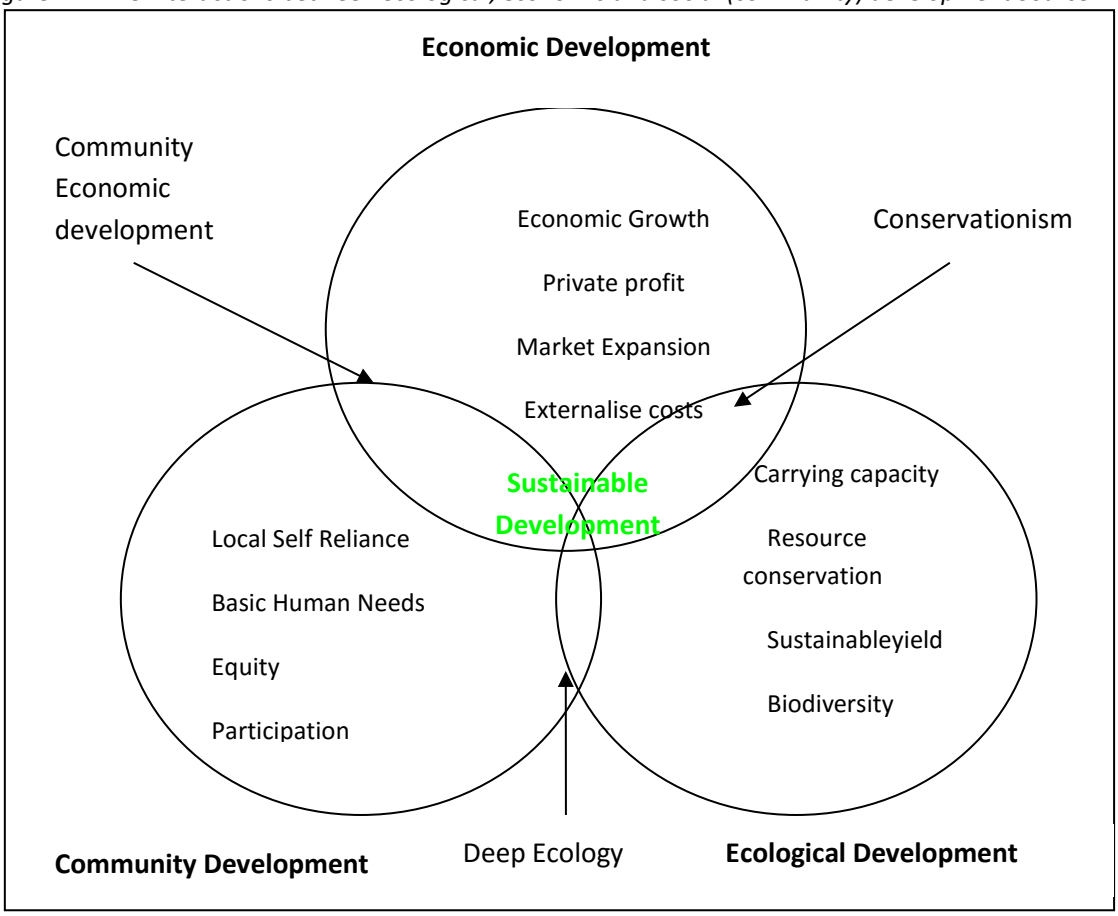
The most common definition of sustainable development was defined by the Brundtland Commission in 1987, who documented the sustainable development definition as: *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."* This implies that we need to look after our planet, our resources and our people to ensure that we can live in a sustainable manner and that we can hand down our planet to our children and our grandchildren to live in true sustainability. Sustainability is focused on reducing consumption and changing our lifestyles to save the environment. On the contrary, sustainable development focuses on establishing infrastructure that will in effect induce a steady incline of economic growth while keeping the environment clean. There is no universally agreed definition on what sustainability means and there are many different views on what it is and how it can be achieved (education, policy ect). It is widely accepted that to achieve sustainability we must balance economic, environmental and social factors in equal harmony. This definition brought together what is now known as the three pillars of sustainability. Figure 2.1 shows a common diagrammatic representation of how these three pillars need to link together to meet this goal of sustainability. These three pillars are interrelated and interconnected, showing the importance of interdisciplinarity to sustainable development. The scope of each pillar is defined below by Bell and Morse (2013):

Environment and Ecology: awareness of natural resources and fragility of the physical environment.

Economy: sensitivity to the limits and potential of economic growth and its impacts on society and environment.

Society and Culture: understanding of social institutions and their role in change and development. Ways of being, relating, behaving, believing and acting differently according to context and history.

Figure 2.1 The interactions between ecological, economic and social (community) development Source: Bell and Morse (2003)



2.2 Education for Sustainable Development

The principles of environmental education (EE) as set forth in the Tbilissi Declaration (UNESCO-UNEP, 1978) already include the fundamental elements of sustainable development: the need to consider social aspects of the environment and take into account the close links between economy, environment and development; the adoption of both local and global perspectives; the promotion of international solidarity. Interest for a "new focus" in environmental education and the need to define the concept of environmental education for sustainable development (EEFSD) has emerged

over the past few years. This orientation does not seem to add new objectives or principles to EE, nor to propose a different educational approach. The characteristics of EEFSD as defined by Daniela Tilbury (1995) are the same as those of EE identified by Hart (1981) and the United Nations Educational, Scientific, and Cultural Organization (in UNESCO-PNUE, 1986): holism, interdisciplinary, value clarification and integration, critical thinking, issue-based and action learning, etc.

Environmental education is closely associated with sustainable development. This relationship however can be perceived in different ways. For some, sustainable development is the ultimate goal of environmental education: the term environmental education “for” sustainable development (EEFSD) is proposed. For others, sustainable development refers to specific objectives, which should be added to those of environmental education: therefore, they use the expression education for environment “and” sustainable development. According to the document proposed by UNESCO (1992) at the ECO-ED Conference, EE is just one of many thematic educations that contribute to the overall education for sustainable development. For others still, the term environmental education implicitly includes education for sustainable development and it is therefore pointless to change the terminology; quite the contrary, this could lead to confusion and might have a negative impact on EE. Finally, the expression education about sustainable development is found in the literature: sustainable development becomes the focus of a critical analysis. Education is widely reported as an essential tool for achieving sustainability (IUCN 2002). Indeed for many educators and policy makers, the term 'sustainable development education' or ‘education for sustainability’ is used interchangeably or instead of the term 'environmental education'**.** People around the world recognise that current economic development trends are not sustainable and that public awareness, education, and training are key to moving society towards a sustainable future (Ghai & Vivian 2014).

2.2.1 Background to ESD

Education for sustainability has often been described, in its broadest sense, as about empowerment and developing a sense of ownership; improving the capacity of people to address environmental and development issues in their own communities (Warburton 2009). It is about touching people's beliefs and attitudes so that they want to live sustainably, providing sufficient information to support these beliefs, and helping to translate attitudes and values in to action (Tilbury 1995). Tilbury (1995) believes that EfS should prepare people for the rights and responsibilities of life enabling them to make informed decisions as members of a community and society. Palmer and Birch (2003) believe that 'Education for sustainable development enables people to develop the knowledge, values and skills to participate in decisions to do things individually and collectively, both locally and globally that will improve the quality of life now without damaging the planet for the future'. Reid *and Morgan* (2007) also states that 'Education for sustainable development aims to develop a critical awareness of the ecological, social, economic and political forces which shape all our lives and of how they contribute to, or work against, quality of life and a sustainable future. It increases understanding of the interdependence of all life on earth, and the consequences of our decisions and actions, both now and in the future'. Although these definition vary they bring together the notion that education for sustainability requires input from individuals and community for it to succeed.

Environmental education can be enacted in schools (Ballantyne, Fien, & Packer, 2001; Caro, Borgerhoff Mulder, & Moore, 2003), at places of environmental significance (such as national parks or museums) (Orams, 1997; Siemer & Knuth, 2001;Powers, 2004), on a community-wide basis (such as large scale education campaigns) (Abrahamse, Steg, Vlek, & Rothengatter, 2005; Barr & Gilg, 2005; Calvert, 2004; Volk & Cheak, 2003), and may involve cooperation between two of the above (Talsma, 2001). Two common goals of environmental education programs are the communication of scientific knowledge to the public and changes in behaviour or attitude (Pooley & O'Connor,

2000; Vaske & Kobrin, 2001). A third goal of environmental education is educating students how to think about the environment (Hungerford, 2002). In other words, individuals should be able to make decisions that take into account various points of view about a topic, and to think about their interactions with the environment (Simmons & Volk, 2002).

The United Nations (1993) state that environmental education can incorporate both formal and informal education; should focus on knowledge and skills development; and result in environmentally responsible behaviour. In the literature dealing with education for sustainability, Orr (2004) makes an urgent case for a complete overhaul of the formal education system, which currently prepares people for careers that support economic development and "progress", rather than imparting an understanding of our place in nature and our dependency on natural life support systems. Orr (2004) states that " education is no guarantee of decency, prudence or wisdom" and illustrates this point by using the example of how highly educated people have been responsible for the large scale environmental destruction at local, regional and global levels, through the promotion of the economic development model of western society, and the politics that support it. He therefore insists that only a different kind of education will be adequate. This re-education is an example of a whole paradigm shift of systems rather than just working in the system, and includes everyone, children, youth and adults alike.

In order for Education for Sustainability to have an impact on wider society, it must tackle the three different aspects of environmental knowledge, environmental attitudes and environmentally responsible behaviours, and understand the links between them. Over the last 30 years many psychologists and sociologists have explored the roots of direct and indirect environmental action (Jensen 2002). The answer to the questions: 'Why do people act environmentally and what are the barriers to pro- environmental behaviour?' is extremely complex. By 'pro-environmental behaviour' we simply mean behaviour that consciously seeks to minimise the negative impact of one's actions

on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production).

In terms of higher education, education for sustainable development means working with people to encourage them to consider what the concept of global citizenship means in the context of their own discipline and in their future professional and personal lives and develop a future-facing outlook; learning to think about the consequences of actions, and how systems and societies can be adapted to ensure sustainable futures (Burmeister et al 2012).

The UK Sustainable Development Strategy (HM Government 2005), which aims to secure 'a sustainable, innovative and productive economy' and 'a just society that promotes social inclusion, sustainable communities and personal wellbeing', is clear on the role of education and training. It identifies 'a need to make 'sustainability literacy' a core competency for professional graduates'. All graduates will share responsibility as stewards, not only of the environment, but also of social justice - as employees, citizens and, in many cases, parents and mentors of the next generation.

Evidence suggests that students already have a high level of awareness of sustainable development issues (Drayson et al., 2013). A three-year longitudinal study carried out by the National Union of Students (NUS) and the HEA, with support from Change Agents UK, over 2010, 2011 and 2012 has shown that over two-thirds of students surveyed believe that sustainable development should be covered in their degree courses (5,763 responses in 2010; 3,193 in 2011; and 6,756 in 2012).The final tranche of the study reported that 80 per cent of third year students (2,657 respondents) see universities as key actors in the delivery of skills for sustainable development.

Businesses and industry are also considered to be key factors. Corporate (social) responsibility may be defined as 'the responsibility of an organisation for the impacts of its decisions and activities on society and the environment through transparent and ethical behaviour above and beyond its

statutory requirements' (Department for Business, Innovation and Skills 2013).A study carried out for the HEA in 2008 found that over half of employers surveyed (n=87) had at some time referred to social and environmental responsibility in their selection of recent graduates.

Education for sustainable development is 'future-facing' in the sense that students are encouraged to think about current and emergent and future situations, relevant to their studies, and in so doing gain a wider socioeconomic and environmental perspective on the relevance of their work (HEA 2006). Being open to a range of other areas of expertise and banks of knowledge, outside their immediate discipline, through both formal and informal learning environments, is a fundamental feature of education for sustainable development (Kopnina & Meuers 2014).

Pedagogical approaches that are particularly effective in the context of education for sustainable development tend to have an authentic aspect, enabling students to relate their learning to real-life problems and situations. There is likely to be a strong interdisciplinary, multidisciplinary or transdisciplinary element, reflecting the interconnected nature of many issues in sustainable development (Cade 2008). Experiential and interactive approaches are also particularly well suited to education for sustainable development, particularly where they encourage students to develop and reflect on their own and others' values. Critical reflection on values and assumptions may in some cases lead to what is known as 'transformative learning'. In addition, Burmeister et alo (2012) suggests that participatory learning approaches, peer-learning and collaboration, within and beyond the classroom, are encouraged, allowing students to be exposed to multiple perspectives and enabling creative responses to emerge.

2.3 Education for Sustainable Development Policy and Background (International)

Many of those involved in the field view education for sustainable development (ESD) as emerging around the time of, and stimulated by, the first Earth Summit, the 1992 UN Conference on Environment and Development (UNCED). At the Earth Summitin Rio in 1992, education was identified as one of the key forces central to the process of sustainable development during the 21st century. Disinger (1990) suggests that the these ideas were around earlier, and that the first use of the term environmental education was at an IUCN (International Union for the Conservation of Nature and Natural Resources) meeting in Paris in 1948. The term was increasingly used throughout the 1960's, and this was echoed in the UK by the Council for Environmental Education in England, which first met in 1968. In the US, in 1970's , a United Nations Educational, Scientific and Cultural Organisation (UNESCO)/ IUCN conference adopted one of the first and later widely adopted definitions of environmental education (EE) Environmental education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, Tbilisi Declaration, 1978).

In little more than three decades, environmental education has emerged and evolved from marginal beginnings to claim the necessity to indicate the possibility of fundamental change in our collective view of the purposes and nature of education and learning- a change which, if made effective, would be critical to the quality of life of future generations (IUCN 2002). The Decade of Education for Sustainable Development (DESD), declared by the United Nations General Assembly at the 57th Session on 20 December 2002, offered an important vehicle for promoting education for sustainable development (ESD) within all areas of learning. According to UNESCO, ''The overall goal of the DESD is to integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behaviour that allow for a more sustainable and just society for all'' (UNESCO October 2005). The vision of the DESD took into account education in sustainable development plans, creating public awareness of the importance of sustainable development and having

regular and substantial coverage of sustainable development issues in the media. Recognising that education is vital in the transition to sustainability, the DESD vision is one in which everyone has the opportunity to benefit from quality education and learning that motivates societal change towards a sustainable future (UNESCO 2004). As a global initiative, it aimed to reach and motivate persons from all generations and among all sectors to get involved in the effort to develop a sustainable future (UNESCO 2007).

There is a crucial role for government and advisory bodies such as the Sustainable Development Commission and National Consumer Council to play in continuing to explore the boundaries of the current mandate, for example stimulating policy debate on well-being, travel, consumerism, trade-offs between energy policy options and lifestyles, or personal carbon trading (Hopwood et al 2005). Members of the public could be brought into this process through the use of appropriately designed deliberative opportunities.

Sustainable development cannot be achieved by political agreements, financial incentives or technological solutions alone. Sustainable development requires changes in the way we think and act. Education plays a crucial role in bringing about this change (Loorbach & Rotmans 2006). Action at all levels is therefore required to fully mobilize the potential of Education for Sustainable Development and enhance learning opportunities for sustainable development for all (Kemp et al 2005). The Global Action Programme on Education for Sustainable Development (ESD) intends to generate this action.

The United Nations Decade has been successful in raising awareness regarding ESD, has mobilized stakeholders across the globe, has created a platform for international collaboration, has influenced policies and contributed to the coordination of stakeholders at the national level, and has generated large amounts of concrete good practice projects in all areas of education and learning

(Kopnina and Meuers 2014). At the same time, considerable challenges remain: successful activities in ESD often merely operate within fixed time-frames and with limited budgets; ESD policies and practices are often not properly linked; ESD has yet to complete its integration into the mainstream of **the** education and sustainable development agendas (Burmeister et al 2012). Furthermore, sustainable development challenges have acquired even more urgency since the beginning of the Decade and new concerns have come to the fore, such as the need to promote global citizenship. Consequently, a scaling-up of ESD actions is required.

The overall goal of the Global Action Programme is to generate and scale up action in all levels and areas of education and learning to accelerate progress towards sustainable development. This goal is further declined into two objectives, the first relating directly to the education sector and the second going beyond this sector:

(a) to reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development; and
(b) to strengthen education and learning in all agendas, programmes and activities that promote sustainable development.

While not the complete answer to the question of how we move whole societies towards sustainability, education must play a role in imagining new ways of living and transforming existing patterns (Fien, 2001). This includes early childhood (pre school age) education and care (ECEC). There is already a growing research literature that shows the value of quality ECEC to the development of healthy children and healthy communities (Friendly and Browne, 2002). Central to the provision of

such quality care and education in the early years is the recognition that early experiences be stimulating and involve positive interactions with adults in appropriate learning environments (Fein, 2001)

While the early childhood field has been rather slow to take up the challenge of sustainability, it has a potentially significant role. Recently, a new dimension has been added to ECEC. This is early childhood education for sustainability (ECEfS), an emerging national and international field, given a boost by the launch of the United Nations Decade of Education for Sustainable Development (2005-2014) (UNESCO, 2005). ECEfS recognises that young children have capacities to be active agents of change now, as well as into the future, and that early learning is important for shaping environmental attitudes, knowledge and actions. This is because early childhood is a period when the foundations of thinking, being, knowing and acting are becoming 'hard wired', and relationships with others and with the environment are becoming established. It is also a time for providing significant groundings for adult activism around environmental issues (Chawla, 1990; Davis and Gibson, 2006; Wells 2000).

If children are to grow up in a world that maximises their life opportunities, that recognises their capacities as active citizens, and nurtures hope, peace, equity and sustainability, adults cannot do 'business as usual' and simply pass the problems of unsustainable living on to the next generation (UNESCO 2008). The UNICEF (2003) report, The State of the World's Children, stresses that children need to be seen and heard in their communities, around a wide range of social and environmental issues of concern to them. It also observes that responsible citizenship is not something suddenly given at 18 years of age. Hart (2013) insists that even very young children have the capacity for active participation and the acquisition of political literacy skills, though it is critical that children are not seen as the 'redemptive vehicles' (Dalberg and Petrie, 2002) where the social and environmental troubles of the world are cured through children. With a projection of just over 11.6 million

under 16's in the UK by 2015 (National Population Projections 2010) which constitutes as 17.9% of the population, it is easy to see how child focused environmental education programmes take priority. With such emphasis on child environmental education it is important to highlight the involvement of adults in changing environmentally responsible behaviours within the family. Involving parents and children together through intergenerational learning offers the potential to break the barriers associated with adult ESD outside of the formal education system.

2.4 The stages of environmental education: environmental knowledge, attitudes and behaviour

There has been a great deal of research into predictors of environmentally responsible behaviours through environmental education. However, despite the abundance of studies in environmentally responsible behaviour there is still disagreement regarding how environmentally responsible behaviour can be predicted from attitudes and other variables (Bamberg and Moser , 2007; Kollmuss and Agyeman, 2002).

2.4.1 Environmental knowledge

Environmental knowledge can be defined as one's ability to identify a number of symbols, concepts and behaviour patterns related to environmental protection (Laroche et al, 2001). In the earliest linear regression models (Figure 2.2), knowledge was defined as a source from which environmental attitudes were formed and behaviours manifested (Kollmuss and Agyeman, 2002). It has been demonstrated that these models were wrong, and it is necessary to consider variables explaining environmentally responsible behaviours for future research manifested (Kollmuss and Agyeman, 2002). Although theoretical knowledge seems to play a significant role in environmentally responsible behaviours, the evidence is not so clear (Kaiser et al, 1999; Zsoka et al., 2012).

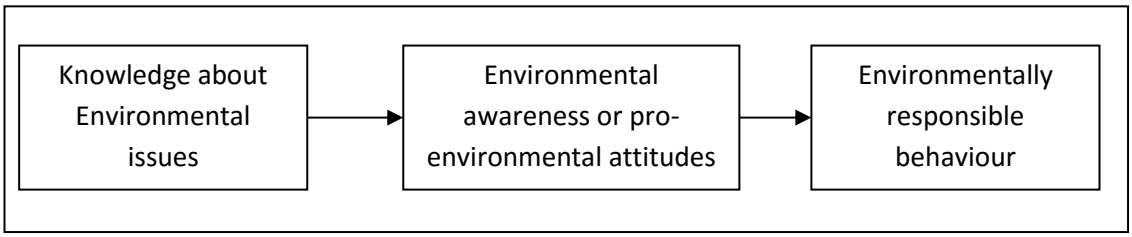


Figure 2.2 A simplistic linear model of environmentally responsible behaviour (Dillon & Gayford 1997)

Changing attitudes through increased knowledge to become more 'pro-environmental' is regarded as an important aspect of environmental education because attitudes are seen to influence lifestyle decisions and affect behaviour, a change in which would help bring about sustainability (Commission on Sustainable Development, 2001). However, the role of increased environmental *knowledge* in bringing about environmentally responsible behaviours is often questioned (Caro et al., 2003). For example, it has been shown that knowledge of a particular environmental issue or species does not necessarily result in higher conservation priorities with respect to management decisions (Hunter & Rinner, 2004). However Lozano (2006) and Olli et al (2001) suggest that more highly educated individuals are more concerned about environmental quality and are more motivated to engage in environmentally responsible behaviour since they are better aware of the potential damage.

Some research evidence over the past thirty years, (Gould, 1991; Orr, 2004) tells us that simply knowing about environmental issues has little impact upon behaviour. Knowing is not enough; children have to care enough to create harmonious relationships with the Earth and with fellow human beings. The early years are the most fruitful time to forge emotional bonds with the natural world, and given enough time for outdoor exploration, develop 'biophilia', as described by Harvard biologist Edward Wilson (1984). Despite the affinity of young children with the environment, only a minority of children in the developed world are able to spend their days freely observing and exploring their environments (Basile 2000). Monroe *et al* (2008) and Rathzel & Uzzell (2009) continue with

this argument and agree that EE can never be 'delivered' in a 'scheduled programme'; its focus is not academic, but making sense of the child's own world.

Other studies have also found no significant relationship between environmental knowledge and pro-environmental behaviour (Bartiaux, 2008; Laroche et al., 2001). Yet other studies reveal that a deeper knowledge of environmental issues and how to solve them increases the likelihood of individual taking actions to protect the environment (Kaiser et al, 1999; Kollmuss and Agyeman, 2002; Mobley et al., 2010). People who have greater knowledge of environmental problems are more inclined to to behave in a pro-environmental way (Oguz et al., 2010). A shortage of knowledge or the holding of conflicting information might limit pro-environmental behaviour. The study conducted by Kennedy et al. (2009) in Canada found that more than 60% of respondents felt that their pro-environmental behaviour was often constrained by a perceived lack of knowledge. Other scholars have suggested that a lack of appropriate knowledge or an excess of self-perceived knowledge might impel individuals to make environmentally wrong decisions. Thus, if such individuals are more aware of environment problems and their causes, they will become more motivated to act towards the environment in more responsible ways (Barber et al., 2009). It has been assumed that knowledge is a necessary but not sufficient condition for pro-environmental behaviour by an individual (Kollmuss and Agyeman, 2002) since cultural factors could act as barriers (Kennedy et al., 2009; Lozano, 2006).

Two main approaches have been used to analyse the environmental knowledge of individuals: objective and subjective knowledge (Barber et al., 2009). Objective knowledge (actual knowledge) refers to how much a person actually knows about a type of product, issue or object. Subjective knowledge (also called perceived knowledge) shows how much a person thinks that he/she knows (Dodd et al., 2005). Most of the scales for measuring (environmental) knowledge have been developed solely in accordance with subjective (self-rated) knowledge (Amyx et al., 1994) or objective

(actual) knowledge (Bartiaux, 2008; Laroche et al., 2001). This might be the source of the contradictory results found (Laroche et al., 2001). Martin and Simintiras (1995) measure both objective and subjective knowledge of environmental issues. Their study reveals that the ability of consumers to answer questions on environmental issues correctly does not correlate with subjective environmental knowledge and purchase intention. Additionally, Ellen (1994) finds no significant relationship between either objective or subjective knowledge and recycling-based shopping decisions. Hence, it is essential to identify the types of knowledge that encourage environmental behaviour effectively if the most efficient informational strategies are to be promoted in education (Frick et al., 2004).

Environmental knowledge and pro-environmental attitudes are highly interconnected; according to Bamberg (2003) they strengthen each other, especially in information-seeking about environmental issues. Regarding the environmental knowledge of students, Asunta (2004) observed in her survey of 13-15 year old Finnish and German students that the number of sources students use to gather information about the environment increases with the students' class grade. Michalos et al. (2009) compared pro environmental and sustainable behaviours across a sample of Canadian adults and students aged 10-18. For adults, having a favourable attitude towards the environment and sustainable development was a far more important determinant of behaviour than knowledge about these issues (Kagawa, 2007 also found the same for university students), but for high school students the importance of knowledge and attitudes as behavioural drivers was about equal. In addition to internal factors which are reflected in knowledge, attitudes and values, several external factors are also known to influence pro-environmental behaviour.

Knowledge of ecology is described as a requirement to sound decisions regarding solutions to issues even if it doesn't necessarily produce environmental behaviour (Hungerford & Volk, 1990). Knowledge and understanding are also important because they are linked to ownership of an issue

(Hungerford & Volk, 1990). A study was able to conclude that environmentally responsible behaviour is a complex system itself, relying on the interaction of intention, moral norms, attitude, perceived behavioural control, guilt, social norm, attribution, and problem awareness (Bamberg & Moser, 2007). The authors concluded that although the processes contributing the enactment of pro-environmental behavioural intention are not fully understood, the role of knowledge is a necessary, although not sufficient, precondition for moral norms and attitudes (Bamberg & Moser, 2007). Gigliotti (1990) expressed the view that the public is emotionally charged, but lacking in basic ecological knowledge, hence knowledge should form an important part of EE. For the public to take environmental action they need to believe that solutions to environmental problems are necessary, and fully understand the consequences to the environment and themselves of not taking action (Gigliotti, 1990).

2.4.2 Environmental Attitudes

Milfont and Duckitt (2010) define environmental attitude as a psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour. However other authors refer to environmental attitudes as environmental concern (Dunlap and Jones, 2002). The empirical findings regarding the relationship between attitudes and environmental behaviour are contradictory. Some studies have reported a positive relationship between environmental attitude and pro-environmental behaviour (Kim and Choi, 2003; Kollmuss and Agyeman, 2002; Tilikidou, 2007), while others find a negative relationship (Cottrell, 2003). Furthermore, other studies reveal a weak relationship between attitudes and pro environmental behaviour (Kollmuss and Agyeman, 2002; Olli et al., 2001). The empirical evidence suggests that attitude alone is a poor predictor of intentional pro-environmental behaviour (Vermeir and Verbeke, 2006). Some relevant studies conclude that each behaviour pattern has its own cluster of predictors, pointing out that general attitudes are bad predictors for specific environmental behaviour patterns (Hines et al., 1986 & 1987).

Maineiri et al. (1997) explain this in terms of four reasons: (1) weak correlations between environmental behaviour patterns (not all patterns are interchangeable); (2) different levels of specificity in the measurement of attitude and behaviour; (3) effects of other variables; and (4) lack of measure of reliability and validity.

In general, research on environmental concern includes (1) Attitudinal studies that examine differences in opinions about the environment based on respondents' demographic and socio-economic characteristics (e.g., country, social class, income, race, gender, and age); (2) Experimental surveys that test hypotheses derived from social-psychological theory like norm-activation theory. The norm activation theory, originally formulated by Shalom Schwartz (1970, 1977), posits that two conditions are required for an individual to activate a norm. First, the individual must accept that there is a public good/bad aspect of his private actions. This is called awareness of consequences. Second, the individual must ascribe personal responsibility for the issue at hand. These are necessary, but not sufficient, conditions for making moral decisions. Empirical tests of the theory in general support its main claims (Stern 2000); (3) Applied research on environmental attitudes and behaviours which investigate social factors related to behaviour associated with the environment such as littering, recycling, and energy conservation.

A review of the literature indicates country, gender, social class, and education as important factors that affect people's awareness of environmental problems; shape their efforts to solve environmental problems; and influence their willingness to contribute to solutions to environmental problems. For example, thorough and extensive cross-cultural studies revealed high levels of concern about the environment in both rich and poor countries (Dunlap et al., 2000, Inglehart, 1995). These results led Dunlap et al to question the validity of the 'conventional wisdom' that 'concern' about the environment is 'limited' to developed and industrialized nations. According to Dunlap et al (2000), "environmental problem are salient and important issues in both wealthy and poor nations and residents in poor nations expressed as much concern about environmental

quality as do those living in wealthy nations". Consequently, it was argued that such strong support for the environment is in fact an indicator of a paradigm shift in the relationship between society and the environment (Bell et al, 2009). According to Bell et al (2009), Dunlap, Catton, and colleagues' paradigm shift theory suggests "that in response to discrepancies between evidence of environmental threats and ideologies that do not consider environmental implications, people are slowly but steadily adopting more environmentally aware view of the world". In addition, a paradigm shift theory implies that "people are becoming more aware of the real material effects that industrial life has on the environment, and their ideologies are beginning to change to match this new understanding" (Bell et al, 2009).

2.4.3 Environmentally Responsible Behaviours

While attempting to reduce environmental impacts, scholars have adopted various terminologies to describe behaviour that protects the environment. As shown in Table 2.1, various terminologies and definitions have been proposed. Borden and Schettino (1979) pioneered the study of ERB by assessing the relationship between attitude and behaviour. To educate individuals and improve their ERB, Sivek and Hungerford (1990) explored the factors influencing personal ERB, indicating that ERB represents the actions that an individual or group to solve environmental problems and address environmental issues. Axelrod and Lehman (1993) examined what factors guide individual action and defined environmentally-concern behaviour as individuals engaging in environmental conservation efforts. Moreover, Kollmuss and Agyeman (2002) regarded pro-environmental behaviour as individuals acting to minimise environmental impact. Additionally, Stern (2000) developed the concept of environmentally significant behaviour, which refers to individuals acting to improve the environment.

Recently, Meijers and Stapel (2011) proposed the sustainable behaviour concept, indicating that individuals act or make choices with more sustainable considerations. Therefore, based on findings of the above studies (Axelrod & Lehman, 1993; Borden & Schettino, 1979; Kollmuss & Agyeman, 2002; Meijers & Stapel, 2011; Sivek & Hungerford, 1990; Stern, 2000), this study defines ERB as families who attempt to reduce environmental impacts and contribute to environmental preservation through specific actions in the home. Many studies have introduced different constructs to measure ERB. Smith-Sebasto and D'Costa (1995) divided ERB into six constructs (i.e. educational action, civil action, financial action, legal action, physical action, and persuasive action) as shown in Table 2.2. Kaiser (1998) later developed an ecological behaviour scale, indicating that general ecological behaviour scale can be viewed as a uni-dimensional measure (i.e. it is one dimensional and has no scope). Based on the findings of Kaiser (1998), Kaiser and Wilson (2004) also suggested that ecological behaviours should include energy conservation, mobility and transportation, waste avoidance, consumerism, recycling, vicariousness, and social behaviours related to conservation. However, the ecological behaviour concepts proposed by Kaiser (1998) and

Table 2.1 Terminology of environmentally responsible behaviour

Terminology	Sources	Definitions	References
Environmentally responsible behaviour	Assessed the relationship between attitude and behavior (Borden & Schettino, 1979).	Environmentally responsible behaviour (ERB) is defined as any action, individual or group, directed toward the remediation of environmental issues/problems.	Sivek & Hungerford, 1990
Environmentally concerned behaviour	Examining what factors guide individual action.	Actions which contribute towards environmental preservation and/or conservation.	Axelrod & Lehman, 1993
Pro-environmental behaviour	Examining sociological and psychological factors to explain pro-environmental	Individual consciously seeks to minimize the negative impact of one's actions on the natural and built world.	Kollmuss & Agyeman, 2002

	behaviour based on the finding by Fietkau and Kessel (1981).		
Environmentally significant behaviour	Developing a theoretical behavioural framework of environmentally significant individual behaviour.	Environmentally significant behaviour can reasonable be defined by its impacts: the extent to which it changes the availability of material or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself.	Stern, 2000
Sustainable behaviour	Examining if a person is more likely to make sustainable choices in a comparison between time perspectives and person perspectives.	People who are high in the consideration of future consequences are more likely to behave more sustainable and make sustainable choice.	Meijers & Stapel, 2011

Kaiser and Wilson (2004) lack the constructs of education action, persuasive action, and legal action. Moreover, Stern et al. (1999) suggested that environmentally significant behavior includes consumer behavior, willingness to sacrifice, and environmental citizenship. Because the theoretical framework of that study came from environmentalism, environmentally significant behaviors proposed by Stern et al. (1999) focused mainly on civil and financial actions. Meanwhile, to our knowledge, educational, physical, legal, and persuasive actions have not been measured with respect to environmentally significant behaviors. This study is mainly concerned with evidence of educational, physical and persuasive action within the family.

Table 2.2 Constructs of environmentally responsible behaviour

Construct	Definition	References
Civil Action	A person (or a group) takes actions to promote preservation of the environment through political avenue without	23,26

	any donation or persuasive strategies, such as protest, voting, and participating public hearings.	
Educational Action	A person (or a group) helps to acquire knowledge and/or information about environmental issues and problems, such as reading articles or books, watching television programs, and taking academic course-works.	1,3, 4, 5, 6, 10, 11, 12, 13, 14, 15, 18, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31
Financial Action	Any action to express promoting or protesting of the natural environment through financial measures, such as purchasing or boycotting commodities because of the degree of their environmental friendliness, donating to environmental organization, companies, and campaigns.	2, 3, 5, 6, 8, 9, 15, 16, 19, 22, 23, 24, 26, 27, 31
Legal Action	A person (a group) takes legal (or judiciary) action to protect environment.	9, 23
Physical Action	A person (a group) takes any action for environment without involving monetary, such as picking up litter, participating in community clean-up programs, classifying garbage, and installing resource-conserving devices.	1, 4, 5, 6, 8, ,9, 10, 12, 14, 17, 20, 21, 23, 25, 26, 27, 29, 31
Persuasive Action	A person (a group) motivates others to promote preservation of the natural environment without nonmonetary action, such as writing letters, making speech, discoursing information, and lobbying.	15, 23

1: Ballantyne, Packer, & Falk, 2011, 2: Chen, 2011, 3: Dono, Webb, & Richarson, 2010, 4: Homburg & Stolberg, 2006, 5: Kaiser, 1998, 6: Kaiser & Biel, 2000, 7: Kaiser & Keller, 2001, 8: Kaiser et al., 2003, 9: Kaiser & Gutscher, 2003, 10: Kaiser & Wilson, 2004, 11: Kaiser, Wölfing, & Fuhrer, 1999, 12: Kilbourne & Pickett, 2008, 13: Kim et al., 2011, 14: Kim & Han, 2010, 15: Lee & Lin, 2001, 16: Mainieri et al., 1997, 17: McKenzie-Mohr, Nemiroff, Beers, & Desmarais, 1995, 18: Miller et al., 2010, 19: Mobley, Vagias, & DeWard, 2010, 20: Orams, 1997, 21: Rice, 2006, 22: Scott, 1994, 23: Smith-Sebasto & D'Costa, 1995, 24: Stern et al., 1999, 25: Tarrant & Green, 1999, 26: Thapa, 2010, 27: Thøgersen & Crompton, 2009, 28: Vaske & Donnelly, 1999, 29: Vaske & Kobrin, 2001, 30: Walker, Chapman & Pietsch, 2003, 31: Whitmarsh & O'Neill, 2011.

One significant element of personal environmental action is that which is undertaken in and around the home, defined as day-to-day behaviour which reduces the use of resources by everyday practices, such as turning down the thermostat and recycling packaging. Such home centred behaviours have become a key priority for governments who wish to meet a range of environmental targets, without resorting to either financial incentives or penalties (Barr & Gilg 2007). ERB-occurs at two

levels- at the level of the individual and household or community, and at the level of governance, the law and policy making. Monroe et al (2008) defines ERB, as "those activities that support a sustainable society". Monroe et al (2008) also discusses several complexities, for example differences in perspectives of ERB in different geographical locations, when the frame of reference is local. The reliance on individuals as the key agents of change was outlined extensively in 1992 in the pages of agenda 21 (UNDC 1993) and then by the United Nations (2002). These documents all embrace the notion that environmental problems are most effectively tackled locally and on a consensual basis. Issues such as waste management and energy saving have all been key components of local sustainability strategies. Efforts in the past five years by national government to encourage environmental actions have been highlighted in the British government's last two sustainable development strategies (DETR 1999; DEFRA2005).

More recent policies have placed greater significance on the role that individuals can play in sustainable consumption and managing natural resources (DEFRA 2007). In the UK the Framework for Pro-environmental Behaviours produced by the Department for Environment, Food and Rural Affairs (DEFRA) (2007) represents one of a slew of recent reports dealing with issues of lifestyle, behaviour, and climate change. Others include 'Creatures of habit: the art of behavioural change' (Prendergast et al, 2008); `I will if you will' (Sustainable Consumption Round Table, 2006); Changing Behaviour Through Policy Making (DEFRA, 2005), `Motivating sustainable consumption'(Jackson, 2005), and `Driving public behaviours for sustainable lifestyles'(Darnton, 2004). The titles alone provide some clue as to how social change is conceptualised and indicate that issues of climate change and other environmental issues have been framed in terms of an already well-established language of individual behaviour and personal responsibility (Halpern et al, 2004). While there are points of difference within this literature, there is no mistaking a dominant line of reasoning reinforced by extensive mutual cross-referencing.

Many studies about environmental education are focused on factors resulting in the improvement of environmental behaviour or attitudes rather than the other goals (Aleixandre & Rodriguez, 2001; Brackney & McAndrew, 2001; Campbell Bradley, Waliczek, & Zajicek, 1999; Costarelli & Colloca, 2004; Culen & Volk, 2000; Hsu, 2004; Jenkins & Pell, 2006; Jurin & Fortner, 2002; Knussen, Yule, MacKenzie, & Wells, 2004; Ma & Bateson, 1999; Milfont & Duckitt, 2004; Zelezny, 1999). There is no doubt that the interaction of motivation, cognition and behaviour is poorly understood, however there is a need for a structured approach to research about environmental education (Palmer, 1999). Issues such as "learned hopelessness" and apathy (Nagel, 2005), emotional reactions and knowledge (Borden & Schettino, 1979), and competency in environmental problem-solving skills in combination with environmental information and values (Ramsey, Hungerford, & Tomera, 1981) affect environmentally responsible behaviour.

Other researchers cited by Monroe (2003) have defined ERB as "an approach to seeking information, making decisions, and valuing a stewardship ethic". This moves us closer to putting environmental knowledge into practice. Monroe makes a distinction between ERB that comprises specific behaviour and ERB that comprises the cultivation of environmental knowledge (eco literacy). Monroe (2003) refers to a number of direct actions that people can take at an individual household level, including taking fewer trips by car, installing energy saving light bulbs and installing water saving devices.

Stern (2000) identifies two different interpretations of what he terms environmentally significant behaviour. In contrast to Monroe (2003), Stern takes a different approach to discussing ERB, by defining environmentally significant behaviour as that which is defined by its environmental impact, whether from perspective of resources use, production of wastes, or in terms of changes caused in ecosystems. The second interpretation considers the role of intent in environmental decision making and choice of actions, and is the result of people becoming more environmentally aware.

Environmentally significant behaviour in this context, is seen to be "behaviour that is undertaken with the intention to change (normally to benefit) the environment" (Stern 2008). Stern (2000) asserts that ERB must be characterised for both cases, to prevent impact as well as to enhance benefits through positive intent, usually based on beliefs and personal motives. The cultivation of ERB is further complicated by the limiting factors or barriers to its development, which could include technology, attitudes or values, knowledge, and material resources.

Mechanisms for developing ERB include both formal and informal methods, both within the classroom and outdoors. Zelezny (1999) compared educational programmes conducted in classrooms with those conducted in "non-traditional settings", finding in both cases that environmental education could positively affect ERB, where active participation was most likely to result in an improvement of ERB. The author refers to studies that have found a direct link between environmental education and an improvement in ERB, as well as others in which the link is contested. The link is not as simple as it may appear and there are several variables that contribute to the relationship between education and behaviour. The location/setting of the educational experience, whether there is active participation or not, and the length and nature of the educational intervention, are some of the variables.

Many researchers have studied ERBs and a variety of theoretical models exist to describe factors that promote or inhibit ERBs. Hines, Hungerford, and Tomera (1987) designed one such model called the Model of Responsible Environmental Behaviour (Figure 2.3). The researchers performed a meta-analysis of 128 studies about ERBs and identified six variables associated with ERBs (Kollmuss & Agyeman, 2002). These variables are:

> *Attitudes*: individuals with pro-environmental attitudes, including a general attitude towards the environment in addition to more specific attitudes such as those towards the energy crisis and taking environmental action, were more likely to engage in ERBs.

Locus of Control: individuals with an internal locus of control were more likely to engage in ERBs. An internal locus of control means that an individual believes his or her own behavior is significant and can create change. In contrast, an external locus of control means that an individual believes his or her actions cannot create change.

Individual sense of responsibility: individuals who felt a greater sense of personal responsibility to help the environment and engage in ERBs were more likely to perform ERBs.

Knowledge of issues: individuals who were more informed about specific environmental problems and their causes were more likely to take action.

Knowledge of action strategies: individuals that were aware of actions they could take in order to mitigate environmental problems were more likely to engage in said action.

Action skills: individuals with greater action skills were more likely to participate in ERBs. Action skills represents the knowledge that an individual has, enabling him or her to actually complete an ERB.

Each of the mentioned variables contribute to one's *intention to act* which can be measured by one's verbal commitment to perform an ERB. Individuals who stated they would take action were more likely to engage in ERBs. However, another variable in the model, "situational factors," can interfere with one's intention to act and influences actual completion of the ERB. Situational factors play a large role in actual ERBs and can include lack of economic resources and social pressures (Hines *et al.*, 1987). Figure 2.3 displays these situational factors that can influence the outcome of environmentally responsible behaviour.

It is important to understand what motivates and underlies ERB in a person, so that effective programmes can be designed to promote its development. A substantive body of literature exists on the psychology underlying the adoption of ERB. Saunders (2003) provides an overview of the concept of conservation psychology, the purpose of which is to research and promote enduring behaviour change towards sustainability. At the core of conservation phycology, lies the concept of the relationship between people and nature, and Saunders (2003) contrasts conservation psychology with sub-disciplines of psychology. By this she means that the mechanism is trans-disciplinary and its express purpose is to solve the problems of the sustainability of the natural world and their quality of life implications.

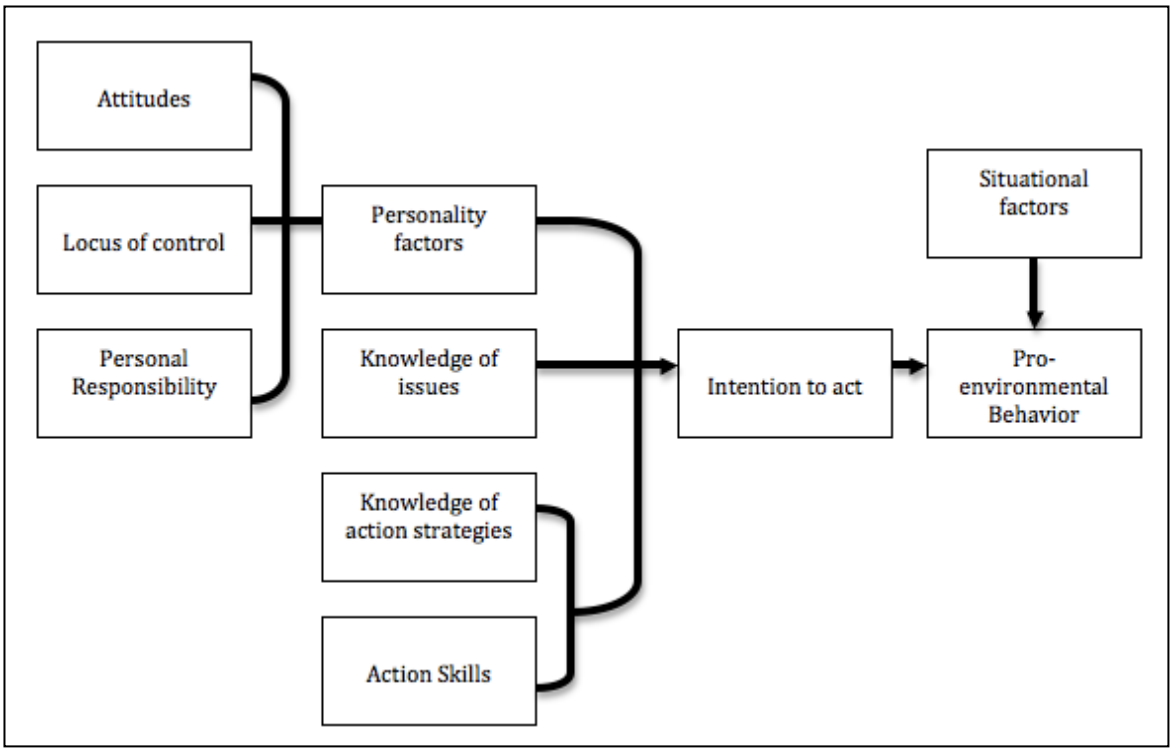


Figure 2.3.: The Model of Responsible Environmental Behavior (Hines et al., 1987)

Oskamp (2000), De young (1993) and Kaplan (2000), explore various motivations for ERB such as altruism and loyalty. Oskamp (2000) offers a range of motivational approaches for this type of behaviour. De young (1993), considers the role of self-interest as a key motivator of ERB, identifying

the need for competence as a critical requirement for the successful adaption of ERB. Kaplan (2000) expands on the importance of competence as an antidote to feeling helpless in the face of the environmental problems which must be solved. He suggests an approach of creating ERB that motivates, reduces helplessness and is not founded on material sacrifice, and which generates solutions.

De Young (2000) focuses attention on motivation for ERB, stating that until recently most attention has been given to material motivators (financial incentives) or trying to encourage altruism. He suggests that there are many more sources of motivation than only these two, both of which have inherent problems in creating sustained ERB. Successful mechanisms for sustaining ERB, incorporate elements of reliability and durability. In addition to internal factors which are reflected in knowledge, attitudes and values, several external factors are also know to influence pro-environmental behaviour. According to Fliegenschnee and Schelakovsky (1998), these account for 80% of an individual's environmental awareness. Important among these are norms (standards), pressures and traditions transmitted by the social environment (Ajzen, 1985; Widegren, 1998). The behavior of students proves to be most strongly shaped by stimuli arising from the immediate environment (Lukman et al., 2013; Asunta, 2004), including family, friends, neighbors and education. Another key set of external factors are related to the environmental behaviour in question, namely the availability of options and infrastructure, as well as the degree of sacrifice entailed (Hines et al., 1986; Stern, 2000). Kagawa (2007) found that students were most likely to undertake 'light green' activities (like recycling, saving energy and water, using public transportation and buying organic, fair trade and healthy products) which required minor changes in lifestyle. Boyes et al. (2008) compared the perceived utility of specific activities undertaken to mitigate climate change with Australian secondary students' willingness to carry out these actions. They found that willingness to engage in certain behaviors often exceeded the perceived climate benefits of those behaviors.

Typical activities which required little effort and inconvenience (such as switching off unused electrical appliances and recycling) were most frequently undertaken. However, students were generally unwilling to give up traveling by car, although this was seen as being highly influential at preventing climate change. Respondents also expressed a reluctance to vote for political solutions such as increased environmental taxation and stricter environmental regulations, despite the perceived effectiveness of such changes. In their conclusion, Boyes et al. (2008) state that environmental education has the highest potential for fostering behavioral change with activities (such as eating less meat or paying more for renewable electricity) where students have an (originally low) willingness to engage, but where willingness steeply increases along with the perceived utility of the action. Obviously, environmental education may impact students' pro environmental behavior in several ways, including the transfer of knowledge and values, as well as providing examples and shaping the school as a social setting. The cited research findings also show that interest in environmental topics and commitment to them is crucial in determining the relationship between environmental knowledge and pro-environmental behavior. This suggests that the new challenge for environmental education is to effectively go beyond the role of simply transferring knowledge.

2.4.4 The Value-Action Gap

The biggest challenge for environmental education seems to be how to encourage sustainable lifestyles and discourage the unsustainable lifestyles of students by providing them with tools which are effective enough to make a broader societal impact (Fien, 2002; Sibbel, 2009). The environmental value –action gap (Blake, 1999) can be described as the gap between expressed awareness and values, and action. It is the aim of environmental educations and policy makers to bridge this gap and give people the incentive to carry out environmentally responsible behaviours. Not only is this gap a challenge to behavioural scientists, educators and policy makers, but also the discrepancy between verbal and actual commitment to environmentally responsible behaviours has actually

attenuated the effectiveness of many environmental policies and measures. For this reason it is important to examine way and in what form the gap exists.

Littledyke (2006) stresses the need for strategically connecting the cognitive and affective domains of environmental education. This is also supported by Álvarez Suárez and Vega Marcote (2010) who tested an experimental didactic model on secondary school students, concluding that attitude-focused teaching methods can be more successful in evoking behaviour changes in students than the use of purely knowledge-oriented tools. In accordance with Leeming and Porter (1997), Kagawa (2007) states that in a "rapidly changing and uncertain world faced by sustainability-oriented challenges, higher education needs to play an increasingly significant role in helping students become active, responsible citizens" (Kagawa, 2007). For environmental education to be successful, strengthening responsibility is definitely key, both in both school and at university level where innovative approaches are required to effectively prepare students to deal with environmental and sustainability issues.

In recent years, higher education for sustainable development (HESD) has emerged as being a field of enquiry which seeks to understand how sustainability may be advanced in the curriculums and operational activities of higher education institutions (1; Waas et al., 2010). One of the main objectives of HESD is to play the traditional role of transforming societies and serving the greater public good (Fien, 2002; Wright, 2007, Waas et al., 2010; Stephens et al., 2008). According to Zilahy and Huisingh (2009) "universities are increasingly moving beyond the old science driven model and realize that their roles in society are broader than was the norm earlier". Higher education institutions also have a tendency to be conservative and resist change, which makes this transformation process rather difficult (Ferrer-Balas et al., 2010).

In order to foster behavioural change through education, Svanström et al. (2008) points out the importance of systemic and holistic thinking, the integration of different perspectives, the promotion of skills such as problem-solving, critical thinking, creative thinking, self-learning, communication and teamwork and becoming an effective change agent. “Transformative learning” is essential to make students able to integrate, connect, confront and reconcile multiple ways of thinking and handle uncertainty. Burandt and Barth (2010) adopt a similar view, stressing that, when dealing with sustainability issues, the development of these competencies is more important than the acquisition of knowledge. Competencies – unlike knowledge – can only be learned, not taught, so the learning setting for sustainability has to be designed in a way which provides students with the autonomy required to direct the learning process, as well as offering opportunities for collaboration. Self-directed learning and the importance of practical experience are also emphasised by Steiner and Posch (2006) and Svanström et al. (2008). According to Sibbel (2009) “the curriculum should include experiences which lead to a greater awareness of social and moral responsibilities. In particular, greater self-awareness of personal value systems and a willingness to revise them is required to prepare graduates for works towards sustainability”. Providing students with all the skills necessary to become change agents is a fairly challenging task for environmental education programs and curricula; reality indicates only partial success so far. The main goal of environmental education should thus be to engage students with a complex toolset – containing cognitive, affective and conative elements – which fosters behavioural change.

Numerous theoretical frameworks have been developed to explain the gap that exists between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behaviour. Although many hundreds of studies have been done, no definitive answers have been found. The psychological determinants of our behaviours are complex and multi-dimensional including psychological, social and environmental factors. Nonetheless, research has shown how environmentally-driven behaviours seem to share underlying altruistic values and

intrinsic goals i.e. (De Groot and Steg, 2009; De Groot and Steg, 2010; Stern, 2000; Whitmarsh and O'Neill, 2010). These altruistic values can be described as beliefs that guide our selection and evaluation of behaviours and events (Schwartz and Bilsky, 1987).

Kollmuss and Agyeman (2002) recognise interrelationships, with varying degrees of emphasis, between: demographic factors; external factors (e.g. institutional, socio-economic, cultural factors); and internal factors (e.g. motivation, knowledge, values, emotion), all of which can act as enablers or constraints to behaviour. However, there are a range of motivations that will affect environmental impact such as status, finance, comfort or health (Stern, 2000; Whitmarsh, 2009). Whitmarsh and O'Neill (2010) suggest that a pro-environmental self-identity and past behaviours are important influences on pro-environmental intention. In response to the limitations of rational behaviour models such as the Theory of Planned Behaviour as shown in figure 2.4 (Ajzen and Fishbein, 1980), which are often criticised for being too individualistic and decontextualized (Shove, 2010), more sociologically informed models have sought to summarise the value-action gap by identifying two variables of behaviour (Blake, 1999; Kollmuss and Agyeman, 2002; Moisander, 2007).

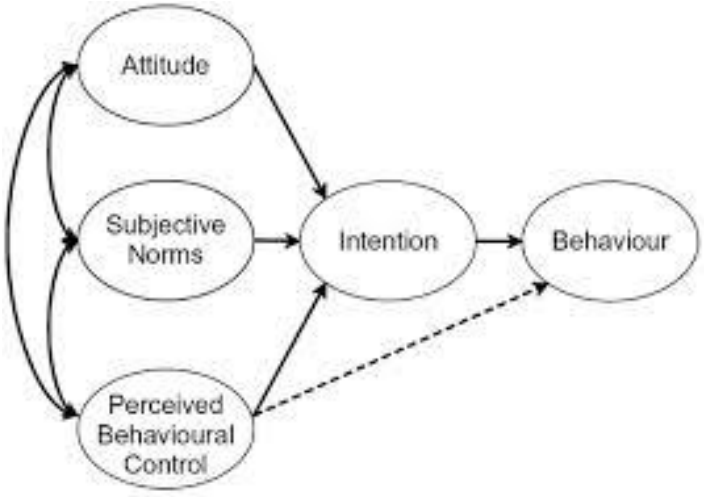


Figure 2.4 Theory of Planned Behaviour

The first is the structure and strength of personal attitudes that direct our motivation; and the second is the situated contexts and constraints of action that affect our ability to do things. Thus, our behaviour is contingent on often conflicting and competing primary motives, such as abstract values; and more immediate selective motivations (Schultz and Zelenzny 1998) which are often based on comfort and expediency. However, these models do not offer an explanation of how to increase the synergy of motivations towards pro-environmental behaviours.

Individual's commitment to environmental conservation may take many forms: some recycle, use public transport, or participate in environmental debates, amongst others. However, despite evidence showing that a large proportion of the public in various regions of the world express commitment to the environment, participation in environmentally responsible behaviour rarely mirrors the strength of this stated commitment (Schultz and Zelezny 1998, 1999). While an individual may express environmental values, in some instances other priorities such as safety or financial security may take precedence over environmentally responsible behaviour.

The oldest and simplest models of pro-environmental behaviour were based on a linear progression of environmental knowledge leading to environmental aware- ness and concern (environmental attitudes), which in turn was thought to lead to pro-environmental behaviour. These rationalist models assumed that educating people about environmental issues would automatically result in more pro- environmental behaviour, and have been termed information models of public understanding and action by Burgess et al. (1998). These models from the early 1970s were soon proven to be wrong. Research showed that in most cases, increases in knowledge and awareness did not lead to enhanced pro-environmental behaviour. Yet today, most environmental Non-governmental Organisations (NGOs) still base their communication campaigns and strategies on the simplistic assumption that more knowledge will lead to more enlightened behaviour. Owens (2000) points out that even governments use this assumption, for example the UK government's

"Save it" energy conservation campaign in the mid-1970s, and the "Are You Doing Your Bit?" campaign which was launched in 1998 to develop public understanding of sustainable development. However, to mobilise broad-based support for social change, citizens cannot be treated as objects for manipulation or bombarded with information. Rather, they should be treated as citizens involved in a mutual dialog. As Luke (2005) argues, the core problem with the current environmental movement is the narrowing of the public sphere and a restricted understanding of the public interest. Hence, he calls for a public ecology that could engage citizens in a collective effort to rebalance the economic and social order with human and natural needs. Additionally, the messaging strategies need to be integrated into broader efforts to foster political mobilization in support of social change. Specifically, Gamson and Ryan (2005) advocate a participatory communication From Environmental Campaigns to Advancing the Public Dialog 91 model that ‘‘involves developing an ongoing capability of people to act collectively in framing contests.’’ This reliance on purely knowledge-based strategies to drive behavioural change is surprising because common sense tells us that changing behaviour is very difficult. Anyone who has ever tried to change a habit, even in a very minor way, will have discovered how difficult it is, even if the new behaviour has distinct advantages over the old one. Rajecki (1982) defined four causes of influence in relation to the value-action gap:

Direct versus indirect experience: Direct experiences have a stronger influence on people’s behaviour than indirect experiences. In other words, indirect experiences, such as learning about an environmental problem in school as opposed to directly experiencing it (e.g. seeing the dead fish in the river) will lead to weaker correlation between attitude and behaviour.

Normative influences: Social norms, cultural traditions, and family customs influence and shape people’s attitudes, e.g. if the dominant culture propagates a lifestyle that is unsustainable, pro-environmental behaviour is less likely to occur and the gap between attitude and action will widen.

Temporal discrepancy: Inconsistency in results occur when data collection for attitudes and data collection for the action lie far apart (e.g. after Chernobyl, an overwhelming majority of Swiss people were opposed to nuclear energy; yet a memorandum two years later that put a 10-year halt to building any new nuclear reactors in Switzerland was approved by only a very narrow margin). Temporal discrepancy refers to the fact that people's attitudes change over time, and with distance from an event.

Attitude-behaviour measurement: Often the measured attitudes are much broader in scope (e.g. Do you care about the environment?) than the measured actions (e.g. Do you recycle?). This leads to large discrepancies in results (Newhouse, 1991).

The last two items point out frequent flaws in research methodology and make it clear how difficult it is to design valid studies that measure and compare attitude and behaviour. Ajzen and Fishbein (1980) addressed these issues of measurement discrepancies in their Theory of Reasoned Action and their Theory of Planned Behaviour (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). They pointed out that in order to find a high correlation between attitude and behaviour the researcher has to measure the attitude toward that particular behaviour. For example, comparing attitudes toward climate change and driving behaviour usually shows no correlation. Even people who are very concerned about climate change tend to drive. This is because the attitude toward climate change is not closely related to the behaviour (driving) (Lehmann, 1999).

Fishbein and Ajzen (1975) maintain that people are essentially rational, in that they 'make systematic use of information available to them' and are not 'controlled by unconscious motives or overpowering desires', neither is their behaviour 'thoughtless' (Ajzen & Fishbein, 1980,; see also Fishbein & Ajzen, 1975). The beliefs central to the Theory of Planned Behaviour include behavioural beliefs (related to the consequences of certain actions), normative beliefs (perceived expectations

of others) and control beliefs (the actions/effects that an individual believes can be enacted/influenced). These beliefs are strongly influenced by a person's values and are dependent to some degree on the information available to the individual. The central point of the TPB is that it proposes that actions are selected on the basis of a reasoned consideration of the alternatives whereby the optimum outcome is achieved – in essence, the theory "views the individual mainly as a utility-maximising actor" (Bamburg and Schmidt 2003).

However, other theories have been proposed that stress the importance of personal norms in predicting behaviour (in particular, a sense of moral obligation), thereby negating the need to account for behavioural intentions.[7] In cases where an individual is aware of the consequences of a number of actions and takes responsibility for these actions, these theories posit that norms and behaviour are closely correlated. One such approach is the Values–Beliefs–Norms (VBN) theory that causally links values and beliefs, with personal norms and actual behaviour. The VBN theory implies that social, egoistic and biospheric value systems are the most stable determinants of pro-environmental action (Bamburg and Schmidt 2003).

Fishbein arid Ajzen (1975) claim that behaviour is likely to be modified when individuals are aware of a given social norm and, more crucially, accept this norm. Oskamp (1991) found that the degree to which respondents acknowledged neighbours recycling behaviour was important in shaping recycling behaviour. In other contexts, Ajzen and Fishbein have demonstrated that attitudes predict behaviour better when no strong norms exist dictating how to behave. It is important to understand how individuals go beyond saying they will carry out an action or wanting to do a specific action to actually pursuing it. This is a challenge in terms of environmental education and is important to highlight in the design of EEPs.

2.5 Environmental Education in the UK

2.5.1 Background

The UK is one of the pioneering countries in fostering, integrating and implementing Environmental Education. It was only in 1974 when the School's Council Project Environment came to print, defining the content of environmental education within an educational framework for the environment and about the environment. There has been significant effort to promote environmental studies at primary, secondary, and tertiary levels in the UK at different times (Porrit et al, 2009). The impact of environmental education programmes for young people will not, however, be immediate because there is an inevitable time lag before the children or students, who are being educated, are in planning or decision-making roles yet children are playing an increasing role as consumers.

During 1960, the National Rural Environmental Studies Association developed and was renamed into the UK National Association for Environmental Education (Palmer et al, 1999). In the late 1990s the National Curriculum Council (NCC) worked on the examination of the topics of environmental education focusing on the enhancement of students' knowledge, understanding and skills. Specifically, it wants to get the students to understand the natural processes, the total dependency of human kind (physically and socially) on the environment, the environmental impact of our activities and the conflicts that stem from environmental issues. Moreover, it aspires to 'create' more skilful students now and more active citizens later, able to 'decide' and shape the environment. Finally, one main concern is the realisation of the environmental impact of decisions and actions from the past, which is obvious now, and how our current decisions and actions will affect the future generations, in conjunction with the identification of our personal commitment towards the environmental protection (Palmer et al, 1999).

Two more notable initiatives of the UK were the publication of Toyne Report – Environmental Responsibility: An Agenda for Further and Higher Education, in 1993 and in 1996 the Publication of the British Government: Taking Environmental Education into the 21st Century. More recently, in November 2006, the Department for Education and Skills (DfES) launched the National Framework for Sustainable Development, setting as target every school to be a Sustainable School by 2020. So, this initiative was based on the government's acknowledgement of the role of schools in forming attitudes and behaviour, by influencing students directly and their close social environment (e.g. family and community) indirectly. School is the place where learning processes are situated, an attribute that has been proven beneficial to helping students understand on their own the environmental impact of their actions. This programme also encourages students to lead their lives in a sustainable way, communicate the message and set a good example to others. Another contribution of this programme is the promotion of community cohesion through the creation of strong and important connections between schools, students and parents (DCSF, 2010). This three-fold connection can be enhanced due to the schools' ability to ameliorate the physical environment around and within the school, and in doing so, they finally manage to influence students' behaviour, attendance and academic achievement, ensuring parents' support (Broadhurst, Owens, Keats, & Taylor, 2008).

Environmental education has tended to take place associated with single subjects which inhibits the introduction of cross-curriculum teaching of the kind needed in environmental education. While traditional approaches are being replaced by, for instance, the encouragement of theme and project teaching in the National Curriculum in Britain, A-level studies remain constrained. Evans (1988) has, for example, criticised syllabuses offered by Examining Boards in A-level Biology for:

(i) their lack of emphasis on Man's impact on the environment;

(ii) their failure to treat environmental issues from global perspectives; and

(iii) their failure to deal with such issues from multidisciplinary viewpoints.

Environmental education has been included in some form in the UK's national education goals for more than a decade (Gough, 2002). In 2013 the new draft guidelines for children in key stages 1 to 3 made no mention of climate change in the syllabus, with only a single reference to how carbon dioxide produced by humans affects the climate in the chemistry section. All references to sustainable development were also to be dropped. Later that year these plans were abandoned, in light of a back lash from teachers and scientists that this subject would be lost (Wintour 2013).

From the late 1970s UK environmental education was clearly aimed at young people. It was firmly rooted in the formal educational sector and influenced by the Government. A key set of publications acted as preparation for establishing a place for environmental education in the school curriculum. They included an HMI working paper entitled Environmental Education in Curriculum 11-16 (HMI 1979) and the DES's consultative document: The National Curriculum 5-16 (DES 1987). These were followed by HMFs Environmental Education from 5-16, for England and Wales (HMI 1989) and the Curriculum Guidance 7: Environmental Education document (NCC 1990), which officially placed environmental education as a 'theme' in the National Curriculum in 1990. These documents were without doubt influenced by Our Common Future or the Brundtland Report, which had called for a major educational campaign and debate as well as public participation (WCED 1987). A year after the Brundtland Report was published came a May 1988 European Commission (EC) Declaration to encourage environmental education. The Council of the EC resolved that:

> *"The objective of environmental education is to increase the public awareness of the problems in this field, as well as possible solutions, and to lay the foundation for a fully informed and active participation of the individual in the protection of the environment and the prudent and rational use of natural resources (Journal of the European Communities CEC 1988, cited in Palmer 1998 16)."*

The National Curriculum for primary schools and high schools in England and Wales sets out the statutory and non-statutory requirements of what must be taught by teachers. It describes the aims and goals it aspires to achieve and the content of its subjects (National Curriculum 1999). The national curriculum programmes of study for citizenship, geography, science and design technology and even aspects of RE all include elements of sustainable development. However, Ofsted (2008) note that the extent to which this is reflected in teaching varies considerably within and between schools. It is recommended that issues related to sustainable development should be at the heart of geography teaching, but this isn't being carried out in the majority of schools that Ofsted visited. Of the various subjects taught in primary and secondary schools Ko & Lee (2003) note that science is often perceived as the subject that can make a significant contribution to Environmental education. However, many scholars have suggested that this should not be the case and that environmental education should encompass education about, through and for the environment (Fien 1993; Lee et al, 2013; Tilbury 1997).

It is widely believed that we have come a long way in how we address the subject of the environment in schools. It is now a formal part of the curriculum, so students are able to learn about the impacts of climate change as part of their ongoing education (Littledykes 1997). This is important, as it means the way students learn about the environment in general and climate change in particular form part of the pedagogic experience (Ofsted 2009). These subjects are not 'add ons' or 'nice to haves' but form part of subject teaching which is tested and evaluated. This helps position environmental issues as serious ones in students' minds.

Ofsted (2009) reported that in 2009 they visited 14 schools over a three year period and found that their focus on sustainability had a wide range of positive consequences. Sustainability was shown to capture the interest of young people because they could see its relevance to their own lives and futures. This study showed that there was evidence of an increased knowledge and understanding

of the importance of leading more sustainable lives, and there were examples of more positive attitudes to learning, better behaviour and attendance and improved standards of achievement. Importantly, the finding showed that sustainability was a significant factor in improving teaching and learning in these schools. Such benefits are also shown in research carried out by Porritt et al (2009). A study carried out by Birney and Reed (2005) concluded that out of 56 schools, those that focused on sustainability brought an ethic of care and a common vision for building a more inclusive school and society. This illustrates the contribution that sustainable schools can make to building stronger relationships and understanding across communities and further afield. In a similar report carried out by Ofsted (2009) and Gayford (2009) schools, students and staff took responsibility for improving the sustainability of the school, for example, through monitoring and reducing electricity, auditing and managing sustainable transport to and from school and growing food for the school kitchen. In these schools it was reported that the involvement of all students and staff resulted in the embedding of sustainability within the culture of the school. Many of the young people in Gayford's (2009) study were able to explain their learning about sustainability in terms of healthy eating, recycling and saving energy and were able to relate this to their personal actions, in particular reported ERBs that followed.

2.5.2 Sustainable schools

Whilst initially in the UK, education for sustainability was seen as a cross-curricular theme to which all subjects could contribute, it received a significant boost when the focus was widened to the notion of 'sustainable schools' (DCSF 2010). At one step this moved issues of sustainability from an optional element in the curriculum to a matter of whole-school policy affecting every aspect of school life. The DCSF (2010) strategy on Sustainable Schools identified eight doorways into education for sustainability: i) food and drink; ii) energy and water; iii) travel and traffic; iv) purchasing and waste; v) buildings and grounds; vi) inclusion and participation; vii) local well being; viii) global

citizenship. Detailed ways in which such themes could be creatively explored in the classroom were provided in Sustainable Schools, Sustainable Futures (Hicks 2007; 2011), Planning a Sustainable School and Towards Whole School Sustainability (DCSF, 2008). Education for sustainability is now subject to Ofsted inspections and a recent survey (Ofsted, 2009) encouragingly reports that:

- In the most successful schools, education for sustainability was an integral element of the curriculum and all pupils and staff contributed to improving the sustainability of their institution;
- Most of the head teachers found that education for sustainability had been an important factor in improving teaching and learning more generally. This was confirmed through lesson observation across the sample of schools visited;
- A common characteristic of the lessons observed, across the full range of National Curriculum subjects seen, was the high level of engagement of the pupils in the work they perceived as relevant to their own lives and future well-being. Symons (2008) in her review of research on the progress of education for sustainability in schools found some of the main barriers to be: time and money, lack of priority given to sustainability, a knowledge gap and lack of training.
- Enablers for moving towards more sustainable schools include: time to create a shared vision, a joined-up approach, formalisation, local authority support, training, external partnerships and student participation and leadership.

Dedicated sustainable schools have a major part to play in the face of global issues such as climate change, ethical consumerism, energy use and peak oil (Field et al 2008). All such issues have an impact on the school and local community. Helping pupils and students engage with them critically and creatively results in greater 'owner ship' of the issues and a willingness to engage in active citizenship now and for the future (Porrit et al 2009).

Figure 2.5 provides an overview of Porrit et al.'s (2009) conclusions when looking at the environment fits into the school community system as a whole. It recognises the interconnectedness and adoption of a systemic approach between sustainable development and positive outcomes for the children that will help practitioners work together more effectively, creating better outcomes for children and young people and a continuing sustainable future for all.

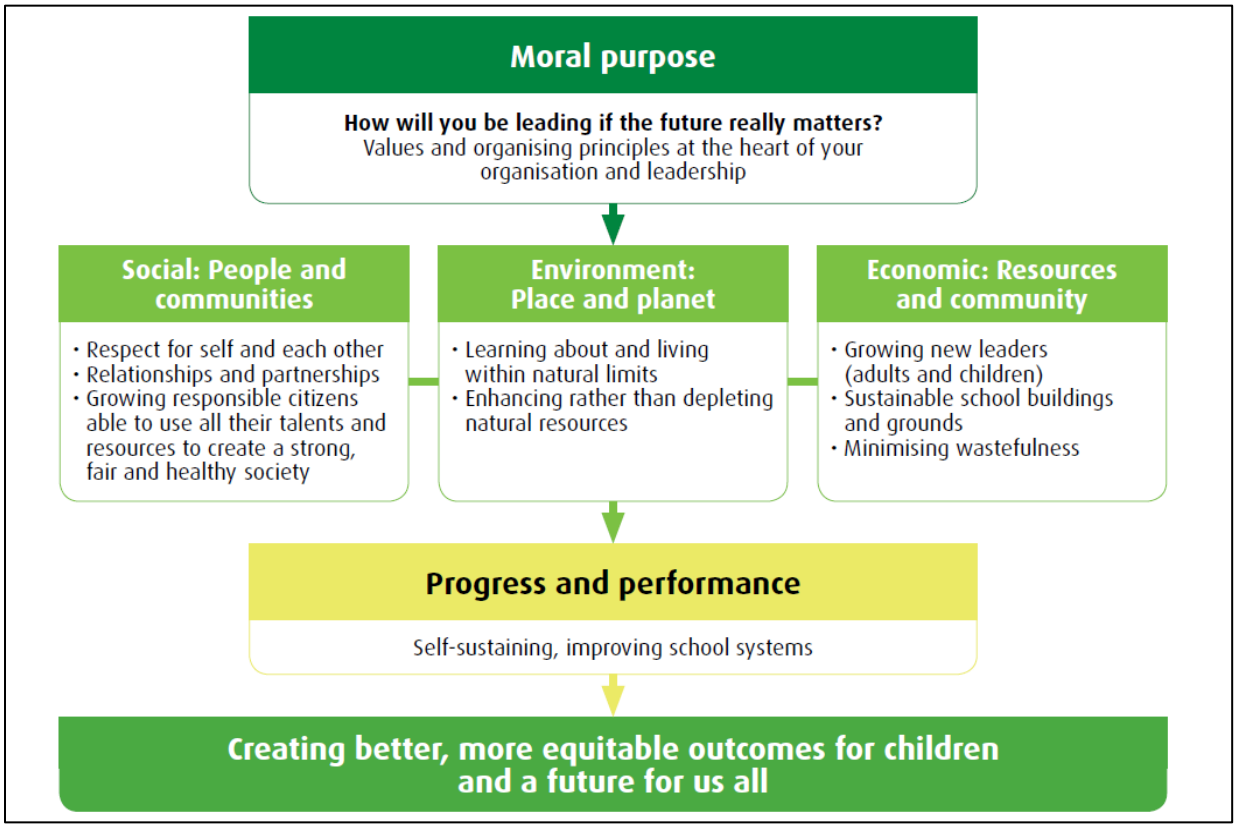


Figure 2.5: Every Child's Future: leading the way Porrit et al 2009 page 7

2.5.3 Environmental Education Strategies

Environmental education can play a key role in raising awareness and changing individuals' attitudes, values and behaviour towards achieving sustainability as stated by many authors (Ballantyne *et al* 1998, Ballantyne *et al* 2001, Barr & Gilk 2007,Hicks 2007). It is widely acknowledged that environmental education is a significant tool in environmental management and the pursuit of sustainability, alongside more traditional tools such as policy, regulation and compliance. Many

sectors of society are involved in developing and delivering educational courses and public awareness campaigns.

Some years ago, it may have not been discernible for somebody to see where environment and education overlap, but after 1990s many public and private initiatives have taken place globally, to establish environmental education and make it an integral part of countries' school curriculum. Regarding the roots of environmental education, it should not be neglected the contribution of Goethe, Rousseau and Montessori to the evolution of environmental education. These important thinkers influenced the world with their environmental thoughts and practices, but the 'founder' of environmental education in the United Kingdom, a country with remarkable tradition in that field, is widely seen to be Sir Patrick Geddes (1854)(Palmer, 1998). He was a Scottish Professor of Botany, who combined the quality of the environment with that of education, by bringing students closer to the environment.

The term 'environmental education' first appeared in the UK in a conference at Keele University, Staffordshire; in 1965 which resulted in the establishment of the Council of Environmental Education in 1968. The IUCN's definition of environmental education says that:

> "Environmental Education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality" (IUCN, 1970, cited in Palmer, 1998).

Environmental education encompasses a spectrum of approaches, such as:

Environmental awareness-raising in the media, the Internet and other networks; The media's role in environmental education is important because it is through newspapers, magazines, radio, and television that people gain awareness, particularly the adult population, of modern communications have provided information for the growing public demand of environmental related information; we now see more environmental magazines, newsletters, and journals, along with TV and radio programs (Filho et al 1995). Recently, public radio and television broadcasting considers all of its programming to be educational by including topics like science and nature, drama, music and dance, in addition to varied civic issues. It has a vast delivery span given the fact it can reach audiences in homes, schools and public places (Monk 1991). Communicating environmental information is very challenging due to the dynamic and complexity of natural systems.

Participatory community programs; Environmental education is an integral part of a sustainable community as it encompasses a wise use of natural resources, promotes civic engagement, and enhances the quality of life for community members. Of particular significance has been the role of the ubiquitous 'community' as the primary stakeholder in these processes (UNEP 2004). Participation of the community, and its partnerships with other stakeholders, has become an important component of all environmental programmes and projects, both in terms of subsidiarity of decision-making processes, and of creating an enabling environment for the community to have a say over aspects that affect their lives. One common form of public participation is through the activities of environmental groups. The involvement of social organizations, nongovernmental organizations (NGO's), and volunteer organisations is often seen as a necessity for organizing and mobilizing community support and for turning a programme into a local, regional or national movement.

School-based programs; Non-formal environmental education (within classroom learning) and informal environmental education (e.g. after school clubs, externally run workshops) are options for people to gain more information on the environment. Within the school grounds there are many award schemes and groups which run along side the formal curriculum to aid pupils in gaining environmental knowledge and experiences.

Uzzell (1999) built upon the existing research about environmental education, by discussing the possibility of educating children to educate communities and inspiring community environmental action. Uzzell (1999) recognised the phenomenon of child-to-parent influence, though based on his previous research, noted that support in a number of areas was required for the communication between child and parent to meet its fullest potential. The shortcomings that were identified in existing environmental programming include: a) environmental education is currently based on a top-down teaching model which is against our knowledge of social influences; b) environmental education does not necessarily equate to environmental action; c) environmental education is not always contextual and it is the real-life examples and local experiences that are going to empower people to action; d) the ability of environmental education to change the attitudes and behaviours of children is uncertain, though this may have to do with the scale at which they are being taught at; and e) for effective change to be sustained, political, social and cultural contexts must support and facilitate that change (Uzzell, 1999).

2.5.4 Effective Environmental Programmes

Schools face the rising challenge of providing engaging environmental education programs for their students with pressures from government, parents and competition from other schools. The Department for Children, Schools and Family (2008) stated that these programs had to be multi-faceted and foster environmental awareness and understanding while facilitating action. As

children are spending increasingly less time outdoors interacting with nature and more time interacting with media to learn about nature, and as urban structures continue to consume the natural areas, the need to re-examine how we train educators to address environmental education increases (Hudson, 2001). Hudson's article described how one large, urban university teacher preparation program addressed the issue of preparing teachers of young children to be effective environmental educators through an integrated partnership called Strengthening Awareness and Valuing the Environment. There is a variety of approaches to engage people with environmental issues that can be taken depending on the desired outcomes and the particular situation, however programmes in the past have focused on increasing knowledge, but the overall goal of all environmental education programs must be sustainable behavioural change.

The most frequently used tool to achieve communities awareness towards threatened species over the past has been environmental education. However, the effectiveness of these initiatives has been recently challenged since many people think they are limited, in general, to increase people's knowledge on natural history, through information distribution on media which does not generate attitudinal changes that foster conservation (Barr 2003). The most frequent types of programs, aimed at communities, that are reported are those centred on the general community and within school communities. Likewise, propaganda (posters and leaflets) and educational tools (workshops and courses) were the communication means most frequently used in research studies (Ballentyne et al 1998).

Non-Government Organisations (NGOs) have emerged as major partners in development and conservation activities, performing a multitude of roles including environmental education and awareness-raising among the public. NGOs have helped design and implement environmental policies, programmes and action plans, and set out specifications for environmental Impact Assessments. They also play crucial advocacy roles through their environmental campaigns (Barret, 2005). NGOs

and 'major groups' have a critical part to play in Agenda 21 activities by contributing ideas and spreading knowledge and encouraging involvement. Widespread NGO participation prior to and during the Rio Conference of 1992 greatly helped disseminate knowledge of Agenda 21. Agenda 21 activities have led many organisations to broaden their involvement and develop linkages among the environment, development and social justice. The most active bodies have included adult education associations; environmentalist, development co-operation and solidarity organisations; church organisations and at both national and regional levels associations of local authorities. The major groups identified by Agenda 21 as being critical in its implementation include indigenous people, women, youth, workers, farmers, local governments, the scientific community, business and industry, and NGOs.

2.6 Intergenerational Learning

2.6.1 Background

In the literature of Environmental Education and Education for Sustainable Development there have been a limited number of studies on children's potential to influence their family members, especially parents, to make their lifestyles more sustainable and environmentally friendly. The capacity of children to prompt pro-environmental behaviour within the family by influencing their parents is an emerging field which was first paid attention in the early 1990s (Rickinson, 2006). It aims to examine a succession of events and influences beginning with that of school on children and children on parents through intergenerational influence (see for example Uzzell et al, 1994; Vaughan et al, 2003; Leeming et al, 1997). In general, this literature finds that children do have an influence on their parents, affecting their values, attitudes and decisions (Axinn & Thornton, 1993); which in turn determine their choices as consumers, their sport and leisure activities and even their clothing style (Howard & Madrigal, 1990).

Reviewing the literature, eleven studies have been conducted, that deal with students' influence on their parents' environmental knowledge, attitudes and behaviours (Sutherland & Ham, 1992; Uzzell et al., 1994; Evans et al., 1996; Leeming et al., 1997; Ballantyne et al., 1998; Legault & Pelletier 2000; Ballantyne et al., 2001a; Ballantynte et al., 2001; Volk & Cheak, 2003; Vaughan et al., 2003; Grodzinska-Jurcack et al., 2003). These studies focus on environmental education programmes which last one year at the longest and among others they investigate children's influence on parents' pro-environmental behaviour. However, the teaching programmes that these studies investigate are part of the experimental design of the research project and do not consist of a long-term strategy that was running before and after the studies. As a result, this constrained the effect that the programmes could potentially have, because sustainability was not well-embedded in school ethos due to the short duration of the programme and lack of continuation. Regarding the methods that were used in those studies, they were mostly teaching methods through various activities, as part of the programme used for the purpose of the study rather than a wide range of data collection methods.

Ballantyne, Connell and Fien (1998) have conducted research into the notion that children can act as catalysts for environmental change by educating their parents using the knowledge and skills gained in environmental programming experiences. This type of education is referred to as intergenerational influence. The root word, generation as defined by Hagestad (1981), refers to a person's position in family lineage (as cited in Gadsden & Hall, 1996).

Research into intergenerational influence does indicate that children can actively sway their parents' choices, attitudes and values (Ballantyne, Fien, & Packer, 2000,). Researchers in the field of marketing have studied the ability of children to influence the knowledge and behaviour of their parents for decades, indicating that children play a significant role in influencing the consumer choices of their parents (Duvall & Zint, 2007). Sutherland & Ham (1992) and Uzzell (1994) have

provided evidence that young people can influence their elders environmental awareness. However, the processes of how a child influences his or her family members are not yet fully understood. Alexander & Clyne (1995), recognise that families are the main centre of learning. Learning within the family is lasting and influential. They use the term 'family learning' to encompass a wide range of informal and formal learning activities that involve family members in developing an understanding of, and the skills involved in, family roles, relationships and responsibilities. Learning in the family benefits both adults and children. With mutual learning and free flow of ideas among family members, a 'learning family' is built. The National Institute of Adult Continuing Education (2003) publication indicates that family learning serves as powerful stimulus to developing a true culture of lifelong learning amongst adults and children.

The call for increased intergenerational engagement is coming from many directions. We see it in newspaper editorials providing commentary on the increased sense of social isolation experienced by many young people and older adults (Kollumuss & Agyeman 2002). The theme of intergenerational learning is also finding its way into the publications and meetings conducted by professional societies in a broad range of fields, including education, volunteerism, child development, service learning, and gerontology. Hundreds of intergenerational program guidebooks and manuals have been published over the past 15 years and authors in the intergenerational field have found mainstream venues for their publications (Brabazon & Disch, 1997; Hill et al. 1998; Henkin and Kingson (1998); Kaplan et al., 1998; and Winston, 2001). In all of these venues, there is a growing recognition that these efforts to facilitate meaningful intergenerational engagement will enhance the quality of people's lives, strengthen communities, and contribute to needed societal-level change. Intergenerational approaches in schools, the focus of this thesis, typically call for using the strengths of one generation to meet the needs of another.

2.6.2 Parent-Child Relationship's Influence on Environmental Values

The influence of the parent-child relationship on environmental attitudes and behaviours has been examined in environmental education programs through the mechanism of intergenerational learning (Kenner et al 2007). Several studies have examined the effects of intergenerational learning across KS2-4 environmental education (EE) programs (see section 2.6.1). Intergenerational environmental programs aim to influence students to share environmental knowledge with their parents as a means of promoting environmental stewardship in the older generation.

Research on the parent-child relationship has also examined the influence that a parent can have on the environmental beliefs and behaviours of his or her child. Chawla (1999) from a review of multiple studies, found that adult environmentalists consider their parents to have played a significant role in their career choices and attitudes towards the environment. Concluding this Kollmuss and Agyeman (2002) summarized Chawla's research findings and found pro-environmental values held by one's family was one of the most frequently mentioned influences, with parents being the most influential family members.

Childhood experiences in nature, such as holidays and camps, were the most frequently cited influences on ERBs and environmental awareness. These childhood experiences may arise from parental decisions, such as deciding to go on a holiday to a national park. It is important to note that Chawla's studies focused on the influences that impacted the environmental attitudes and career choices of environmental professionals. Her subjects did not include a broader population of individuals that have little or no connection to the environment in their careers. The research above suggests that the parent-child relationship can influence one's environmental attitudes and behaviours (Chawla, 1998; Chawla, 1999; Duvall & Zint, 2007).

Based on these findings, it is reasonable to believe that the parent-child relationship has the potential to intervene in variables of the ERB models (see figure 2.3). In the Hines *et al.* (1987) Model of Responsible Environmental Behaviour, attitudes, locus of control, and personal responsibility are all personality factors that an individual learns or inherits which may be influenced by a parent or child. Additionally, a parent or child could provide the other with knowledge of issues and knowledge of action strategies. For example, a student may learn about a relevant environmental issue at school and inform his or her parent of the issue. Additionally, examining the ERBs that a parent or child performs may impact the decision of the other to engage in the ERB. For example, if a child (parent) observes his or her parent (child) using a reusable water bottle and sees how convenient the practice is, the child (parent) may be more obliged to similarly use a reusable water bottle. Based on these models, it seems reasonable to suggest that the parent-child relationship could have a significant impact on variables that are believed to contribute to ERBs.

2.6.3 Child-to-adult influence in environmental education

While the research on adult-to-child influence is an important contribution to the study of intergenerational learning, we now recognize that society and human communication is not unidirectional or asymmetrical from adult to child (Uzzell, 1998). Cowan & Avantis have criticised the one sided view that parents are the only influencers with children having no reciprocal effect on their parents (1988). The trend in more recent research on intergenerational influence, specifically relating to environmental education, has been to also consider the important role of children in the family structure and relationship.

One of the first studies to look at the influence children have on their parents' environmental attitudes and behaviour was conducted by Sutherland and Ham (1992). Sutherland & Ham (1992) ex-

amined the communication of environmental information and ideology between children and parents. A series of pre and post-test interviews were conducted with parents, both before and after their children were given an environmentally-focused homework handout. The purpose was to measure the change in environmental awareness in the parents following the homework assignment, which focused on watershed education. Duvall & Zint (2007), in their review of intergenerational research in environmental education, recall that Sutherland and Ham (1992) discovered that the majority of the adults showed an increased knowledge of the watershed, with the parents citing the educational handout as the source of their information. However, the researchers reported that the majority of the information that the parents gained was acquired through indirect sources such as the education booklets that were handed out and not necessarily as a result of interaction with the child. As noted by Duvall and Zint, "Overall they [Sutherland & Ham] concluded that although children may pass on environmental information and ideologies to parents, transfer is often unreliable, and the information exchanged is generally vague" (2007).

Many researchers cite the work of Sutherland and Ham (1992) as one of the inaugural works in the discourse of child-to-parent environmental influence. The study has been criticized for its small number of participants and researchers have suggested that a stronger child-to-parent relationship might have been found, if the sample size had been larger (Legault & Pelletier, 2000). However, despite these shortcomings, the study is generally regarded as the foundation for the child-to-parent influence research in environmental education that followed.

Following on from this Evans and Gill (1996) suggested that a programme of environmental education received by the children in their study indirectly influenced their parents in recycling paper, plastics and tin cans. Comparisons were made of responses to four key questions in a questionnaire completed by parents and pupils at a middle school in Newcastle, UK both before and after the education programme. Evans and Gill (1996) are presuming that the parents reacted

to information received from their children about activities at school, and perhaps to direct pressure from them to behave in environmentally friendly ways. The study goes on to suggest the development of community education programmes in which children and adults interact and learn with each other is desirable.

Leeming & Porter (1997) contributed more to the dialogue surrounding intergenerational influence in environmental education with their research on the effects of participation in environmental education programs on children's environmental knowledge and attitudes and the influence that children may have on their parents' environmental attitudes and knowledge. Unlike most of the research performed prior or since, Leeming & Porter (1997) conducted pre- and post-tests on a wide age-range of children. In this study, participants were selected from grades 1 through 6 (age 4-11). They used the Children's Environmental Attitude and Knowledge Scale to measure the results of their study (Leeming & Porter, 1997). The sample size for this project was considerable, with over 980 children tested and 486 parents returning questionnaires. Leeming & Porter (1997) evaluated the environmental program, called the Caretaker Classroom Program, which encouraged elementary school classes to engage in pro-environmental activities. The researchers found it had a significant positive effect on the attitude of the children towards the environment but did not influence their knowledge of environmental issues (Leeming & Porter, 1997). One of the major contributions of this study is the finding that differences in environmental attitude exist between parents of children who received the Caretaker Program and the parents of the control children's group. Porter (1997) interpreted this difference as evidence that children who received the Caretaker program influenced their parents' environmental attitude. The researchers' recommendations for future research included identifying the specific activities or assignments that had the greatest impact on parents, this is something that was considered in the design of the EEP run as part of this research. They also acknowledged that more longitudinal studies are necessary to understand how long the

pro-environmental attitudes and behaviours of the families last beyond the programme(Leeming & Porter, 1997).

Ballantyne, Connell & Fien (1998) summarised the research on the subject of intergenerational influence in the social sciences and education. Based on this review, they identified several areas of study that necessitate further investigation in order to aid environmental educators in conveying their messages from child to parent. These include: a) increasing the knowledge about the child-parent interaction process as well as community-child relationships; b) a comprehensive description of the nature of the influences between parents and children, particularly with reference to environmental education; c) widening the understanding of how each of the parties in the relationship perceive the mechanisms behind the influence; d) identifying the factors that either strengthen or weaken the influence; e) evaluating environmental education programs in their promotion of opportunities for intergenerational influence; f) developing a definition of the 'pedagogical considerations in environmental education design and teaching approach related to intergenerational influence'; and g) developing methods by which to measure intergenerational influence within environmental education (Ballantyne, et al., 1998). With additional research addressing these areas, environmental educators will be able to design programs that provide the support children and adults need for optimal child-to-adult influence and therefore be an effective tool for spreading positive environmental messages and ultimately influencing ERB.

2.6.4 Key Findings on the presence of intergenerational learning

The following table presents eleven studies on children's influence on environmentally responsible behaviour, summarising their basic structure and outcomes. Table 2.3 shows that all of the previous studies used mainly questionnaire and interviews as data collection methods, however, some less conventional methods were used mainly for teaching purposes. The longest of these studies lasted

1 year. The literature summarises that the duration of the programme can facilitate the transfer of environmental knowledge from school to homes through children (Duvall & Zint 2007) and assure the ongoing involvement in environmental education activities. The EEP run by the researcher promotes the diffusion of environmental knowledge and environmentally responsible behaviours, which can finally lead to a repetition of environmental knowledge. The repetition of environmental information will help children consolidate their knowledge enhancing their confidence in knowledge and their 'expert' feeling. At the same time it can increase the possibility of children to bring up this topic and initiate a discussion about the environment with their parents.

Table 2.3 Summary of previous intergeneration studies

Study	Duration	Goals	Partici-pants	Teaching Methods	Data Collection Methods
Suther-land & Ham (1992)	4 Months	To Examine: -The transfer of envi-ronmental knowledge and information from children to parents. -Children's influence on parents' pro envi-ronmental behaviour.	-Grade-6 students -Parents	A booklet with environmental information was given to students	-Ethnographic data -Pre-and-post-program inter-views with par-ents. -participant ob-servation of two families and schools.
Uzzell et al. (1994)	N/A	To examine (i)the role of instruc-tions in children's en-vironmental knowledge and action competence (ii)the phenomenon of catalysis without any significant interven-tion of environmental education (iii)the intergenera-tional communication and influence towards action competence (iv) children's and par-ents knowledge, con-cern and actions about the local and global environment	-Politicians -Techni-cians -Teachers -Pupils -Parents -Local peo-ple -journalists	-Interviews -Question-naires -Observation studies -Experimental and laboratory based studies -Pre-and-post-programme questionnaires and inter-views.	An international project that took place in four European countries (Den-mark, France, Portugal, UK).

		(v)the conditions that could encourage the catalysis effect.			
Evan et al. (1996)	6 Months	-To test if children have different and better-informed opinions about the environmental issues than their parents. -To find out if children can influence their parents' environmental attitudes.	-Students -Parents -Experts	N/A	-Pre-and-post-education questionnaires for students and parents
Leeming et al. (1997)	N/A	To assess if the participation in environmental activities: (i) change the environmental attitudes and knowledge of children at different ages. (ii) encourage children to influence their parents' environmental attitudes and knowledge and pro-environmental behaviour.	-Elementary school students -Parents	-Participation in environmental activities	-Pre-and-post-questionnaires about environmental knowledge and attitudes of children and parents. -Instruments: Children's environmental attitude and knowledge scale Weigel & Weigel Scale (Weigel & Weigel, 1978)
Ballantyne et al. (1998)	N/A	-To focus on the factors which affect the intergenerational communication -To determine to what extent school environmental education programmes are able to encourage intergenerational communication and learning.	-Primary school children (Grades 5 & 7) -Parents -Teachers	-Conversation objectives -Attractive materials -Dramatic performances -Dance -Stories Interactive games	-Pre-and-post-programme questionnaire for students. -Pre-education questionnaire for parents. -Post-education interviews for parents. -Observations -Instruments children's environmental attitude and knowledge scale six dimensions

					of student-parent communication.
Legault & Pelletier (2000)	8 months	-To investigate the changes that participation in an environmental education project can cause to children's and parents environmental knowledge, attitudes motivation and behaviour -if an how children can influence their parents ecological attitudes, motivation and behaviours. -Focus on: (i) Ecological Knowledge on issues and strategies. (ii) the importance parents and students give to environmental issues. (iii) How satisfied people are with environmental conditions. (iv) their competence to take their action. (v) The rate of recurrence of pro-environmental behaviour. (vi) the measure of intrinsic and extrinsic motivation	-Grade 6 students -Parent	-Motivation of pro-environmental behaviour through the theory of self-determination (Deci & Ryan, 1985)	-Pre-and-post-programme questionnaires for students and parents.

Ballantyne et al. (2001a)	N/A	-To find out if: (i)school-based environmental educational programmes can have an impact on students learning. (ii)it can cause any intergenerational communication and influence within the family.	-Primary school (year 5 & 7) students -Secondary school students (year 9) -Parents -Teachers	-Story telling -School visit to an environmental centre. -Six thinking hats (De Bono, 1992) -Students' assessment work.	-Post programme questionnaire for students. -Personal interviews with teachers. -Telephone interviews with parents. -Methods of analysis: Comparisons across the programmes and across different groups of students from each programme
Ballantyne et al. (2001b)	-1,2,5 months -1 year	-To focus on the development of the environmental education programmes to enrich students' environmental knowledge and enhance their pro-environmental attitudes and action competence. -to examine the programmes' effectiveness in enhancing students learning and intergenerational communication and influence within the family.	-Primary and secondary school students. -Parents -Community members -Public forums -Local newspapers -Local industries and business	-Class discussions -Hands-on activities -Homework -Roll-plays Oral presentations -Small group research -Observations -Written assignment Industry visits -Water quality monitoring -Experiential learning -Interschool meetings	-Surveys for students and parents -interviews with parents

Volk & Cheak (2003)	5 Years	-To evaluate the impact of an environmental education programme on students, parents and the community.	-Grade 5 & 6 students -Parents -School personnel -Community members	N/A	-Interviews of students, parents, school teachers, administrators and community members. -Newspaper articles written by children -Proceedings from symposia. -Surveys conducted by students. -Instruments: Middle school Environmental Literacy instrument Critical thinking test of environmental education.
Vaughan et al. (2003)	1 month	To examine: (i)if the children learn and retain some environmental principles (ii)if they manage to transfer this knowledge to their parents	-Elementary school students (grade 3 & 4) -Parents -Adult residents	-Colouring books -Homework (worksheets with questions)	-Pre-and-post programme questionnaires for students, parents and residents.
Grodzinskajurcack et al. (2003)	4 months	-To determine the extent to which students', parents' and teachers' environmental knowledge, attitudes and behaviours have been affected by school environmental education programmes.	-Primary school students (Year 4 & 5) -Parents Teachers	-Textbooks for students -Manuals for teachers -Brainstorming -Discussion -Demonstration -Visit to local landfill site. -Meeting with local authorities.	-Pre-and-post-programme questionnaire for students, parents and teachers.

Many environmental problems are desperately in need of attention. Both Uzzel (19940 and Ballantyne et al (2001) agree that educating both adults and young people is seen as part of the solution to such problems. Given this situation, and the already considerable investment in environmental education in schools, many agree that the notion of encouraging students to initiate environmental discussions with adults at home and in the community seems like an attractive strategy (Uzzell 1994).

Chapter 3. Research Methodology

3.1 Introduction

The study was conducted as a mixed qualitative and quantitative case study incorporating field research. It was intended to construct a thick description of individual development of environmental concern and subsequent change in Environmentally Responsible Behaviours (ERBs), based on a specifically designed, school based Environmental Education Programme and measured before and 1 month after. The intention was to observe any evidence of child-adult environmental dialogue and changes in behaviour of the participant and their parents over a period of time. The analysis included consideration of the development of environmental concern and subsequent change in ERB, and influences on participants' perspectives and behaviours, as suggested by Babbie and Mouton (2001) in their discussion of qualitative research using case studies.

3.2 Choosing a Research Methodology

3.2.1 Quantitative, qualitative and mixed methods approaches

The majority of the research done to date on intergenerational influence in an educational setting has used either quantitative (Leeming & Porter, 1997; Vaughn et al., 2003) or mixed method approaches (Ballantyne, et al., 1998b; Ballantyne, et al., 2000; Ballantyne et al., 2001a; Ballantyne et al., 2001b; Legault & Pelletier, 2000). However, there is some debate as to whether the two 'opposing approaches' of quantitative and qualitative research can be usefully combined in a single study. In the view of Blaikie (2000) triangulation or method combination is difficult because of the different epistemological and ontological underpinnings of the two research strategies. Such writers as Lincoln et al (2011), Hughes (1999) and Blaikie (2000) argue against the idea of combining

the two research strategies in a single study with the reason that research methods carry epistemological commitments and the use of any data collection technique is not simply an issue of collecting data but a commitment to either positivism or interpretivism (Blaikie, 2000; Grix, 2004).

Contrary to the above position, some writers emphasise the usefulness of combining the two approaches in spite of their different epistemological underpinnings (Grix, 2004; Bryman, 2004). Bryman (2004), for instance, has argued that methods themselves should be viewed as mere tools for collecting data and should not be looked upon as being automatically rooted in epistemological and ontological commitments. He, therefore, views research methods from one approach as "capable of being pressed into the service of another" (Bryman 2004). In support of this position, other research methodologists (including Bryman and Cramer, 1997, Creswell, 2002 and Grix, 2004) recognise that there is much to be gained from a fusion of quantitative and qualitative methods in a single study of social phenomena. Denzin (1989), for instance, has suggested that triangulation might be done in social research by using different methods, sources, investigators or theories, while Robson (1993) also observes that a social research question can, in most cases, be attacked by more than one method. According to Robson, there is no rule that says only one method must be used in an investigation. He goes on to suggest that using more than one method in a single investigation can have substantial advantages even though it almost inevitably, adds to the time investment required. Preece (1998) also supports the combination of qualitative and quantitative methods when he observes that while some disciplines have come to be associated more with qualitative or quantitative approaches, both find a place in most fields of study.

The views of these researchers suggest that the methods of quantitative and qualitative approaches can complement each other in a single study of social phenomena. As noted by Grix (2004), "as long as you are aware of how you are employing a specific method, and what this method is pointing

you towards, and how this relates to the ways you employ other methods, there should be no problem". In this regard, Grix (2004) has advised that it is generally a good idea for social scientists to use more than one method of enquiry to improve the chances of getting better, more reliable data and to minimise the chances of biased findings. He argues, for example, that there is no reason why one should not employ methods usually associated with quantitative research in an in-depth case study. These arguments provide a firm basis for the combination of quantitative and qualitative methods in social science investigations. Thus, the criticisms notwithstanding, the mixed methods strategy of social investigation is fast becoming popular among researchers (Grix, 2004; Bryman, 2006).

Adopting a mixed method approach helps the understanding of complex data and gives a more complete and comprehensive account of the subject of enquiry (Bryman, 2006; Creswell, 2003). The complexity in this particular research is the intergenerational influence children may have on their parents regarding pro-environmental messages and to what degree the children are influencing the parents' choice to partake in environmentally responsible behaviours at home. The use of qualitative methodologies can provide valuable new insights and greater depth of understanding, as they allow participants to share their personal stories about their experiences with intergenerational relationships. Qualitative methods also allows for a more detailed description of the processes of influence involved in intergenerational relationships. 'Eco-diaries' kept by the children will constitute the qualitative part of this research enabling the child's point of view to be captured. The quantitative research in this study in form of a questionnaire to parents pre and post intervention provides numerical evidence and allow statistical analysis of changes that have occurred in behaviour, awareness and attitude over the time of the interventions. Unexpected results from any of the methods might be explained through the findings generated by the other thus offering a more complete understanding (Bryman, 2006; Davies, 2003). As the sample size of this study was rather

small (parents n =49(pre) n=51(post)/child n=42) the mixed method approach provided opportunities to gather more detailed and in depth data.

The mixed method design was used with the aim of one form of data supporting the other. In this case, diary data supported the questionnaire data from the parents. Also to then be able to cross reference child and parent experiences the diaries were used with the children. Also the mixed method approach was used in order to access both parent and child's perceptions, experiences and practices. Through questionnaires the researcher would be able to obtain the parents' opinions, points of view, values, feelings, attitudes, perceptions and practices regarding the environment and experiences with their children. Through diary exercises, the researcher will be able to see what children actually thought of the workshops, the potential knowledge they have gained and any experiences they have shared with their parents and siblings in term of environmental conversations and any reference to environmental behaviors carried out in or around the home, hence enabling the researcher to obtain a deep understanding of what the pupils say and do about the issue being investigated (Cohen, et al., 2000). This enabled the researcher to compare what parents say about how they engage in ERB within their households before and after the EEP. This will be compared alongside the children's diary abstracts which refer to the EEP itself, the knowledge they have gained and ERBs at home.

Many authors agree that all components of environmental education are very complex in nature and involve the 'human' dimension. The development of knowledge, skills, values, responsible behaviour and other EE components are affected by many external factors, such as social status of the families, parents attitudes, education and knowledge, living environment, reinforcement from friends, family and community, culture and traditions. Thus, there are many interactions and correlations between these various components and not all of them have been studies. In many cases, it is difficult to capture the whole range of complex interactions through statistical functions.

I believe that a combination of qualitative and quantitative methods would be more appropriate and effective in EE because they would provide a more in-depth descriptive analysis of the living and learning environments in which EE components are developed. These qualitative descriptions can be combined with statistic results for a more complex interpretation of the research findings.

3.2.2 Methodological analyses

This study uses grounded theory as the qualitative method for data collection and analysis. Based on the ideas of sociologists Barney G. Glaser and Anselm L. Strauss, grounded theory offers strategies for conducting qualitative analysis. Grounded theory is an investigative research method with no preconceived hypothesis and used continually comparative analysis of data (Charmaz, 2011). Glaser and Anselm use a 'constant comparative method' to compare data at each stage of analysis, while continually constructing a theory during each step in the research process (Charmaz, 2011). Sampling is aimed at developing a theory and is not concerned about a representative population, as in quantitative research practices. In order to not bias theory development, Glaser and Anselm recommend conducting the literature review once the data analysis is complete (Charmaz, 2011). A grounded theory approach is deemed the most suitable qualitative method for obtaining the information necessary to address the questions of this research. First, grounded theory is the study of social constructs (Malterud, 2001; Bowen, 2006). It focuses on examining the processes and actions of participants, rather than a description of setting, while creating a conceptual interpretation of the data (Charmaz, 2011).

The second reason that grounded theory is a good methodological match for the research is that it is well suited to the study of intergenerational influence because little is known about this social process. Creswell et al. (2007) believe that grounded theory is a strong method to use when no theory exists for a topic or where the current theories are inadequate. There is still more research

needed on intergenerational influence, as we understand only a small fraction of the child-to-parent influence relationship. This study's research questions seek to recognise the existence of and evidence for intergenerational influence in the child-to-parent relationship regarding environmental messages in the home. Ballantyne et al. identified the need for this type of research inquiry, the results of which will aid environmental educators to "use this social process to advance environmental education beyond the classroom" (1998). These researchers comment on the need for better comprehension of how both the child and the parent perceive the influence processes (Ballantyne et al, 1998).

The third reason that the grounded theory method is a good methodological match for the research is that grounded theory is a flexible, descriptive approach that keeps the research focused on analysis and theory development (Charmaz, 2006). This is extremely valuable when working with children, especially when there are participants who find reflecting upon or sharing information with an unfamiliar person a challenge. Grounded theory allows the researcher the flexibility to move beyond the prepared set of questions in an attempt to establish trust with the participant (Charmaz, 2006).

Procedures that recognize the researcher's role in making decisions about the data, while bringing personal values, experience and priorities to the research is the fourth reason grounded theory methods are appropriate for intergenerational research (Creswell et al, 2007). As my participants took part in their environmental education experience over a period of one month, I as a researcher will have a potential influence on their reflections. Likely, they have not previously contemplated the processes of influence within their families or the role the children play in these processes. The participants will also influence the way I contemplate and perceive influence in my own life. My personal experiences with child-to-adult influence gives me a number of preconceived ideas about how the communication of influence might be occurring within families. Grounded theory accounts

for the impact the researcher and the participants may have upon one another by having the researcher initially state his or her biases, perspectives and believes so that these also become part of the rich fabric of data collected through the study (Charmaz, 2006). Charmaz also advocates completing data collection and analysis prior to conducting a literature review so that the researcher can avoid imposing the work of others onto the data. For this study a basic literature review was carried out in terms of environmental education and possible methods for collecting data but I avoided reading too much literature on the complexities of intergenerational learning.

The fifth reason for using the qualitative data in a grounded theory format is that studies of child-parent interaction typically have low quantitative survey response rates since both parent and child need to respond in order for the test to be considered statistically significant (Uzzell, 1994). By using diaries, I was able to collect rich data and reduce the concern about low response rate. The qualitative grounded theory method is not concerned with statistical significance or validity in the quantitative sense but is interested in the fit and relevance of the data (Charmaz, 2006).

3.2.1.1 Advantages and disadvantages of the research approach

This sub-section explains the advantages and disadvantages of different data collection methods, which were used in this research approach and specifically between types of qualitative and quantitative methods. Because in this research both types have been used, it would be useful to have a brief mention of their strengths and weaknesses, which can eventually play an important part in the reliability and credibility of the methodology in the first place and in the conclusion afterwards.

Qualitative methods worked very effectively in this research study as they targeted at: (i) studying an issue in depth and detail, (ii) focusing on a small number of participants (iii) trying to elicit information and individual meanings through open-ended questions and (iv) adopting an “intense and holistic overview of the context under study”. Hence, qualitative methods produce a great amount

of information of important interpretive value, deepening our understanding in tandem (Patton, 2002). Moreover, Patton (2002) maintains that the open-ended responses can give the researcher the opportunity to see and understand the world through the participants' eyes.

However, one of the drawbacks of these methods is the restricted generalisability, due to the aforementioned small number of participants and cases, which makes it difficult to apply the findings for the whole population or a substantial part of it (Patton, 2002). Another issue with qualitative methods in general and consequently with qualitative data, that I also encountered in this study, is the researcher's objectivity / neutrality and how he can remain as distant as it takes so as to keep understanding in high level, but involved enough in order not to affect the judgement. Patton (2002) calls this stance "emphatic neutrality".

On the contrary, the quantitative methods that were deployed in a small scale in this study can focus on a bigger number of people, enabling researcher to conduct only some generalisations, comparisons and statistical aggregations, being characterised by Patton (2002) as succinct and parsimonious. Another advantage of these methods is their objectivity and detachment (Gray, 2009). However, quantitative methods have also got some disadvantages. One of those is "...the use of standardised measures so that the varying perspectives and experiences of people can be fit into a limited number of predetermined response categories to which numbers are assigned" (Patton, 2002). This is something that I did in order to organise childrens' responses to the children's diaries. Another weakness mentioned by qualitative researchers, is its inability to have access to social and cultural dimension of people's lives which constitute their reality (Guba & Lincoln, 1994; Silverman, 2000). This is a drawback that I tried to moderate by combining and justifying ideas, suggestions or conclusions drawn from qualitative data.

After the comparison of the two basic research methods and how they worked in this research study, a third one which has started gaining ground has been used. This is the mixed methods Research (Johnson, Onwuegbuxie, & Turner, 2007). The term 'mixed' can be attributed to the mixture of methods for data collection, either both for data collection and analysis or throughout the whole research (Johnson, Onwuegbuxie, & Turner, 2007). According to a definition which focuses on data collection and analysis stages, mixed methods are defined as "...the collection or analysis of both quantitative and qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of data at one or more stages in the process of research" (Creswell et al, 2007).

The mixed methods approach combines the advantages of the both qualitative and quantitative methods. More specifically, we can conduct generalisations, which is a property of quantitative methods and at the same time we can understand the context of a specific phenomenon in depth thanks to qualitative methods (Hanson et al, 2005).

3.2.3 Using a case study approach

This section explains how the theoretical and methodological framework of a case study can be applied to this research study. In effect this study can be seen as a single case study where a specific intervention is being studied. According to Stake (2000) 'case study is not a methodological choice, but a choice of what is to be studied'.

In contrast to survey, where the scope of research is restricted but he number of people who constitute the sample is large, in case studies this is completely the opposite. The sample size for case studies is often small to allow for a deeper understanding and in depth focus on the participants. Using a case study allows the researcher to understand new perspectives, new

relationships, new themes and subjects (Gray 2009). For this reason case studies are selected for their information rich nature (Patton 2002), with a view to answering why and how (Yin 2003) and defining the causal relationship, rather than just answering what.

Braud and Anderson (1998) warn of the weaknesses of the case study method that, “there are possibilities of subjective distortions, omissions, additions, or inaccuracies resulting from bias recall, observation, or reporting”. The researcher endeavoured to overcome these weaknesses by doing thorough preparation for the field work through personal experiences in EE, and using this learning and insight as the basis for recording the proceedings of each researching tool and obtaining verification from an independent party (peer review or debriefing) of the interpretation of the data, as suggested by Babbie & Mouton (2001). MacPherson et al. (2000) on the other hand, believe that case study research can provide “rich understandings of social contexts” and can have broad relevance.

There are a number of sampling techniques that help to maximise the design quality of a case study design. There are the constructs validity, the internal viability, the external viability and finally the reliability (Yin 2003). The construct validity refers to the effective measures which are suitable for the specific concept. This kind of validity can be attached by a methodology using multiple sources of evidence, and it directs the researcher to choose the types of changes that are going to be studied and which are related to the initial research objectives (Yin 2003).

3.3. Research Outline

3.3.1. Research Preparation

Prior to starting the programme of research the following stages were carried out. Table 3.1 also summaries the research methods used to explore each of the research questionss.:

1) Consultation with school and key teaching staff

The researcher informally interviewed a number of teaching staff at Langdale Primary School, including the deputy head teacher and teaching staff from year 5 and 6, in order to obtain an understanding of how environmental issues were covered in the school curriculum and the level of environmental education taught in the school. Particular attention was focused on deciding which year group the EEP would be delivered to and over what timescale.

2) Literature review

An in-depth literature review of current research, was conducted to inform and focus the research process and also to provide material for incorporating into the field instruments. Through the current employment of the researcher and through informal discussions with other environmental educators additional insights into EEP were gained.

3)Design of the Environmental Education Programme

Careful consideration was taken in the design of the Environmental Education Programme. Using the expertise of the researcher a four week programme was developed to encompass the basic principles of environmental education. The programmed aimed to follow the foundations set out by Science for Sustainability, an environmental education group, based at Keele University. This is where I developed my skills and knowledge as an environmental educator. The workshops offered by Science for Sustainability aim to create public awareness on environmental citizenship through a range of educational lesson and interactives. These resources and lesson were collated to produce

a bespoke four week programme together with additional activities included the children green diary. More details regarding the EEP can be found in section 3.5.

4) Design of field instruments

Using the information and insights obtained from the tasks and interactions described above, and led by the fundamental concept outlined in the research problem. Field instruments were designed to facilitate children's diaries and pre and post programme parent questionnaires, to be conducted with research participants. Questions in the questionnaire were centred around two groups of issues, those probing the relationships of children and their parents when it comes to the environment intended to establish levels of intergenerational learning, and a second group probing behaviour changes i.e. levels of ERB.

5) Pilot testing and refinement of field instruments

The diary and questionnaire instruments were piloted with a voluntary school (Christchurch Infant School) partaking in a similar 4 week EEP delivered by the researcher. Child participants completed a 4 week diary which included four home based activities. Questionnaires were administered to parents one week prior to the programme commencing and 1 month prior to the programme ending. The field instrument were then refined and revised based on insights gained by the researcher, and the functionality of the questionnaire and diary guides, structure and process.

Table 3.1 Research questions and approaches

Objective	**Data-Source**	**Approach**	**Method**	**Form of Analysis**
1. Do the children report that their participation in an environmental education program influenced their environmental knowledge and behaviour?	Primary	Qualitative	Children Diary	Qualitative analysis of diaries
2. Is there evidence of child-adult influence during and/or after the EEP?	Primary	Qualitative	Children Diary	Qualitative analysis of diaries
3. Is there an increase in environmental conversation between children and their par-ents after the EEP?	Primary	Quantitative and Qualitative	Questionnaire and children's diary	Frequency analysis McNemar Test Qualitative analysis of diaries
4. Have parents of children involved in the EEP consequently made any household changes in respect to the environment as a consequence of their child's involvement in the eEEP?	Primary	Quantitative and Qualitative	Questionnaire and children's diary	Frequency analysis McNemar Test Qualitative analysis of diaries
5. Do parents report that their understandings of environmental issues and actions towards good environmental practices have been changed since the start of the EEP.	Primary	Quantitative	Questionnaire	Frequency analysis McNemar Test Bowker Test

3.4 Location of study

The study was conducted in one primary school in Newcastle-Under-Lyme in Staffordshire . Langdale Primary School was chosen based on a number of criteria including logistical reasons in terms of location for the researcher and the schools willingness to take part. They have been actively involved in local and national environmental projects, but as with many UK schools it is situated in

a built up urban environment. The participants of this study were 58 primary school children and the parents of those who took part in the EE. The whole of year 5 (58 pupils) were chosen because it was assumed that within the year group most of the children would be at suitable level to participate in the EEP including the home based activities. Year 6 would have also been suitable but through discussion with school teachers this would potentially interfere with their SATs preparation and teaching. A decision was therefore made between the researcher, class teachers and the head master that year 5 would participate in the project. I also felt that this particular age range allows the pupils to be old enough to reflect on their experience during the EEP while still being interested in communicating with their parents. Ballantyne el al. (2001) found that younger students reported a high frequency of discussion with their parents, compared with the older students they surveyed, which reflects the general pattern of social development in teenage years. Parents were approached by letter asking them if they were willing to participate in the project and on behalf of their children. All of the participants were given aliases to protect their anonymity. For the purpose of clarity and comparisons between parent and child, each child-parent pair's alias ended in the same number.

In this study, the phenomenon of interest is to explore if primary school children can have an impact on their parents' environmental awareness and ERBs following a month long EEP. There are different ways in which participants in research can be selected. According to Maykut and Morehouse (1994), in qualitative research the participants are carefully selected for inclusion in order to match the purpose of the research, as the researcher needs to consider the extent to which the sample will generate rich data for the study (Cohen, et. al., 2007). In this study, the choice of participants was based on theoretical sampling (Creswell, 2008). In theoretical sampling the researcher chooses the kind of participants based on their potential to provide data that would give useful information relating to the phenomena being studied (Patton, 2001). Theoretical sampling was used in this study because the goal is to develop a rich understanding of the real situation

concerning the effect of the EEP on school children and their parents. 49 parents took part in the pre programme questionnaire, 51 in the post programme. 58 children took part in the first workshop, and 57 took part in the following 3 workshops, the same child did not participate for the three weeks. From these children who took part 42 submitted a diary at the End of the EEP.

3.5 The intervention: Designing an Environmental Education Programme

Critics of EE have argued that few EE interventions actually encourage responsible environmental behaviour because they do not actively involve students in environmental issues (Volk, Hungerford, & Tomera, 1984). Others have argued that educational interventions, in general, are ineffective in their ability to change behaviour (Cone & Hayes, 1980). Gardner and Stern (1996), however, countered this argument, reportingthat educational interventions that were successful in changing pro-environmental intentions and behaviour presented credible environmental information and actively involved participants. Further, Disinger (1990) suggested that EE in non-traditional settings outside the classroom may be more effective than classroom EE in changing environmental behaviour. Some researchers have found that responsible environmental behaviour is significantly related to experiences in active participation in environmental activities outside the classroom or with practitioners who are not their teacher (Disinger 1990; Jordan, Hungerford, & Tomera, 1986).

The researcher has had five years of experience of environmental education, and through this expertise a programme for the research project was designed to excite and enthuse pupils about the environment and educate them on ways they can become more environmentally responsible. The EEP was carried out over a four week timescale in November 2011. The programme was delivered in four parts, each covering a particular environmental subject: energy saving, deforestation, carbon footprints and food miles and renewable energy. During the sessions pupils were introduced to each subject, carried out group activities and were given a summary of key messages (see figures 3.1, 3.2 & 3.3).

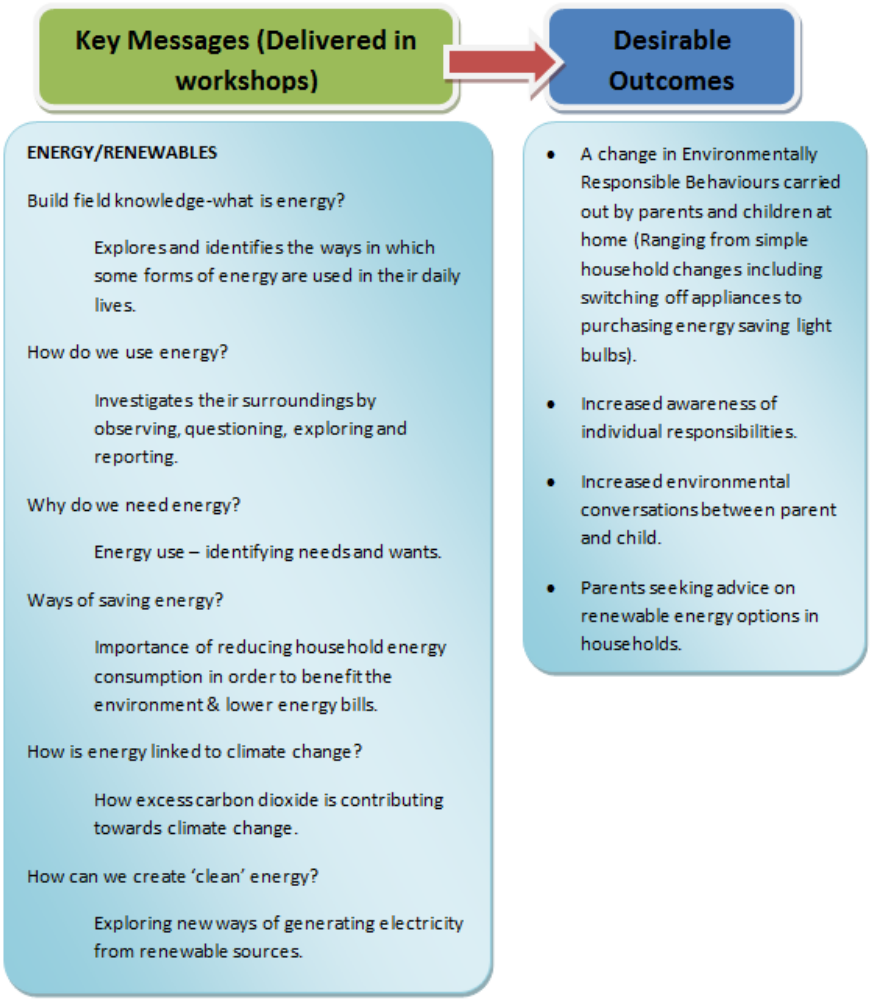


Figure 3.1: Summary of keys messages delivered during energy and renewable energy workshops.

Energy Saving: The energy workshop contained information on all aspects of energy, including the science of energy, sources of energy, consumption, electricity, efficiency, and environmental and economic impacts. The aim was to educate pupils about where energy comes from, the impact on the environment and energy efficiency. By helping pupils to appreciate the electricity that they have at the flick of a switch, we aimed to encourage all the participants to waste less electricity. During the sessions, students were invited to take part in various activities, designed to enthuse and interest pupils in energy saving issues. Children tried their hand at making a draft excluders, played a game on a giant energy snakes and ladders board and tested themselves on the pedal power challenge. A summary of activities ca be seen in Table 3.2.

T*able 3.2 Summary of energy workshop activities*

Activity	Description	Rationale
Giant energy snakes and Ladders	Based on the traditional game this activity involves the whole class working in teams to be the first to reach the final square. In amongst the snakes and ladders were laminates of positive ways of helping the environment with particular emphasis on energy saving. There were also negative counterparts to these which were placed at the heads of the snakes. Each time a child landed on a snake or ladder with a laminate the class discussed the issue.	This activity aims to reinforce the environmental issues surrounding energy. It offers an opportunity for children to build on their knowledge and it provides them with a base line for environmentally responsible behaviours.
School energy audit	Children worked in groups to work their way around arwas of the school looking at different aspects of energy saving and heat conservation. Children worked through workbook highlighting areas such as electrical appliances being left on, lighting, heating and door being left open. They used a	This activity gave children the responsibility to assess their school in terms of its energy performance using a variety of survey methods and producing usable data. It is hoped that this activity would give children a level of confidence in their ability to recognise positive and poor

	number of methods including the use of thermometers and a draft sensor. Children also produced graphs and presented their data to the class.	energy saving behaviours and practises.
Pedal power challenge	It is hard to quantify an amount of 'energy' to children so this custom made bike with a dynamo attached to a light machine allowed children to produce energy. Individual challenges were set for each child to produce enough electricity to power a tv for 10 minutes, use a hair dryer for 5 minutes or charge a mobile phone for 10 minutes.	This activity although quite physical, allowed children to visualise the amount of energy required to power particular things. This reinforced the positive energy saving habits learnt in previous activities and also allowed children to form new attitudes towards the amount of energy they use in everyday life.

Renewable Energy: The solar scrapheap challenge was a fun and interactive session to enthuse your pupils about renewable energy. Pupils learnt about re-using materials and the use of renewable energy and the associated technologies, and then designed, built and raced their own solar powered model cars. The cars were made from re-used materials, they learnt about the basic principles of reusing materials, renewable energy, solar power generation and energy storage. This workshop linked these issues to core science subjects, as well as helping pupils to learn and develop important design and technology and practical skills. This workshop was designed to highlight the importance of renewable energy and the principles of environmental citizenship.

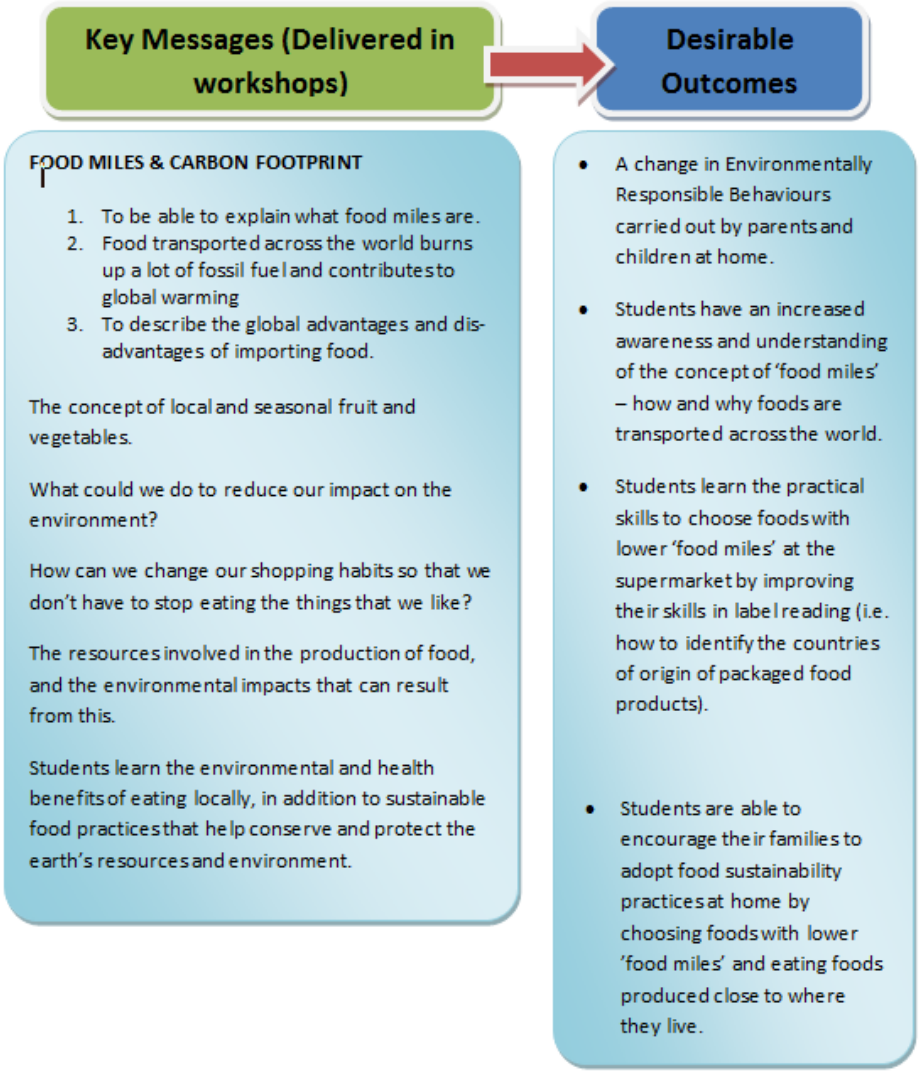


Figure 3.2: Summary of keys messages delivered during Food miles workshop.

Carbon Footprint and Food Miles: Pupils took part in their own mini carbon footprint survey to find out who has very big eco feet and who are the eco warriors. This workshop helped children learn how to calculate their own carbon footprint as a way of encouraging local, more sustainable food and lifestyle choices. This workshop also introduced pupils to food miles and where our food comes from and its impact on the environment. Children learnt about the energy used, and consequent carbon emissions involved in transporting food all around the world. Pupils looked at where all the ingredients came from to make a pizza. Pupils also had the opportunity to grow their own vegetable/fruit from seed.

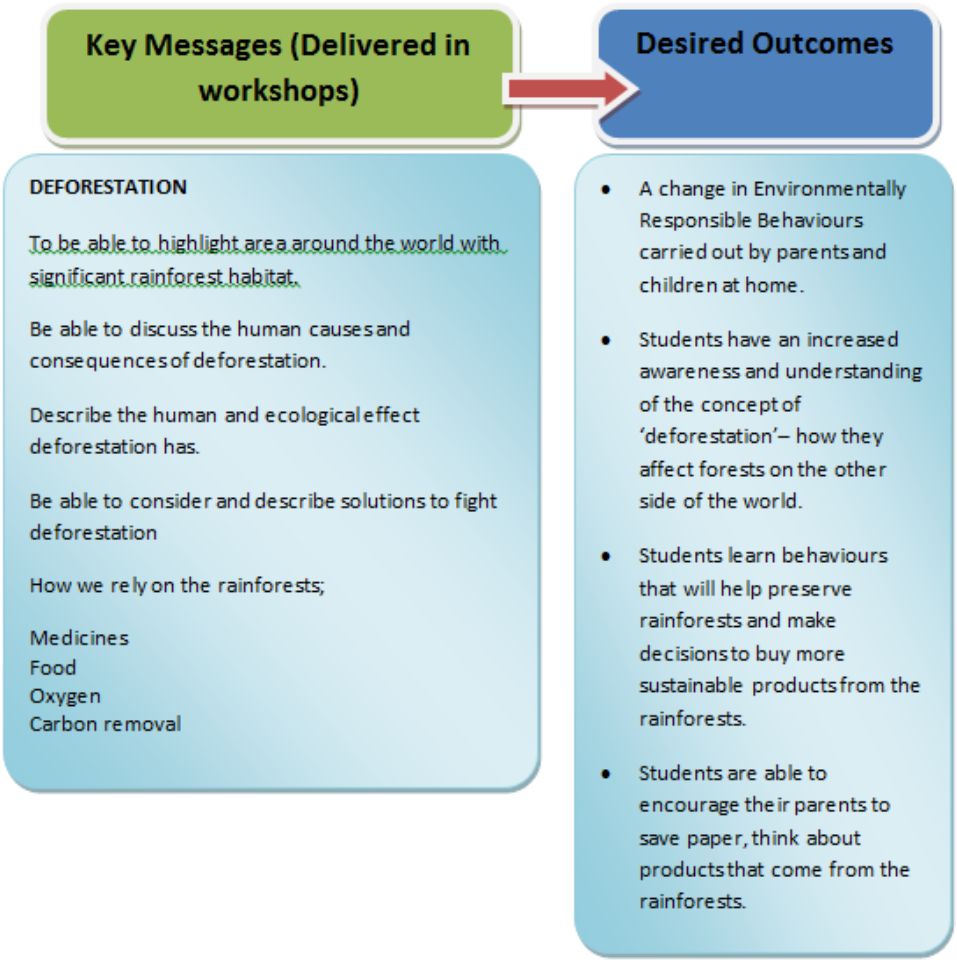


Figure 3.3: Summary of key messages delivered during deforestation workshop.

Deforestation: After an introduction to the world's tropical rainforests, the impacts of cutting down trees and the importance of trees to…., pupils worked together in groups representing different forest stakeholders to produce a short five minute film based on saving the rainforest. Pupils produced a story board for their ideas and had a chance to use and make props for their film. Pupils had to work in their groups to then make a film educating people and making people aware about what is happening to the rainforests. The stakeholder groups included indigenous tribes who live in the forest; scientists researching medicine; conservation organisations working to preserve the rainforest, and farmers who want to use the land to increase their crop productivity.

3.5 Questionnaire design, dissemination and analysis

Questionnaires are frequently used as tools for collecting data in human geography and related areas of research. A questionnaire is a set of questions for gathering information from individuals. You can administer questionnaires by mail, telephone, using face-to-face interviews, as handouts, or electronically (i.e., by e-mail or through Web-based questionnaires). Questionnaires are helpful in gathering information that is unique to individuals, such as attitudes or knowledge. Questionnaires are helpful in maintaining participants' privacy because participants' responses can be anonymous or confidential. This is especially important for gathering sensitive information. Two questionnaires were administered during this project. A pre and post-programme 'parent' survey, to access the evidence of intergenerational learning between pupils learning at school and how that translates to messages of environmental actions that are taken home.

The questionnaire for the parent survey was developed to cover an aspect of the objectives of the study which was to investigate issues concerning environmental knowledge, personal view and environmental behaviours within their lifestyle (copy of full questionnaire can be found in Appendix 1). This also covered question items relating to parent –child interactions relating to the environment. The questionnaire was, therefore, seen as an appropriate tool which allowed for the collection of standardised information across participating households with regard to the variables of interest. The survey questionnaire was semi-structured, containing both open-ended and closed-ended questions. The closed-ended questions required the respondent to make choices from alternative responses while the open ended questions provided space for them to give their own answers to questions. An advantage of the semi-structured questionnaire was that while the closed questions made the questionnaire easy to complete, the open-ended questions provided the opportunity for respondents to give more detail information about the issues being investigated.

Close-ended questions were used throughout the questionnaire. They can be categorised by the number of values (Krause 2002). Two value questions are dichotomous. These questions are easy to ask and are quickly answered and therefore analysis is straight-forward and quick. However due to the specific aims of the questionnaires, two alternatives were not enough in the majority of questions. Multiple choice questions [more than two values] were therefore used throughout the questionnaire. During the design of the questionnaires consideration was taken to avoid wrong words such as being too vague, too specific, misunderstood, objectionable, irrelevant, or uninteresting. It was made sure that words are uniformly understood and provide brief definitions if needed. For example, how will the participants define "actions" when asked questions about environmental actions at home.

The most critical part of developing the questionnaire was defining what the researcher wanted from it and how the information will be used to answer the research questions. By taking the time to define the purpose and objectives it reduces the likelihood of gathering unusable information. The number of questions was limited to eleven to insure a good response. It has been noted that questionnaire response rate declines rapidly as the number of questions, especially those that require time and thought, are added. The questions were designed to provide specific answer choices although there were some questions that provided an "other" value with brief space for adding an additional value. The act of evaluating a program inevitably uncovers conflicting goals: the need for as much rigor in methods as possible while at the same time designing an evaluation that interrupts program delivery as little as possible. It is important to rely on rigorous evaluation design and methods to not only report the outcomes of a program most accurately, but also to lend as much credibility to the results as possible. On the other hand, it is important to take as little time as necessary in order to maintain program participants' trust and comfort in the program setting (Griner-Hill and Betz 2005).

The most widely used evaluation design is a traditional pre then post-test, where participants are asked a series of questions at both the beginning of a program (pre-test) and then again at the program's completion (post-test). This design is believed to measure changes in participant knowledge, attitudes, or behaviors regarding whatever the program content is. The retrospective pretest was designed with instructions at the top, an example, eleven questions, including one with nine statements. The statements were developed using the learning objectives from the strategic planning preparation. Participants were asked to indicate their level of agreement with each statement before and after the workshop using a six-point, Likert-type scale; (1-strongly disagree and 6-strongly agree). This was followed by a series of questions based upon house hold environmental behaviors, influences i.e. friends, media, children and interaction with their children regarding the environment.

3.5.1 Questionnaire Dissemination

Each questionnaire was designed to be completed without the researcher present and with no aid of the researcher. The final version of the questionnaire contained 11 items, with 4 items containing questions dealing with (ERB). The questionnaire was printed as a scanable booklet and with an incorporated cover letter explaining the project. Questionnaires were given to pupils along with a cover letter explaining the project and participation information to then pass on to parents.

3.5.2 Questionnaire Analysis

Questionnaires were given to parents in a pre-test / post-programme (test) design. Data was inputted into an excel spread sheet for ease of analysis. Although names of parents and children are not used in the write up. Names were recorded and inputted to easily correspond answers on the pre and post-test questionnaire results and to correspond with their child's response. This will aid triangulation later during the analysis.

Where closed questions were used, a code can be assigned to each of the possible responses on the questionnaire before the survey is sent out. This is known as pre-coding. The responses are then ready for data entry as soon as the questionnaire is returned to the office. However, the code may detract the attention of the respondent away from the question so where you position the codes on the questionnaire is important (a common place is on the right hand side of the response box and in a small or greyed out font). For missing value codes in numeric responses it was important to distinguish between a missing value and a returned zero. A code was provided for missing numerical values, in this case '99'. This will aid analysis later on and will prevent confusion with returned responses.

The data from the quantitative questionnaire was analysed using SPSS (Statistical Package for the Social Science). Prior to analysis each questionnaire was carefully edited and coded. The values of the Likert scale were coded with 1 being 'no influence'; 2 'slightly influenced'; 3 'somewhat influenced'; 4 very influenced' and 5 being 'extremely influenced'. Non-parametric tests were used because the methods require less restrictive assumptions about the level of data measurements, probability distribution and homogeneity of varience (Anderson et al., 2007).

Analysis was undertaken to generate a descriptive picture of the data gathered on such themes as environmental knowledge, personal view and environmental behaviours within their lifestyle. This also covered question items relating to parent –child interactions relating to the environment. Simple percentages and means (central tendencies) were used to analyse the quantitative data obtained from the parent questionnaire administration. The meaning and implications of the findings were then considered in relation to the theoretical framework provided by related research in the literature and recommendations made for changes and improvement in EEP programme design to access adults through their children.

3.6 Children's diaries design, dissemination and analysis

Child participants of the EEP were asked to keep a diary to respond to a set of specific questions during their EEP. This was set out alongside a series of at home activities set out for the child to complete at home (careful consideration was taken for it not to appear as homework). It was intended to use the diary entries as a source of data triangulation between parent and child experiences in conjunction with the data emerging from the questionnaires.

A narrative approach was chosen, as it offers a framework to explore the structure and content of diaries. Narratives have been described as stories where events, actions, or experiences are presented from the perspective of the individual ((Muller, 1999) and (Steihaug and Malterud, 2008)). The study had a qualitative, descriptive and explorative design. The methodological issues in this study have been challenged by the ambiguous nature of the data, being a "first-hand second-person" account of the illness experience (Rimmon-Kenan, 2005). The analysis draws on the combined features of narrative and content analysis (Polit and Beck, 2008 and Smith, 2000).

Diaries can be open format, allowing respondents to record activities and events in their own words, or they can be highly structured where all activities are pre-categorised. During this study the diary format was open format with guidance to some extent. An obvious advantage of the free format is that it allows for greater opportunity to recode and analyse the data. However, the labour intensive work required to prepare and make sense of the data may render it unrealistic for projects lacking time and resources, or where the sample is large. Although the design of a diary depends on the detailed requirement of the topic under study, there were certain design aspects which are common to most. Below are a set of guidelines followed when designing the. 'green diary'

1. An A5 booklet of 12 pages was designed.
2. The inside cover page contained a clear set of instructions on how to complete the diary.

3. Each page denoted a week in collaboration with the EEP weekly workshops.
4. Pages were clearly ruled up with prominent headings and enough space to enter all the desired information (such as what they thought of the workshop, how they feel about the subject, and so on).
5. Appropriate terminology was designed to meet the needs of the sample under study i.e. children
6. Weekly activities to be completed at home alongside the diary exercise were explained to the participants.

Following the diary pages it was useful to include a simple set of questions for the respondent to complete. It is also good practice to include a page at the end asking for the respondents' own comments and clarifications of any peculiarities relating to their entries. Even if these remarks will not be systematically analysed, they may prove helpful at the editing or coding stage. A copy of one of the diaries can be found in Appendix 1.

3.6.1 Diary Dissemination and Analysis

Diaries were disseminated to children on the first of the four environmental workshops. All children were present at the first session and were given clear instructions about their *'green diary'*. As well as completing a weekly activity based on a particular environmental subject children were asked a series of basic questions referring to their experience of the workshops, what they think about the environment and what they currently do in terms of ERB.

Children's diaries were collected weekly to assess the overall weekly completion of the home activity task and diary and to remind the children to complete their *'green diary'*. All diaries were digitally transcribed and transcribed verbatim, to minimise the risk of bias in recording the responses of participants. Transcripts of the children's diaries were analysed using grounded theory

(Glaser and Strauss 1967). Issues and trends were identified in each of the children's diaries, relating both to the content and the story of the individual participant. Using a process of constant comparison, several themes and sub themes were extracted from the interview data and interpreted. The individual children's diaries were primarily used to determine individual experiences with the EEP and adoption of ERB at home as a result of the EEP. These changes were analysed using the framework provided by the themes that emerged from initial discussions.

The data collected, was analysed using grounded theory, which embodies the creation of theory from a systematic analysis of the research data (Glaser and Strauss 1967). This method is appropriate for the analysis of data in this study, since it involves drawing inferences from the data i.e. it is inductive. In this study, inferences have been drawn from the data to see whether a single contact with a specifically designed EEP might bring about improvements in environmental awareness and consequent changes in ERB at home. Dick (2005) provides a simple overview of the process of grounded theory, which has been applied in the data analysis for this study. The process is summarised below and has been adapted from that outlined by Dick (2005):

Table 3.3 :Dick (2005) provides a simple overview of the process of grounded theory.

Data Collection ↓	Collecting data via diary entries.
Note-Taking ↓	Recording general observations on the data and incidents.
Coding ↓	Searching for similarities or categories from diary to diary by constant comparison and labelling the similarities (finding common themes and sub-themes). In some respects this is a process of visual or conceptual gathering.
Memoing ↓	Making commentary on what appears to be going on, based on the coding e.g. links between themes, causative factors, core issues and so on.

Sorting ↓	Grouping of memos (related to themes and sub themes) and creating a logical sequence that best describes an emergent theory about the data/research tool.
Writing	Describing the theory emerging from the data in writing.

The above steps are shown to be sequential, but in reality comprise am iterative process of overlapping steps with some tasks (e.g. coding and memoing) being conducted simultaneously. Dick (2005) asserts that "data" collection, note taking, coding and memoing occur simultaneously. Three types of coding are identified by Bohm (2004) open, axial and selective coding. Open coding is generally used first on the "raw" data i.e short passages of text, paragraphs or sections of text that logically form a single story. The basic set of codes emerges from open coding. Axial coding is a process of refinement and linkage, where groups of codes are formed from those which logically fir together. The third type of coding is selective coding, but which the core category (theme) is identified, and which will lead to the emergence of the theory.

In grounded theory method, the theory is discovered in the data and the method therefore does not test a hypothesis (Dick 2005). In a description and discussion of laser's grounded theory method, Hildenbrand (2004) explains that " theoretical concepts…are discovered in the data and to prove themselves in the data: there are no other criteria". Bohm (2004) identifies grounded theory as an art, stating that its procedures cannot be learned in the form of prescriptions. There is thus an element of creativity in working towards the emergence of the theory, and Hildenbrand (2004) explains that the method pushes the research process forward rather than to reflect the research process, i.e. proceed according to a predetermined process.

3.5 Ethical Considerations

Ethical approval for this research was obtained through the Keele University Research Ethics committee (Appendix 1). Informed consent was obtained from all adult participants on behalf of themselves and their child. There was a low risk to the participants in this research as the risks would not be greater than those risks encountered in daily life, and the research was not carried out on a sensitive subject area. There was no power relationship between the researcher and the participants, beyond that of the normal educator and learner relationship, as participation in the study had no bearing on student marks or evaluation. All efforts have been made to ensure the anonymity of the participants. Identity information about the participants was removed from the children's diary transcripts. The participants were told they could withdraw from the research at any time without consequence. However, no participants withdrew from this study. Participants were not compensated for their time.

3.6 Research Validity

The trustworthiness of the data is paramount to the credibility of a study. Especially in quantitative studies, it is important to test the reliability and validity of the research instruments to be employed in data collection. Reliability is the extent to which a research instrument yields similar results whenever it is employed to elicit data under constant conditions while validity refers to the extent to which the research instrument records what it is intended to record (Cohen et al, 2000). Burns (2000) shows the importance of ensuring the validity and reliability of research instruments by saying that:

"Quantitative research has a great investment in reliability and validity. If the data is not reliable and valid, if the assessment techniques are not reliable and valid, if the design features do not create satisfactory internal and external validity, then the research is worthless in scientific eyes".

To achieve reliability and validity of the questionnaire, the instrument was designed with great care, matching the questions with the objectives stated for the study. The initial draft was reviewed after which I showed it (together with the proposal for the study) to two other research students who were also using questionnaires in their studies to review it. Next, I employed the 'expert validation' method (Mensah, 2006) by showing it to my supervisors who gave useful advice for improving the content, wording and layout of the instrument. The questionnaire was tested with parents in a pilot study which was conducted in Christchurch infant school in 2011. The responses generated were critically examined in relation to the objectives set for the study and were also compared with each other to check common understanding of items in the questionnaire. The results of the pilot study showed that the questionnaire was well-designed and easy to understand as the respondents had no difficulty in answering the questions. They also showed that the issues raised in the questionnaire were relevant and adequately addressed the concerns of the study. However, a few mix-ups were detected in the design of the questionnaire, especially with the routing of questions, and these were corrected to improve the quality of the instrument and make it more robust for the main fieldwork. The above measures made the questionnaire a valid and reliable instrument for the household survey.

In this study, validity and reliability of the diary entries were ensured the use of a co-judging procedure to ensure the validity and reliability of the study. The co-judging method involves the use of an independent co-judge independently classifying all statements in the transcripts of the diaries, in accordance with the categories of description set up by the researcher (Eklund-Myrskog,

1996). The co judge, who is conversant with qualitative research, was given statements to categorise, which were already categorised according to the researchers' categories. If the co judge's categorisation is the same as the researcher's categories, then it can be said that the study is valid. Also validity in this research was ensured through the honesty and keenness of the researcher. Although discussed separately, the aspects of validity and reliability cut across the research process. The possible influence of the researcher on the participants' perception of influence is a concern to the credibility of the information presented in the study and will be address further in Chapter 5 discussion.

3.6 Limitations

It is important to acknowledge the possible limitation of a study. Since the respondent pool and the participants were limited to one parent completing the questionnaire, a larger sample including any other parent or guardian and also other close family members such as grandparents, would have given additional insight into intergenerational influence and environmentally responsible behaviours carried out at home. An additional limitation to the study proved to be the data collection process. Since information obtained from the green diary was largely dependent on the pupil and what he or she was willing to share, the nature of their information was limited to his or her own perspective and experiences but also motivation to carry out the diary exercise at home. However, this study's triangulation of data helped to verify the questionnaire results, and help to support the accuracy of the themes mined out of the diary transcripts.

Chapter 4 Results

The results that follow provide an insight and evidence into the knowledge and behaviours children have gained through the Environmental Education Programme (EEP) and the child-adult influence relationships and influence reported by children who participated in the EEP together with their parents. This section is structured around and aims to address each of the research questions outlined in chapter 1 and to bring together data from both the parents' questionnaires and the children diaries.

From the target 58 parent respondents, 49 pre-programme and 51 post-programme questionnaires were completed and returned, which represents 84% and 88% respectively of the target sample size. In the pre-programme responses, respondents compromised of 12 (24%) males and 37 (76%) females. In the post-programme responses, respondents compromised of 13 (25%) males and 38 (75%) females. Two parents who had not originally returned their pre-programme survey, completed the post-programme and returned it. During the basic analysis of the data all questionnaire responses were used. During the more complex statistical analysis comparing pre and post programme data, the results from the two parents who did not complete both questionnaires, were not used. A total of 42 diaries were collected from the 58 children who participated in the EEP (72%).

4.1 Research question 1: Do the children report that their participation in an environmental education program influenced their environmental knowledge and behaviour?

The first of the main research questions in this study considers whether the children reported that their participation in the environmental education program influenced their environmental knowledge and behaviour. The aim was to find if there is evidence that the EEP has been successful

in delivering a programme which creates a greater concern for the environment and in turn promotes environmentally responsible behaviour at home and at school. Children were asked to keep a weekly diary to include their thoughts on the workshops, what they may have learnt, what they do at home and if they speak to their family about their experience. Appendix XX shows an example and composition of the green diary given to the children. By asking these questions in a general manner, the intent was to receive more open responses from the children regarding ways in which they have taken on board what they have learnt during the workshops, how this learning has impacted them, and ways in which this learning has been influential in a variety of areas pertaining to their family life. The children's responses to the diary exercises varied greatly, with some children writing up to 300 words per entry whilst others completed a few sentences (see Appendix 1 for example responses).

4.1.1 Development of children's environmental knowledge and skills

Drawing principally on the disciplines of environmental science, geography and ecology, the aim of the EEP was to give children the ability to learn and develop their knowledge and skills in areas that underpin their understanding of sustainability and the environment to then be able to share this within the family unit at home. The development of environmental knowledge and skills in all the pupils that took part has emerged from those pupils keen to recount the lessons, highlighting specific scientific knowledge and their new found ability to identify, prevent and address environmental problems. 39 of the 42 children who submitted a diary at the end of the EEP reported some form of learning in their diary. Most students reported having learnt facts or information about a topic as Child 2 describes 'we learnt about where pollution comes from and about carbon dioxide'. Child 5 also states he '…learnt about the greenhouse effect and climate change that is happening'. Ten children's diaries also reported learning skills in monitoring such as ways to carry out an energy audit at home, Child 25 describes how she '… now know(s) how to do an energy

survey at home and at school to see how much energy we are using'. Nineteen of the diaries describe approaches to solving environmental problems as described by Child 37 and 27 'I really need to help look after the environment by using lots less energy and doing things like walking to school', 'if we all try and grow some of our own vegetables its will stop some of the pollution from the planes bringing in the food'. Twelve diaries described new attitudes about environmental issues. Child 15 states that '…it's really important that we look after the rainforest and all the plants and animals that live there, it contains lots of food and medicine that we don't want to lose, I never knew how important it was'.

Table 4.1 Categories of children's responses

Development of knowledge in children who participated	**Number of children (*n42*)**	**Example of response**
Relaying information or facts about what they had learnt	39	'I learnt about the greenhouse gases and what is happening to the temperature' 'I found out that we get lots of medicine from the rainforest' 'We did an energy game to see what was bad for the environment'
Reported learning monitoring skills	10	'I can do an energy survey at home now' '…but we can now look at how much energy we are using in the house by using the energy audit' '…I can go round with my tick list to see where we are wasting energy'
Describing problem solving approaches	19	'I will try my best to use less paper and recycle it to stop the tree being chopped down' 'To help the rainforest I am going to write to the people in charge and tell

		them to stop cutting the tree down which will help to protect them'
Describing new attitudes	12	'It's really important that now I have learnt about everything that I try my best to save energy'
		'I didn't really know about the greenhouse gases but I now know its very important for me to help save energy at home by swimming off the tv and lights and other things'

Children were able to recount parts of the workshops, describing what they had learnt and summarise solutions in their own way. Children often reported facts that they had learnt after expressing their enjoyment in the workshop.

> *'I had so much fun today. We were energy detectives and found out all of the things that waste energy- carbon dioxide is a greenhouse gas, too much of it around the earth heats it up causing global warming and climate change- Even though there's lots of problems with the environment, there are very easy ways to save energy and look after wildlife*.'
>
> *Extract C35 Diary*

> *'It was so cool in class today we did all about the rainforest and how it's being destroyed to make room for fields for cows and farmers. It's good for some people but bad for the plants and animals.'*
>
> *Extract C41 Diary*

Following on from this, many other diaries continued to show evidence that a positive experience during the EEP enhanced the ability to engage with environmental issues. Although the primary aim of the EEP was to enhance the knowledge and increase ERBs of children and their families, enjoyment through creative learning forms an important part of the EEP*:*

'It was so much fun and I learnt lots about our environment and what I can do I had the best time ever, I have learnt how I can help save energy and make my food miles lower.'

Extract C2 Diary

'It was the best! I have lots of ideas now to be good at home and be good to the environment.'

Extract C4 Diary

The majority of participants possessed prior knowledge regarding aspects of the environment but were able to address these issues on a more detailed level after the EEP. Within this age group some level of knowledge about the environment would be expected, but as many researchers have stated, this pre-existing knowledge can vary hugely.

'*I already knew a bit about the ice caps but I didn't know why it was happening until Nicola came in- We get told to recycle and save energy at school otherwise we get told off, but now I know that it's because all of those things make carbon dioxide and too much is bad for the planet.'*

Extract C37 Diary

'I sort of knew it was good to recycle and have things like solar panels but I didn't really know why. But now I know about the greenhouse gases that are making the blanket around the earth thicker and hotter.'

Extract C40 Diary

4.1.2 Children's attitudes towards the environment

Many of the children spoke of their attitudes towards the environment and the overall responsibility they felt towards the environment in their diary exercises during the EEP. Children described their feelings towards the environment in their diaries. Lessons learnt during the EEP has allowed the children to form emotional affinities such as showing emotion towards particular species and improved attitudes towards nature. Increased environmental beliefs appear to lead to the understanding in pupils of their individual responsibility towards the environment. Moral beliefs were also regularly flagged up within the children diaries, these are the rules that govern which actions they believed are right and which are wrong within an environmental context.

'*We have a job to look after the environment and everybody can do something small like walking to school and it will help the environment*'

Extract C8 Diary

'It's not fair to keep making more and more pollution, everyone needs to start doing little things'

Extract C11 Diary

'I feel really sad for all the animals that need the ice in the north pole to live, because its melting slowly'

Extract C39 Diary

'It's really made me want to help look after the planet'

Extract C51 Dairy

Children described being aware of how they can positively and negatively impact their environment, referring to themselves in situations relating to looking after the environment and this often included family members:

> '*My sister and me can help stop all the pollution, we don't have to do a lot of things just things like walking to school and growing some vegetables.'*
>
> *Extract C17 Diary*

> *'Me and my family need to help to stop the carbon dioxide getting more and more by trying to recycle more and choose things carefully like recycled paper'*
>
> *Extract C20 Dairy*

4.1.3 Intention and desire to act in an environmentally-responsible way

All pupils completing the diaries demonstrated a desire to act in environmentally-responsible ways, whether this be in or out of the school grounds. That many of these actions related specifically to issues covered during the EEP workshops suggests a direct influence of the EEP on pupil's desire to act. Children spoke about their desire to accomplish a goal that fosters environmental protection or improvement which emerged from children stating their intention to act in a specific way, an act that was learnt/taught during the EEP:

> *'I really want to help stop all the tree being chopped down in the big forests, use less paper and I want to draw on both sides of paper, and I know that this will help protect the forests.'*
>
> *Extract C47 Diary*

'I am going to try so hard to do my best for the environment, I am going to start riding my bike to school if mummy lets me.'

Extract C34 Dairy

Multiple children referred to a specific environmentally-beneficial behaviour that they were undertaking that related directly to material in the workshop:

'*I have been very good and mummy has taken me shopping for things to grow my vegetables and we have bought things with the green frog on.'*

Extract C20 Diary

Children described their sadness of the current environmental state, yet many children explored the possibility that their actions could make a difference. For many children their sense of responsibility towards the environment seems to have been heightened and can be seen in a number of the children diaries:

'I think it's bad that we are making the ice caps melt and its sad that polar bears might die, I am going to try and help them and use lots less energy.'

Extract C45 Diary

'I had a really good day but its not nice to see that all the forest trees are being chopped down and there might not be any left when I am 30. I am going to work really hard to not use paper and only use a little bit.'

Extract C19 Dairy

Some of the children reported their beliefs in terms of their own responsibility but also described the idea that there needs to be a whole society approach towards the environment. This was an important message that was reiterated within all of the workshops:

'I am going to try very hard to grow my own vegetables and help stop so much pollution from the planes, I want to tell all my family so they can all help too.'

Extract C31 Diary

'If we all do a little something it will add up to make a big difference'

Extract C23 Diary

This linked to those children noting that they wished to help others understand the need for environmental change. Key areas targeted by the EEP relating to environmental stewardship were behavioural changes and lifestyle changes, and the most widely cited by all participants related to energy consumption, travel and food miles. The children's diaries present evidence that children were changing their behaviour following the EEPs. Children also described of their ability to advocate for environmental change:

'*After the lesson I had lots of ideas, there are some things I can do at home like not leaving my TV on standby, my brother is also naughty as he leaves his lights on all the time.'*

Extract C29 Diary

'Today I went home and had a special job to check that we had energy saving light bulbs and told mummy that it's very important.'

Extract C45 Diary

A need for improvement and investment in energy efficiency measures was seen as important by many of the children, predominantly through simple lifestyle changes that were inexpensive:

'*I told mummy that we can get energy saving lightbulbs and do things like close the door to keep the heat in.'*

Extract C21 Diary

'We can get a draft excluder and people put things in your loft the keep in the warm.'

Extract C24 Diary

Children also spoke of participating in environmental activities which emerged from ideas suggested through the EEP such as litter picks and visiting local nature reserves. There were clear examples given by the children showing examples of this:

'We went and visited the Cannock Chase [nature reserve] to see all the wildlife we can help protect and I had a really fun time'

Extract C31 Diary

'Daddy and me found out where the litter pick was happening and we went and helped'

Extract C20 Diary

4.1.4 Summary

This section answers one of the main research questions which addresses the effect of the EEP on children's knowledge and behaviours through examination of the individual children's diaries. Throughout the children's diaries there are clear examples of how children have described their experiences and emotions towards the EEP and the level of knowledge they have been able to take away.

Driven by the research question, the findings show that the majority of children who submitted a diary reported some form of learning and/or behaviour change. Children reported a combination of increased knowledge on environmental issues, the *desire* to act in a more environmentally-responsible way due to knowledge learnt during the EEP, and *actual* reported environmentally responsible behaviours and activities. There were many occasions where children reported learning

e.g. 'I learnt about the green house gases and climate change', which was then followed by a description of an environmentally-responsible behaviour e.g. 'So I have been switching off my TV and playstation lots more'. There is evidence to suggest that the EEP has been successful in the short term in increasing children's knowledge and environmentally responsible behaviours. There is a risk that some children who did not report any learning or behaviours (<2% children), may be 'passive learners' who take the information and knowledge home from school but do not act upon it. These children may also be examples of those who do not discuss with their family about the environment or they do not try to apply this knowledge to their everyday home life. The study's third research question will explore the relationships between parents' data on environmental conversations with their children and evidence of knowledge gain and increased ERBs reported in the children diaries.

4.2 Research question 2: Is there evidence of child-adult influence during and/or after the EEP?

This research question is a critical part of my research to distinguish whether or not children are able to influence adults about environmental behaviours and if a) the influence increases at the end of the EEP (parents questionnaire); and b) the influence 'Influence efficacy' is defined as the degree to which one believes that he or she can effectively influence another. Using this definition 'influence efficacy' in this project is characterised from strong, which is shown by a confident response confirmed by examples, to weak, which denotes an uncertain or negative response and lacks notable examples of influence.

Of the children who submitted a diary twenty three of these children diaries described examples of children directly influencing their parents with a definite outcome (e.g. '*we are now walking to school more'*) and a further ten diaries describe *wanting to* influence their parents' choice of lifestyle or behaviour, but with no definite outcome (e.g. '*I am going to ask mum if we can start growing vegetables*'). The examples provided by Child 36 and 21, focused on environmental

behaviours in the household. C36 described *'…we learnt about recycling and stuff and we haven't really recycled at home before so I asked my parents to get a recycling bin from the council.*' C21 also described *'…after the workshop I had some good ideas to help at home, I told mum and dad and now they are getting better at walking us to school more and also we made a wildlife garden*.' C18 also described how knowledge he had learnt during the EEP changed family behaviour *'…I learnt that keeping the TV and xbox or Playstation on standby loads can waste millions of pounds in the whole of the UK. So we are turning it off instead and the lights too*.' This shows clear examples of how the children are using the information they have gained to influence others.

4.2.1 Methods and Strategies of Influence

Six of the children who submitted a diary specifically referred to *how* they shared the knowledge they had gained and influenced the behaviours of their family members. These methods varied with each participant. C9 identified a number of strategies she used to teach her parents, including visual examples: *'I showed dad a picture of what I drew about the greenhouse effect and tried to explain it to him but it got a bit complicated so we found a diagram on the internet which showed all the greenhouse gases'*. She also stated that 'they [mum and dad] helped me do the energy survey and they were surprised how bad we were at saving energy' showing evidence of using the diary exercises and involving her parents. C40 and C31 both describe using their diary and at-home exercises to involve their parents *'…I asked mummy to help with my eco house design, we both had lots of ideas and we added the vegetable patch and solar panels, I have asked if we can get a vegetable garden so we can grow food too', 'I showed mum and dad the results from our home energy audit and they were surprised at how bad we were, now we are all going to try and turn the lights off and other things too'.*

As described in the first part of this chapter, some children wrote in their diaries, examples of ways they had promoted environmental activities for their family to be involved in. By children giving their parents ideas for specific activities there is clear evidence of influence from children for their parents to become involved in environmental activities outside of their homes. Activities that children specified in their diaries included litter picks and forest walks. All the children who described this method of influence mentioned that they participated in the activity with at least two family members.

Another example of a method described by children to influence their parents, was to become strict with their parents on environmental behaviours in the home. Many described 'telling off' their parents or another family member, and three children went further and describe putting up signs in their house to try and encourage more environmentally responsible behaviours with consequences for those who didn't abide by the new rules. This shows evidence of children taking a basic responsibility to try and impact on their parents and other family members' behaviours around the house.

> *'I have now put up switch lights off sign up in the house so that everyone stops wasting energy'*
>
> Extract C35 Diary

> *'we have to put 10p in the jar if anybody leaves the playstation on or lights on in the house. It was my idea.'*
>
> Extract C10 Diary

> *'I told daddy off and mummy for leaving all the windows open when the heating was on yesterday.'*
>
> Extract C17 Diary

4.2.2 Parents' perceptions on child-adult influence

Part of the parents' questionnaire asked them to comment on the influence that their children had had on environmental behavior within the home. Hence, this section focuses on the comparison of perceptions of influence written by children in their diaries along with the data collected from the parent questionnaire. 40 of the 42 children's diaries were used in this comparison, as for two of the children (F50 and F51) only post test data from the parents' questionnaires was available.

If parents said 'yes' to 'have you installed or planned any energy saving measures in your home or changed your behaviour to be more environmentally friendly in the past month?' they were asked to rank how their child had influenced them, along with the scale of influence from TV, government advice, fuel company advice, family and friends and finally paper or radio (influence scale 1 = no influence; 2 = slightly influenced; 3 = somewhat influenced; 4 = very influenced; 5 = extremely influenced). I found that there is a consistency regarding moderate to high levels of influence (those who indicated 3 or above) in the post test reported by parents and those whose children had given written examples of influence within their diaries (at least 2 accounts of influencing a family member within their diary).

*Table 4.2 Match of children and parents' reported influence and level of influence on environmentally responsible behaviours in the home (*no answer given)*

	Parents who feel their children have influenced them *(those who indicated an increase in influence in the post programme)*	**Parent who do not indicate child influence or no change in influence (post programme)**
Children who feel have influenced their parents	23	0

Children who reported wanting to influence their parents	10	0
Children who did not report any influence on their parents	9	0

Table 4.2 shows all matched responses between parent and child, including those which show the same positive influence outcome between parent and child (n=23), where children have given clear examples of influence in their diary and the parents have indicated a higher level of influence after the EEP and it also includes parents and children which show little or no influence. Children were quoted reporting things such as '*I have helped mummy and daddy learn about the rainforest and when we went to the shops we looked out for the green rainforest frog stamp on different food'* and *'…I showed mum how energy is wasted through leaving stuff on and heat escaping through windows, so we made a plan to be better at saving energy'*. However, it is also important to highlight the nine cases where parents signified an increase in their child's influence on their environmentally responsible behaviours after the EEP but their child does not mention any form of influence in their diary. As the diaries were left open for children to express their own view, children may not have been aware that they had influenced their parents or have been unable to recount such an event, or may not have thought to include it in their diaries. On the other hand this could indicate a case where a parent estimates the child's level of influence differently, with parents being more positive about their child's influence. In all but one case, the total number of parents who said they had been 'very' influenced or 'extremely' influenced by their children in the post test data, corresponded with a reference to influence by their child in their diary which shows consistency in general for the existence of influence. Overall 41 parents reported higher levels of influence after the EEP and within these families 23 children reported that they had influenced their parents, 10

of these reported wanting to influence their parents and finally 8 children didn't report any influence on their parents even though their parents had reported influence.

The role of child-parent influence was analysed against family income in order to see if there was more influence in families in different income brackets. Table 4.3 shows that the majority of parents who said they had been 'very influenced' or 'extremely influenced' by their children were those who had a household income of £41,000 and above. None of the parents in the lowest income bracket stated that their child was very influential or extremely influential. On the other hand 4 out of the 9 parents in the highest income bracket only ranked their child's influence as 'slightly' or 'somewhat influenced'. The relationship between influence and household income requires further investigation and more substantial data sets.

Table 4.3 Parents' perception of child's influence and annual household income (post programme)

Household annual income * children's influence on parents (post programme)								
		Children level of influence on parents						
		Not at all influenced	Slightly influenced	Somewhat influenced	Very influenced	Extremely influenced	No answer	Total
Household Annual Income	£20000 or below	1	2	3	0	0	2	8
	£21000-£30000	0	4	11	2	0	1	18
	£31000-£40000	0	0	0	3	0	0	3
	£41000-£50000	0	1	2	10	0	0	13
	£51000 or above	0	1	3	3	1	1	9
Total		1	8	19	18	1	4	51

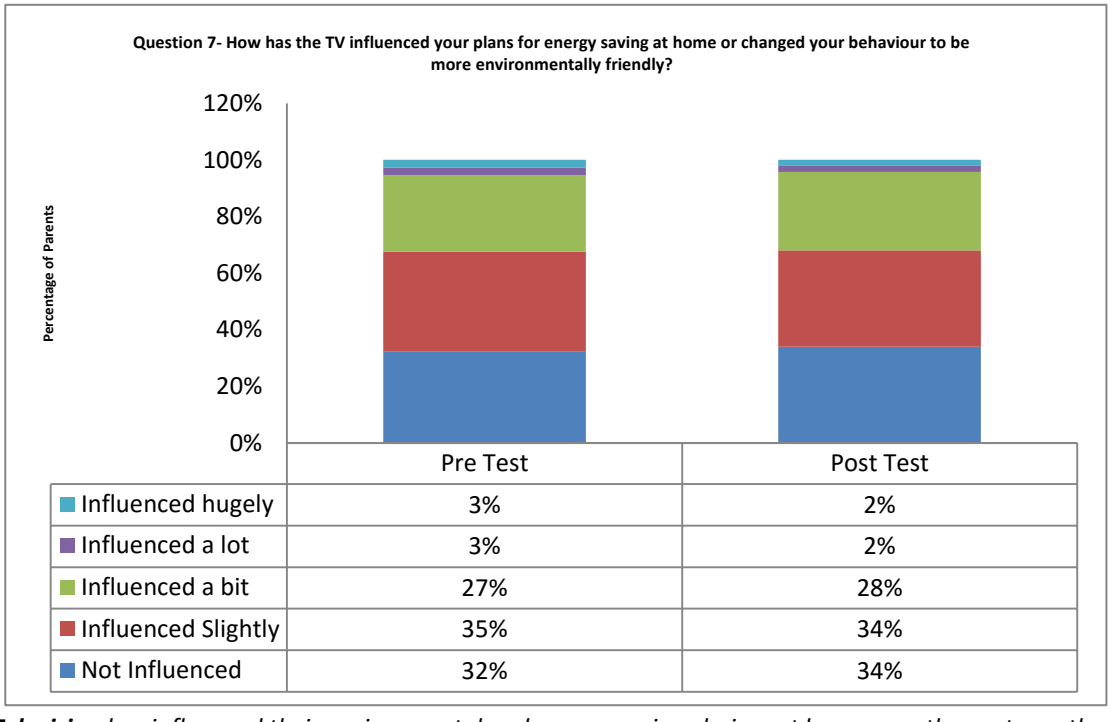
4.2.3 Other potential factors influencing parents' environmentally responsible behaviours

This study aimed to ascertain the factors that influenced parents' pro-environmental behaviour and to determine whether children are one of these factors. This included assessing other possible influences which could be encouraging parents to carry out environmentally responsible

behaviours during the time of the EEP, for example during the winter months the fuel companies and Government annually give out advice on insulation, energy efficient boilers and general energy saving measures (Energy Company Obligation 2013) which may have influenced parents' behaviour.. In the parents' questionnaire, if parents answered 'yes' to Question 7, they were asked to rank how the following factors may have influenced these decisions: television (Fig 4.1); their child(ren) (Fig 4.2); fuel company advice (Fig 4.3); paper/radio (Fig 4.4); friend or adult family members advice (Fig 4.5); and finally government advice (Fig 4.6).

Figure 4.1 demonstrates the level of influence the television has for each parent on their environmentally responsible behaviour. Television campaigns or advertising have been shown to influence people's behaviour (CES 2010). The results show an increase or decrease of between 1% -2% for each category, highlighting that there has been no dramatic change in the post-programme result (after the EEP).

Figure 4.1 Bar graph comparing pre and post-programme answers to Question 7 relating to how much



	Pre Test	Post Test
Influenced hugely	3%	2%
Influenced a lot	3%	2%
Influenced a bit	27%	28%
Influenced Slightly	35%	34%
Not Influenced	32%	34%

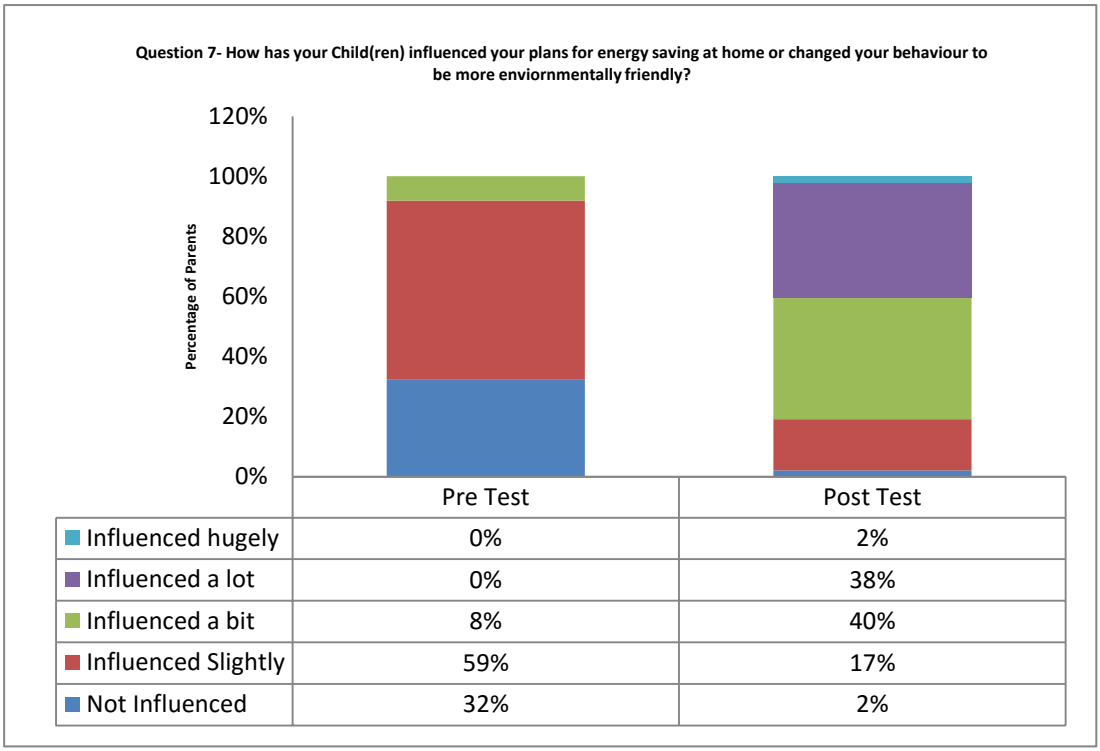
***Television** has influenced their environmental and energy saving choices at home over the past month.*

Statistical tests were used to analyse the data collected from question 7. The Bowker test of internal symmetry (Bowker 1948) is an extension of the McNemar test for 2 variables with more than 2

categories (c > 2). It is used to verify the hypothesis determining the symmetry of 2 results of measurements executed twice X(1) and X(2) of X feature (symmetry of 2 dependent variables X(1) and X(2)). There has been no significant change (p > .05) in the levels of influence that Television has on parents choosing to plan, or install an energy saving measure at home or to change their behaviour to be more environmentally friendly. Figure 4.2 represents the level of influence their child had for each parent who answered yes to question 7. The graph shows a substantial change in influence level from before and after the EEP. The following hypotheses were developed for this question for statistical testing.

(H0) There will be no difference in the level of child influence after the EEP has taken place.

(H1) There will be a difference in the level of child influence after the EEP has taken place.



	Pre Test	Post Test
Influenced hugely	0%	2%
Influenced a lot	0%	38%
Influenced a bit	8%	40%
Influenced Slightly	59%	17%
Not Influenced	32%	2%

*Figure 4.2 Bar graph comparing pre and post-programme answers to Question 7 relating to how much their **child** has influenced their environmental and energy saving choices at home over the past month.*

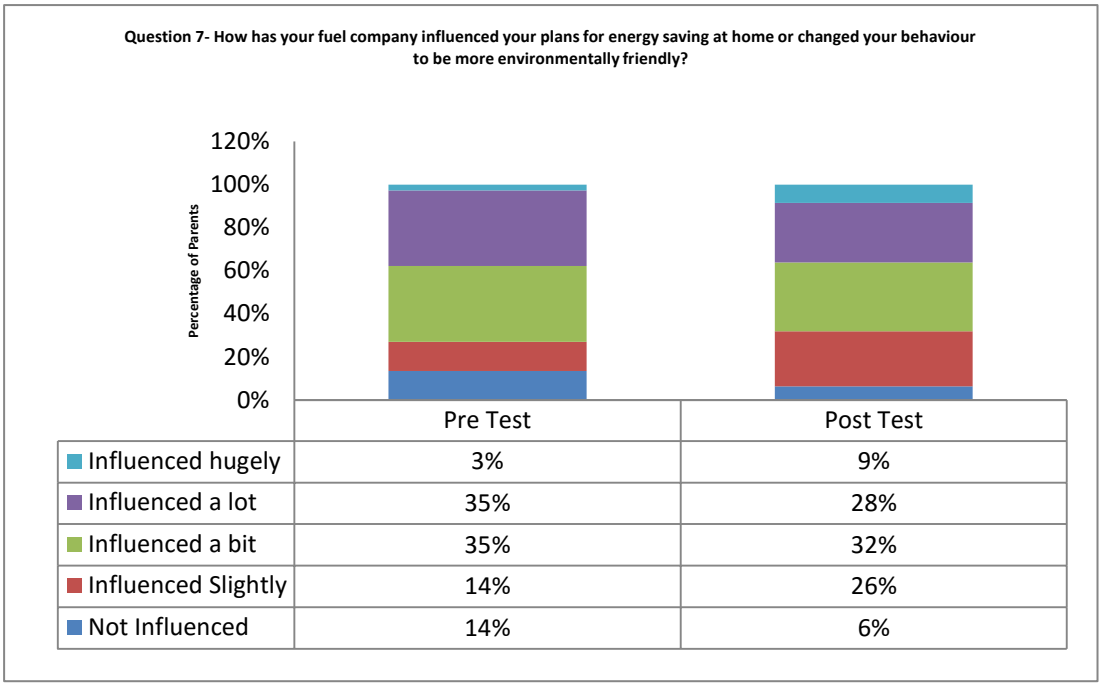
There is a significant difference (p < .01) in the level of influence children have had on their parents' environmental and energy saving choices, over the course of the EEP, with parents more likely to rate their child's influence as higher after the EEP. This implies that the EEP has had a positive effect

on environmental behaviours and measures carried out at home through the child's influence. This analysis corresponds with findings from the children's diaries providing many examples of environmentally positive child-adult influence. Of the parents who indicated that their child had no influence on their choice to install or plan an energy saving measure or change their behaviour to be more environmentally friendly in the pre-programme results, only 8% went on to indicate the same level of influence in the post-programme results. 17% of these parents went on to state that their children influenced them slightly, 33.5% said that their children somewhat influenced them, 33.5% said they had been very influenced by their children and 8% said that they were extremely influenced by their children.

Figure 4.3 summarises the pre and post-test level of parents' perceived influence that fuel companies have on each parents' choice to install or plan energy saving measures or to change their behaviour to be more environmentally friendly. The graph shows changes (>5%) in perceived influence levels in four out of the five categories. There is an overall change in the number of parents indicating influence at both ends of the influence scale (not influence-extremely influenced). Statistically, there is no significant change ($p > .05$) in the level of influence fuel companies had on parents during the EEP. This indicates that the influence from fuel companies did not contribute towards the increase in ERBs carried out by parents after the EEP. There is sufficient evidence to accept the null hypothesis.

(H0) There is no difference in the level of fuel company influence after the EEP has taken place.

(H1) There is a difference in the level of fuel company influence after the EEP has taken place.



	Pre Test	Post Test
Influenced hugely	3%	9%
Influenced a lot	35%	28%
Influenced a bit	35%	32%
Influenced Slightly	14%	26%
Not Influenced	14%	6%

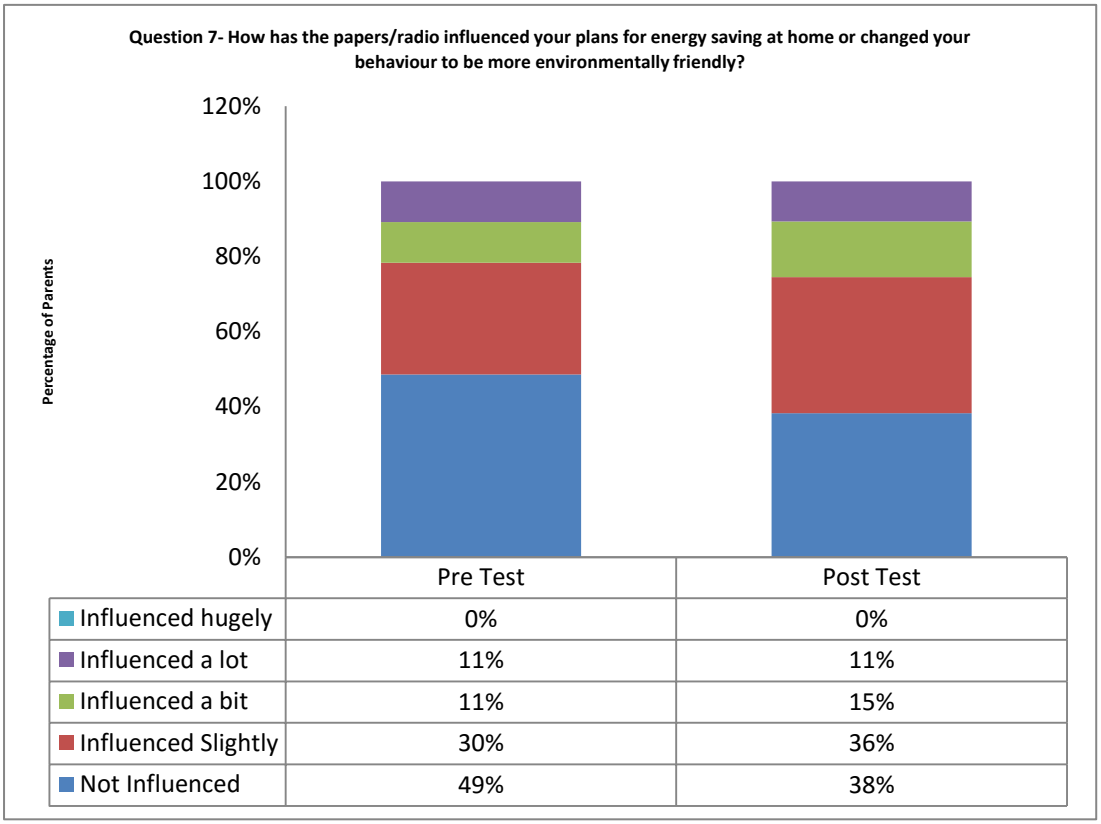
*Figure 4.3 Bar graph comparing pre and post-programme answers to Question 7 relating to how much **Fuel Companies** have influenced their environmental and energy saving choices at home over the past month.*

Parents who had carried out or planned to install an energy saving measure or changed their behaviour to be more environmentally friendly, were also asked how the papers or radio has influenced their decision to makes these changes. Figure 4.4 shows the results from the pre and post-programme survey in relation to the influence of papers and the radio. There is more than a 5% increase in the number of people who answered that they were *influenced slightly* by paper/radio in the post-programme questionnaire.

The p value is 0.05 which shows that there is no equal sign for the significance.

(H0) There will be no difference in the level of paper or radio influence after the EEP has taken place.

(H1) There will be a difference in the level of paper or radio influence after the EEP has taken place



.Figure 4.4 Bar graph comparing pre and post-programme answers to Question 7 relating to how much ***Papers/radio*** *influenced their environmental and energy saving choices at home over the past month.*

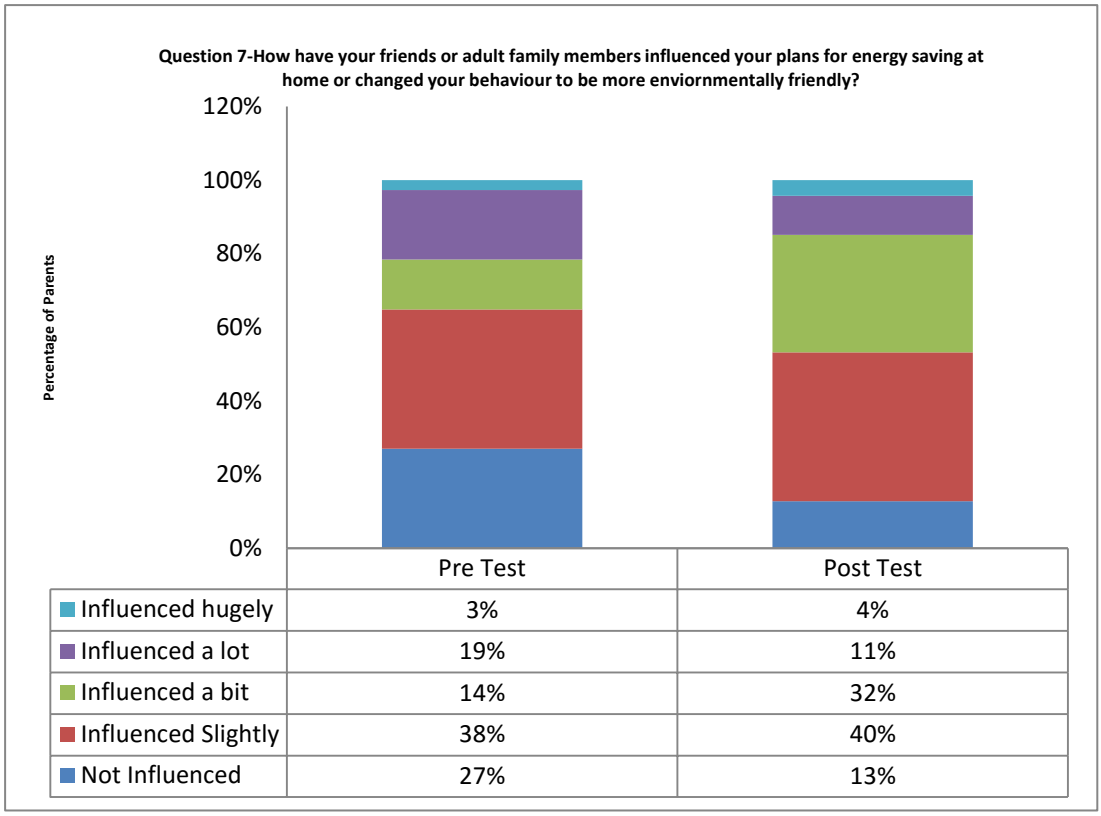
Parents were asked how their friends and adult family members influenced their decisions on ERBs before and after the EEP. Results from this are displayed in Figure 4.5. There were changes in the amount of influence pre and post-programme in all five categories of influence. The following hypotheses were developed for this question.

(H0) There will be no difference in the level of friend/family member influence after the EEP.

(H1) There will be a difference in the level of friend/family member influence after the EEP.

Parents who indicated that their friends and family influenced their decision to plan or install energy saving measure or to change their behaviour to be more environmentally friendly changed significantly ($P < .05$) after the EEP had taken place. Parents were more likely to be influenced by their friends and family after the EEP, therefor the null hypothesis can be rejected. Of the parents

who indicated in the pre-programme results that their friends/family members had not influenced them, 40% continued to say this in the post-programme results, 50% indicated that they were slightly influenced and 10% said they were somewhat influenced.

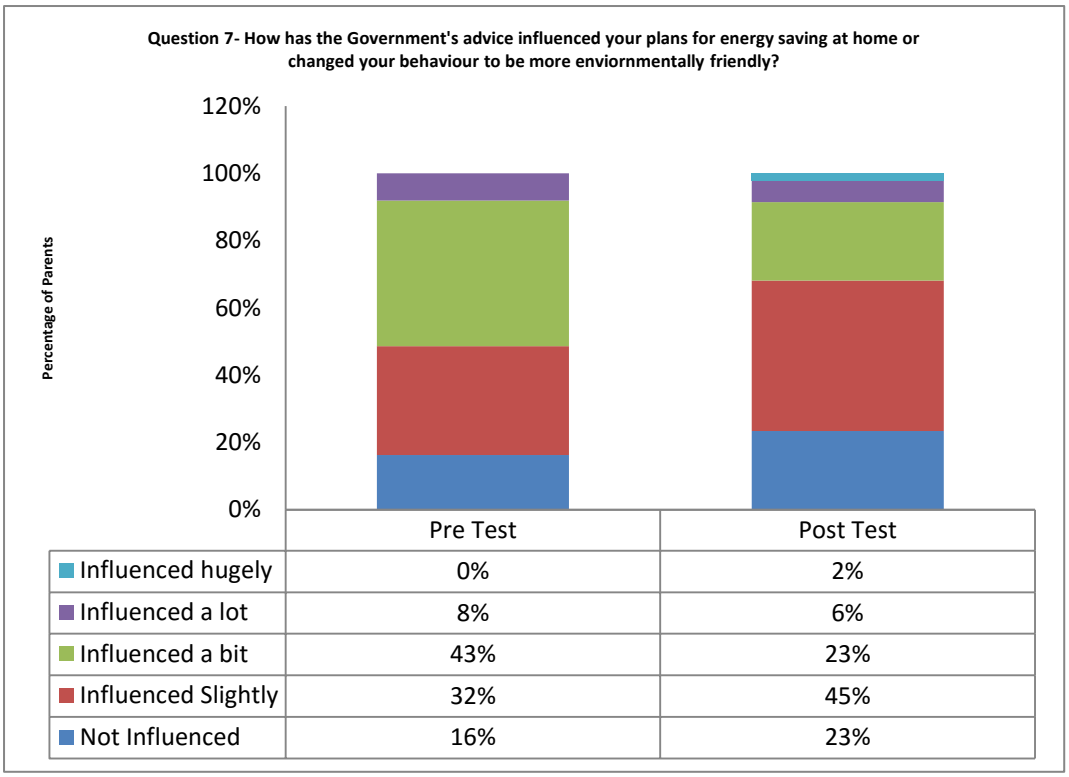


	Pre Test	Post Test
Influenced hugely	3%	4%
Influenced a lot	19%	11%
Influenced a bit	14%	32%
Influenced Slightly	38%	40%
Not Influenced	27%	13%

Figure 4.5 Bar graph comparing pre and post-programme answers to Question 7 relating to how much their ***friends or adult family members*** *have influenced their environmental and energy saving choices at home over the past month.*

Parents were finally asked whether the government had influenced their decision to carry out or plan to install an energy saving measure or change their behaviour to be more environmentally friendly. Figure 4.6 shows that there were changes in pre and post-programme data for all five categories. The largest change can be seen in those who answered that the government *influenced them a bit*. This decreased from 43% to 23%. Overall, there has been no significant change ($p > .05$) in the level of influence the government has had on parents choosing to change their behaviours or carry out energy saving measures at home after the EEP.

Figure 4.6 Bar graph comparing pre and post-programme answers to Question 7 relating to how much



	Pre Test	Post Test
Influenced hugely	0%	2%
Influenced a lot	8%	6%
Influenced a bit	43%	23%
Influenced Slightly	32%	45%
Not Influenced	16%	23%

Government advice *has influenced their environmental and energy saving choices at home over the past month.*

4.2.4 Summary

Through an in-depth look at the pre and post-programme parent questionnaires, in particular question 7 , along with the reports of influence by children in their diaries, a detailed overview of evidence of child-adult influence has been built. There is supporting evidence that children do influence their parents ERBs. The parent questionnaire findings show a significant increase in the perceived level of children's influence on parents' choice to change their (environmental) behaviours. This is echoed by the children when reporting influence in their diaries providing strong clear evidence of for the influence of children on adults' environmentally responsible behaviour which has been heightened during the EEP. Hence designing an environmental education programme that could impact parents through their children could be a huge step in environmental education design enabling a wider audience to be reached through school programmes.

4.3 Research question 3: Is there an increase in environmental conversation between children and their parents after the EEP?

A key part of this research was to examine the evidence of environmental conversations between children and adults, specifically if there had been an increase during the EEP. Parent questionnaires were paired with child diaries to be able to identify direct comparisons. Behavioural influences within the family unit emerged through key references to family conversations about the environment. 33 out of 42 children who submitted a diary referred to actively engaging in conversation with a family member about an aspect of the EEP. One child (C9) wrote about discussing the workshops with his parents in every weekly entry, for example *'…I told mummy at tea time what we had done this week and how much I learnt about solar energy and wind energy…'*. Children fondly spoke of advocating lifestyle changes in terms of ways that their family can pursue environmental friendly lifestyle changes, one child (C16) stated *'I told mummy and daddy all about what I learnt today and how we can make little changes at home to help the environment.'* Discussion with family members appears to be a common way for children to communicate what they had learnt and also as a vehicle for promoting change in the household. Children also used their at-home activities (within the green diary) to involve their parents (see section 4.2.1).

4.3.1 Consistency between Children's and Adults' accounts of environmental discussions

Table 4.4 shows the numbers of families where the results from the parents and children showed consistency in reporting having environmental conversations. The table shows the 40 families that could be used in this comparison. Not all families could be used due to an incomplete data set from either the child or parent. There is consistency in the results in all but four families. In these cases either the parents have said yes to engaging in environmental conversations (post-test) and there has been no reference to conversations in the children's diary or the reverse of this. These

inconsistencies could have been caused because of the fact that children had engaged in long discussions (and activities) about the environment in school with the environmental education officer, some may have regarded this duration as normal, so anything shorter may not be considered a proper conversation.

Table 4.4 Match of children and parents' reported environmental conversations (no answer given)*

	Adult Questionnaire -environmental conversations		*Children Diary*
Family	**Pre test**	**Post test**	**Reference to adult-child conversation in children diary**
F1	Yes	Yes	Yes
F2	No	Yes	Yes
F4	Yes	Yes	none
F5	No	Yes	Yes
F6	No	Yes	Yes
F7	No	Yes	Yes
F8	Yes	Yes	Yes
F9	No	Yes	Yes
F10	No	No	none
F12	Yes	Yes	Yes
F13	Yes	Yes	Yes
F15	No	No	none
F16	No	Yes	Yes
F17	No	Yes	Yes
F18	No	Yes	Yes
F19	No	Yes	Yes
F20	No	Yes	Yes
F21	No	Yes	Yes
F23	*	Yes	Yes
F24	*	Yes	Yes
F25	No	No	none
F27	Yes	No	Yes
F29	Yes	Yes	Yes
F30	No	No	none
F31	No	Yes	Yes
F32	No	Yes	Yes
F33	Yes	Yes	Yes
F34	No	Yes	Yes
F35	Yes	Yes	none
F36	No	Yes	Yes
F37	No	Yes	Yes
F38	No	Yes	Yes
F39	Yes	Yes	Yes

F40	Yes	Yes	Yes
F41	Yes	Yes	Yes
F42	No	Yes	Yes
F45	No	No	Yes
F46	Yes	Yes	none
F47	No	Yes	Yes
F48	No	Yes	Yes

n=40 (y=33/n=7)

From the children's diaries, it seems that the majority of times where children discussed with their parents about the environment were initiated by the child. Most referred to 'I told' or 'I talked to' in relation to conversations with family members within their diaries. However four children wrote that their parent had asked what they had been doing, or what they had learnt, for example 'Mummy asked what I had learnt in the workshop today'. This data indicates evidence of the children initiating most of the conversation in this particular scenario.

From the diary extracts it can be clearly seen that children often relay what they have learnt or an interesting fact to their parents as a basis for the conversation, for example 'I told daddy that we had a visit from Nicola and she taught us about the environment and ways to protect it'. This was often done in the form of children telling their parents what to do and finally, because they wanted to do something good for the environment, for example one child writes,:

> *'I talked to mummy about everything I had learnt and what they need to do at home to be good to the environment.'*
>
> Extract C45 Diary

From the parents point of view question 6 in the parent questionnaire asked parents if they spoke to their children about environmental issues at home, in order to give an indication of the level of conversation parents have with their children about the environment. In the pre-test responses (i.e. before the EEP) 39% of parents engaged in some form of environmental conversation with their children within the last month. In the post-test results, 82% of parents indicated that they engaged

with their child(ren) about the environment (Figure 4.7), signifying a 43% increase in parent-child conversations after the EEP. The following hypotheses were used to test the significance of the change.

(H0) There will be no difference in numbers of parents speaking with their children about the environment before and after the EEP has taken place.

(H1) There will be a difference in numbers of parents speaking with their children about the environment after the EEP.

Of the parents who stated that they spoke to their children about the environment in the pre-programme survey, 95% of these parents went on to say that they had spoken to their child about the environment in the post-programme survey. For those parents who said they did not speak to their children about the environment in the pre-programme survey, 70% went on to state that they did speak to their children about the environment in the post-programme results.

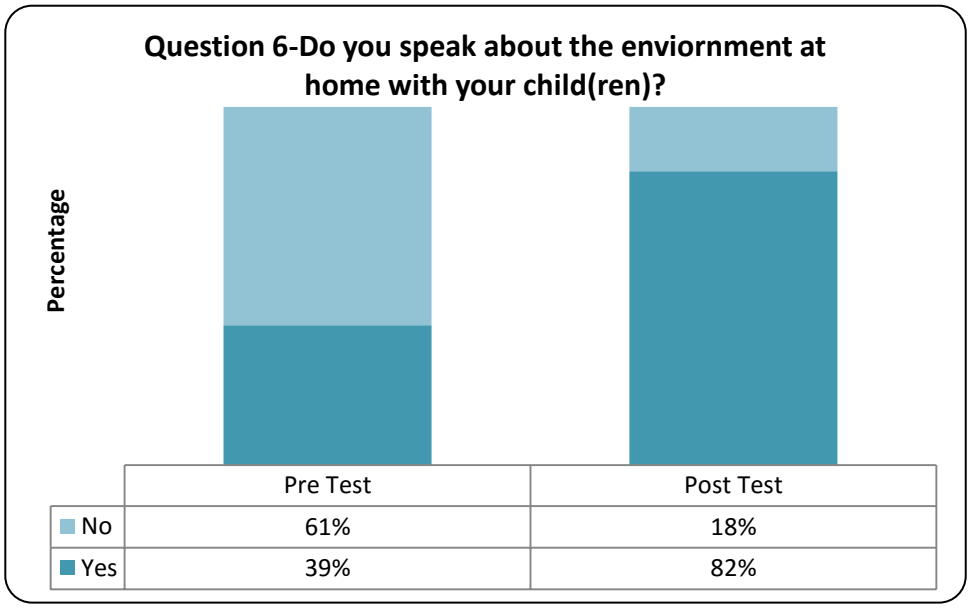


Figure 4.7 Bar graph comparing pre and post-programme answers to Question 6 relating to whether environmental conversations have taken place at home between parents and children.

The McNemar's test evaluates changes in related or paired binomial attributes, whether changes in one direction is significantly greater than that in the opposite direction. The McNemar test (McNemar 1947) is used to verify the hypothesis determining the agreement between the results of the measurements, which were done twice X(1) and X(2) of an X feature (between 2 dependent variables X(1) and X(2)). Parent and child conversations about the environment increased significantly over the period of a month after the EEP took place ($p < .001$). Parents were, statistically, more likely to engage in conversations with their children about the environment after the EEP (82%) than before the EEP (39%).

4.3.2 Summary

It was important to investigate whether conversations between parents and children about environmental issues increased after the EEP. Conversations about environmental issues can act as a catalyst to influence environmentally responsible behaviour. Children often reported telling their parents about what they had done during the EEP specifically, which then seemed to lead onto further discussions. It is clear that there are similarities between parents reported conservations in the home and what children reported in their diaries, providing greater validity of the results.

4.4 Research question 4: Have parents of children involved in the EEP made any household changes in respect to the environment as a consequence of their child's involvement in the EEP?

One of the main aims of this study is to examine if children can influence their parents environmentally responsible behaviours. Parents were asked on two occasions within the questionnaire about any environmentally responsible behaviours they may carry out at home and one specifically asked whether they felt their child had influenced a range of specific behaviours. This section looks specifically at the influences on parents' environmental behaviours both before and after the EEP and also takes an in-depth look at what specific behaviours were influenced by

children. Question 7 (part 1) in the parent questionnaire initially enquired as to whether or not parents had installed or planned any energy saving measures in their home or changed their behaviour to be more environmentally friendly in the past month. This question examined parents' energy saving choices and behaviour changes over the period of time the EEP was carried out.

4.4.1 Changes in parents' Environmentally Responsible Behaviours

Figure 4.8 shows that 76% of parents had planned or put in place some form of energy saving measure or had changed their behaviour to be more environmentally friendly in the month prior to the start of the EEP. This increased by 18%, to 94% in the post-programme results.

Of the parents who stated that they had installed or planned any energy saving measures in their home or changed their behaviour to be more environmentally friendly in the pre-programme questionnaire , 100% of these parents then went on to say in the post programme questionnaire that they had carried out ERBs in the past month (during the EEP). 67% of the parents who said they hadn't undertake nany ERBs in the pre-programme survey went on to say in the post-programme results that they had undertaken ERBs in the past month (during the EEP). The following hypotheses were used to test the statistical significance of this difference:

(H0) There will be no difference in numbers of parents planning or installing energy saving measures or changing their behaviour to become more environmentally friendly over the space of a month before and after the EEP has taken place.

(H1) There will be a difference in numbers of parents planning or installing energy saving measures or changing their behaviour to become more environmentally friendly over the space of a month after the EEP.

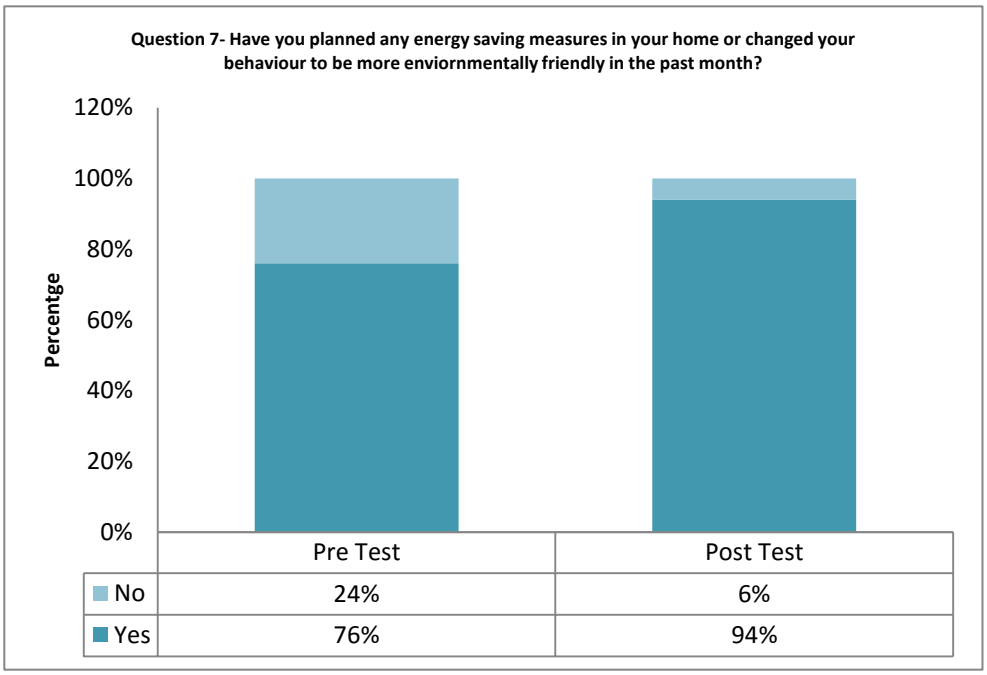


Figure 4.8 Bar graph comparing pre and post-programme answers to Question 7 relating to environmental choices and behaviours made over the past month.

Those parents who answered yes to installing or planning energy saving measures in their home or changing their behaviour to be more environmentally friendly over the past month, increased significantly after the EEP had taken place ($p < .01$).

Question 8 on the parent questionnaire asked parents to highlight from a list of environmental and/or sustainable choices and behaviours where they felt their child had influenced their choice/behaviour in the past month. Parents were presented with a list of 14 behaviours to choose from. These behaviours were chosen specifically as they include key taught behaviours highlighted in the EEP run with the school children. As described in the methodology the aim of these questions was to assess any changes in subsequent ERBs after the EEP had taken place and to see if the key messages had reached parents of the children who were involved. Full frequency tables for question 8 can be found in Appendix 2. There are five main behaviours that parents stated had been influenced by their children. These included walking to school/work (67%), recycling more (39%), not driving as much (47%), turning off lights (27%) and not dropping litter (27%). It is important to

note that the other nine behaviours had between 0%-10% parents mark these as being influenced by their child.

Table 4.5 compares pre and post-programme results from question 8 from parents who answered yes to any of the behaviour changes. The table shows an increase in influence by children in 12 out of 13 of the behavioural/choice categories. The most notable changes included a 52% increase in parents saying that the child had influenced their decision to not leave appliances on standby. Other increases include buying energy saving lightbulbs (>32%), recycling more (>33%), saving not wasting water (>30%), being careful with energy (>38%) and growing own vegetables (>32%). There was a decrease of 1% in parents who indicated that their children influenced their decision or choice not to drop litter but this may be an implication being that most parents don't do this anyway. Full statistical tables can be found in Appendix 2.

Statistical analysis for all 13 categories was carried out to ascertain if any of the changes were significant in a comparison between pre-test and post test data. The McNemar test was used to compare the pre and post test paired data. Nine Environmentally Responsible Behaviours showed clear significant increases in behaviours influenced by children after the EEP. Although dropping litter is not a habit most adults do, it is important to include as it was a part of the key messages taught to children during the EEP.

Table 4.5 Statistical results for question 8

Environmentally Responsible Behaviour	Pre Test	Post test	P value	Significance
Turning off the lights	27%	42%	(p > .05)	No Significant Change: parents were just as likely to switch off lights before the EEP as after.

Buying energy saving light bulbs	8%	40%	(P < .001)	Significant change: parent were more likely to purchase energy saving lightbulbs after the EEP than before.
Not leaving appliances on standby	2%	54%	(p < .001)	Significant change: parents were more likely to carry out this behaviour after the EEP than before.
Closing curtains to trap heat	2%	16%	(p <.05)	Significant change: parents were more likely to carry out this activity after the EEP than before.
Recycling more	39%	72%	(p < .001)	Significant change: parents were more likely to recycle more after the EEP than before.
Not dropping litter	27%	26%	(p > .05)	No significant change: parents were just as likely to not drop litter before the EEP as before.
Walking to school/work	67%	74%	(P > .05)	No significant change: parents were just as likely to be influenced by their children to walk to school or work before the EEP as after.
Saving not wasting water	4%	34%	(p < .001)	Significant change: parents were more likely to save water after the EEP than before.
Being careful with energy e.g. minimising use of electrical items	0%	38%	(p < .001)	Significant change: parents were more likely to be careful with energy after the EEP than before.
Not to drive as much	47%	54%	(p > .05)	No significant change: parents were just as likely to not drive as much before the EEP as they were after.
Growing own vegetables	6%	38%	(p < .001)	Significant change: parents were more likely to grow their own vegetables after the EEP than before.
Encouraging wildlife to garden	10%	26%	(p < .05)	Significant change: parents were more likely to encourage wildlife to their garden after the EEP than before.
Buying locally produced food	8%	28%	(p < .05)	Significant change: parents were more likely to buy locally produced food after the EEP than before.

4.4.2 Children's perception of changes in parents' ERBs.

The data from question 7 and 8 in the parent questionnaire indicates a clear increase following the EEP, in levels of environmentally responsible behaviours being undertaken within the family home of the children who participated in the EEP. This has been echoed by the children in their diaries when referring to what they and their parents have achieved. The diaries were examined for reference to specific environmentally responsible behaviours. Recycling, energy saving, growing food and saving paper were the main themes that children focused on in their diaries. Children often spoke about what 'we' have done indicating that it included other family members and on other occasions children spoke of parents directly partaking in an environmentally responsible behaviour. Some examples are shown below:

> *'Mummy has started growing some chilli peppers with me and my brother'*
>
> *Extract C16 Diary*
>
> *'We've all been recycling plastic bottle a lot more at home'*
>
> *Extract C29 Diary*
>
> *'We've been to b & q and got some loft insulation to keep the heat in'*
>
> *Extract C45 Diary*
>
> *'Daddy wasn't very good at being good to the environment but now I have told him, he is trying to be a bit better at energy saving by not leaving his computer on'*
>
> Extract C1 Diary

In relation to the ERBs that parents referred to in the parent questionnaire, there were significant increases in three of the four ERBs (recycling, energy saving, growing food) that children focused on in the diaries when talking about ERBs in the home. The fourth ERB referred to by children in

their diaries, 'saving paper' was not included in the questionnaire for parents. Although saving paper could be perceived as being included under recycling, it is also an activity more closely related to children's activities.

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4.4.3 Summary

The education programme was designed to try and influence parent's environmentally responsible behaviours through a form of intergenerational learning through their children. It was very important to ascertain if there had been any significant increases in ERBs since the start of the EEP. The data clearly shows that the programme has been successful in increasing ERBs in the homes of the children who participated, immediately after the EEP. For a more in depth look at particular behaviours where children have influenced their parents, the questionnaire asked parents about 13 specific behaviours which were covered as part of the EEP. Nine behaviours showed a significant increase after the EEP, suggesting that messages about these behaviours may be being transferred through the children into the home.

4.5 Research question 5: Do parents report that their understandings of environmental issues and actions towards good environmental practices have changed since the start of the EEP?

This section talks about parents reported knowledge about environmental issues in general. Although these following questions were not designed to test knowledge, they offer the opportunity to explore any difference in opinions before and after the EEP. The questionnaire was designed to look into parents beliefs about environmental education provision for families and the need for such programmes to be available to them. It also aimed to look into specific beliefs regarding their responsibly towards the environment and how they perceive worldwide environmental issues.

4.5.1 Individual environmental priorities

In this section, environmental views of parents in terms of responsibilities and the state of the environment are presented. Views of parents were revealed through analysis of questions 1-4 of the questionnaire shown in Table 4.6:

Table 4.6 Details of Q1-4 in parent questionnaire

Q1 Our environment is: *(followed by a list of statements)*	In such a bad shape, little can be done about it; In bad shape but a lot of effort might save it; In some trouble but can be saved with a little effort; In good shape.
Q2 Which of the following do you feel is the worst environmental problem facing the planet? *(followed by a list of statements)*	Ozone depletion Toxic waste Global warming Water Pollution Air Pollution Deforestation Landfill sites overflowing
Q3 Who do you feel are the worst polluters? *(followed by a list of statements)*	Industries Government Environmental groups Individuals
Q4 Who should be responsible for making sure we have a healthy environment? *(followed by a list of statements)*	Industries Government Environmental groups Individuals

Figure 4.9 shows the results from parents who completed the questionnaire after being asked before and after the EEP to state in what shape they think our environment is in. The category with the largest increase was our environment is *'in bad shape but a lot of effort might save it'*. The workshops were designed to give children the knowledge and confidence to change their behaviours to benefit the environment. These results indicate an increase in parents' negativity towards the current state of the world's environment concluding that it is in a bad way, on the other hand parents may be focusing on the amount of effort required to save the environment, hence highlighting this option. In the children's diaries a minority refer to double negative views about the environment for example, *'…it's so bad that we are chopping down trees and making lots of pollution I don't know what we can all do'*. Environmental education programmes should not be aimed at 'scare mongering' participants, and instead, arming participants with clear knowledge and positivity.

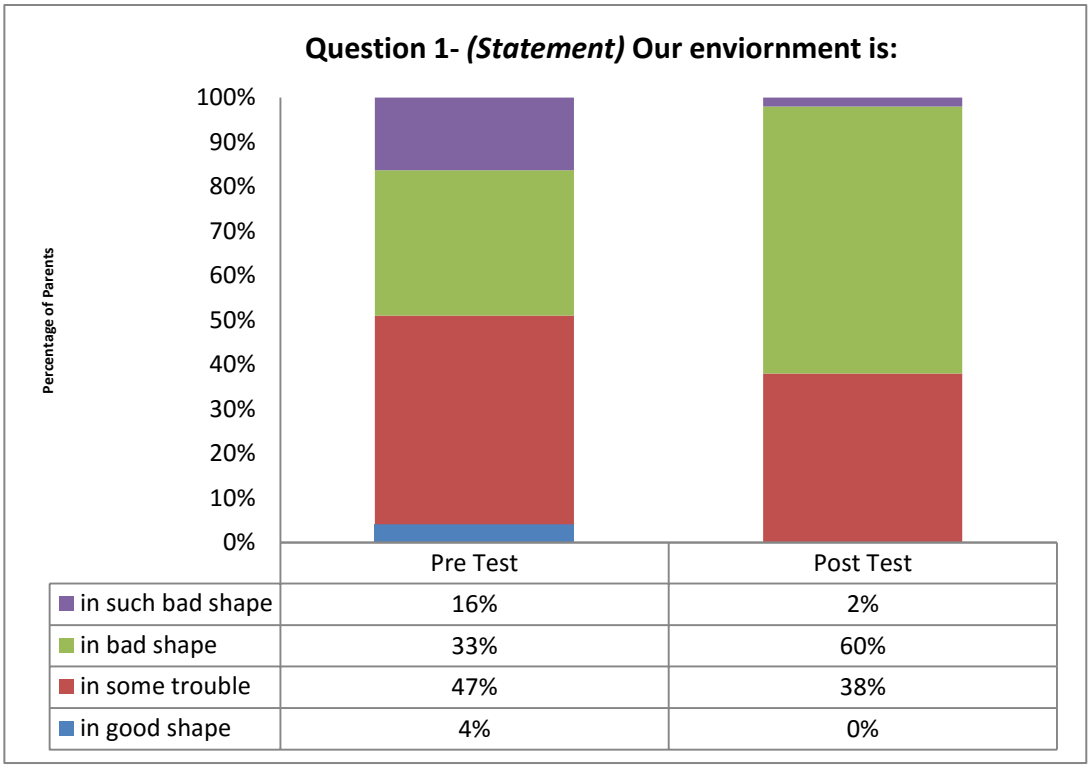
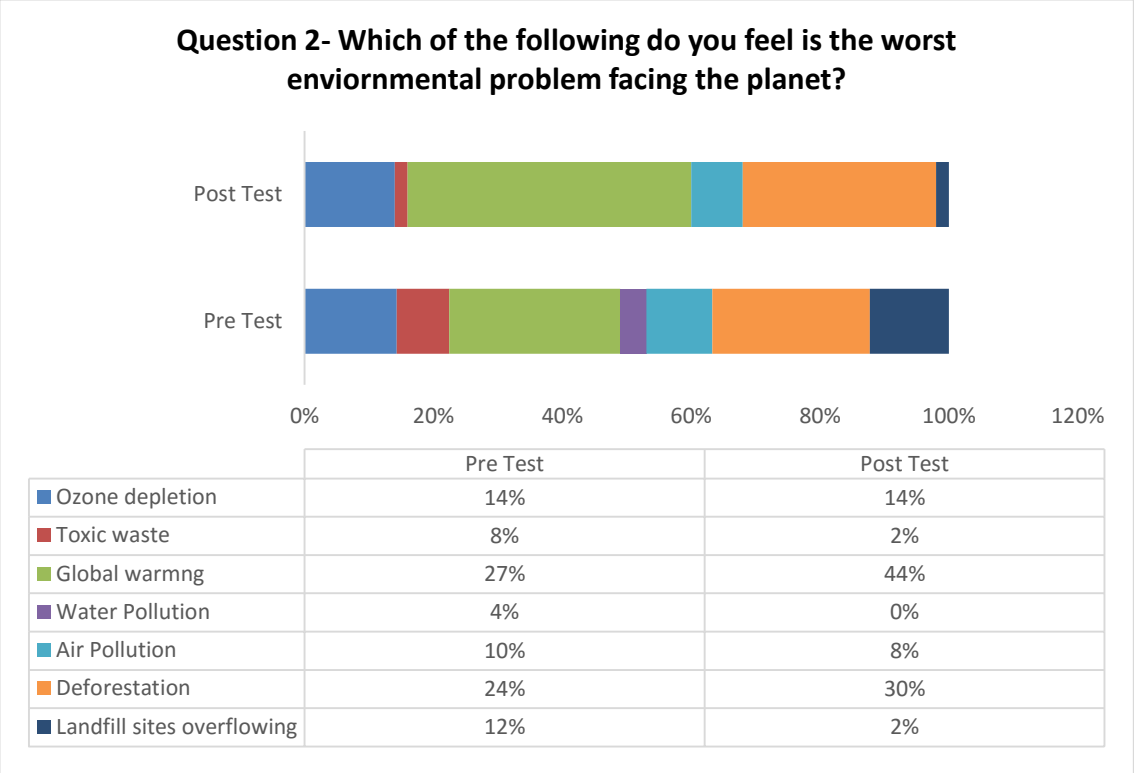


Figure 4.9 Bar graph comparing Pre and Post-programme answers to Question 1 in relation to how parents perceive the state of the world's environment.

Figure 4.10 shows data collected from those who completed the questionnaire pre and post EEP, what they felt was the worst environmental problem facing the planet. The largest proportion of respondents (27%) in the pre-programme questionnaire referred to global warming as being the worst environmental problem. This increased to 44% in the post-programme results. There is also an increase in parents stating that deforestation is the worst environmental problem from 24% to 30% respectively. It is important to highlight that throughout the EEP the school workshops' were focused on teaching the children about global warming, deforestation and landfill sites. This was due to the specific subjects that were chosen to be included in the EEP (see Chapter 3), although each of the seven categories in question 2 were covered in some form within the school workshops.

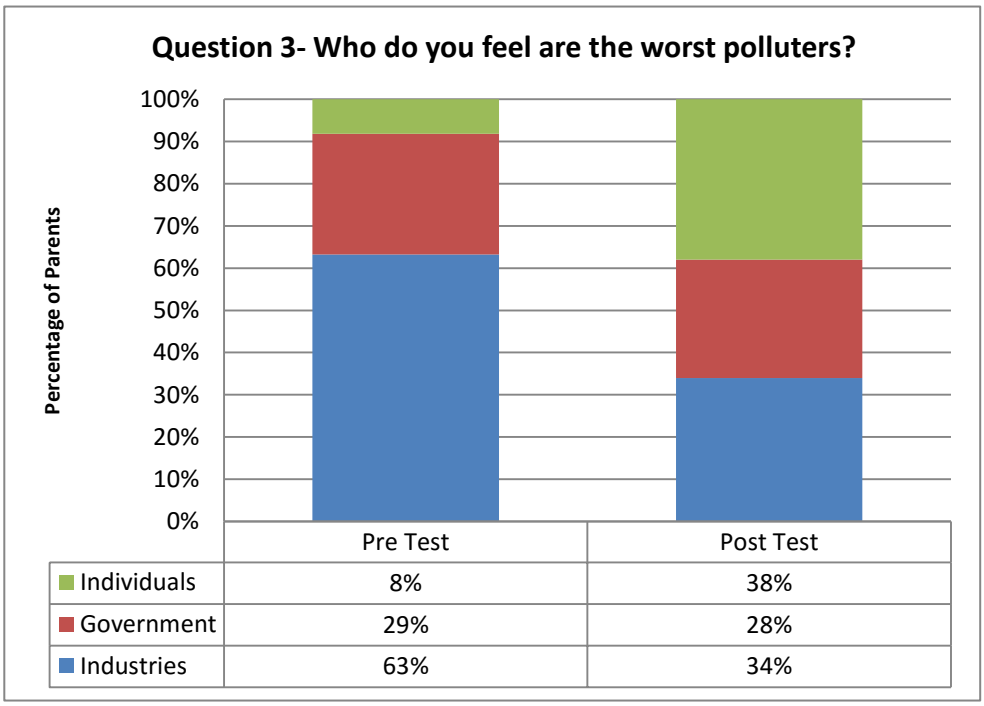


	Pre Test	Post Test
Ozone depletion	14%	14%
Toxic waste	8%	2%
Global warmng	27%	44%
Water Pollution	4%	0%
Air Pollution	10%	8%
Deforestation	24%	30%
Landfill sites overflowing	12%	2%

Figure 4.10 Bar graph comparing Pre and Post-programme answers to Question 2 in relation to what parents feel is the worst environmental problem facing the planet.

Those who completed the questionnaire were asked on both occasions, who they thought are the worst polluters. Figure 4.11 shows that the largest number of respondents referred to industries in the pre-programme (63%) as being the worst polluters, followed by government (29%) and finally

a small proportion of parents marked individuals as the worst polluters (8%). This changed dramatically in the post-test results after the EEP had taken place as the graph shows. In the post test results the largest number of parents marked individuals as the people they feel are the worst polluters (38%), followed by industries (34%) and lastly government (28%). Although this opinion is not directly linked to the outcome indicators or messages taught during the EEP it may show a shift in opinion due to better knowledge or viewpoint. During the EEP children were not taught about blame, but about how individuals, industries and government decisions can influence the environment negatively and positively.



	Pre Test	Post Test
Individuals	8%	38%
Government	29%	28%
Industries	63%	34%

Figure 4.11 Bar graph comparing Pre and Post-programme answers to Question 3 in relation to who parents feel are the worst polluters.

Question 4 was included on the questionnaire to measure the opinions of parents in terms of who they felt was responsible for making sure we have a healthy environment. It refers to the sense of responsibility to looking after the environment (see figure 4.12). The results from the pre-programme questionnaire indicate that the majority of parents believed that industries were responsible for making sure we have a healthy environment (51%), followed by government (33%) and individuals (16%). After the EEP the post-test questionnaire results show an increase in parents who felt that individuals were responsible for making sure we have a healthy environment (52%), with other parents marking government (24%), industries (18%) and environmental groups (6%) responsible. Children were taught about individual responsibilities throughout the EEP but many of the workshops activities covered a whole society approach and abstract concepts as well as an individual's obligation.

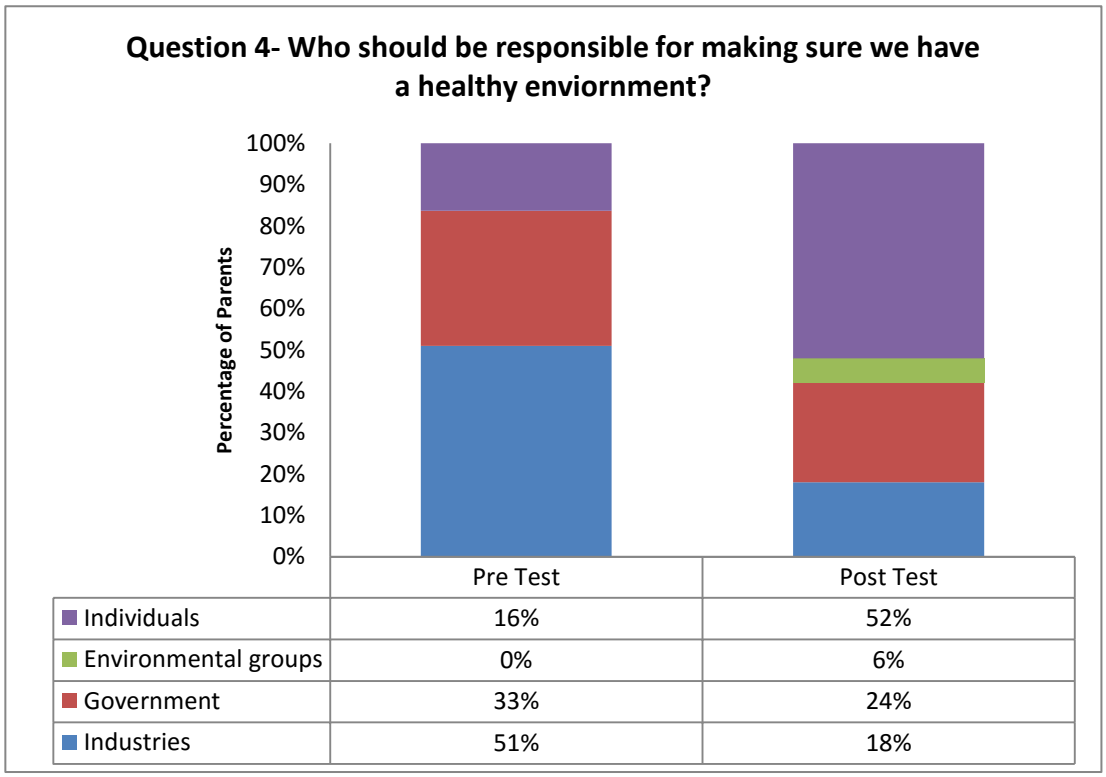


Figure 4.12 Bar graph comparing Pre and Post-programme answers to Question 4 in relation to who they feel is responsible for making sure we care for our environment.

The Bowker Test was used to test the statistical significance of the results from questions 1 to 4 (see table 4.7) using the questionnaires with matching paired responses (n=49). As F50 and F51 did not submit a pre-test questionnaire they were exempt from the statistical analysis. In terms of the state of our environment parents' perceptions of this significantly changed ($p < .05$) after the EEP. Parents' opinions on who are the worst polluters and who is responsible for our environment also both changed significantly after the EEP, however the results for question 2 on the worst environmental problems were not statistically significant.

Table 4.7 Statistical significance tests of results from parent questionnaire q1-4.

Question	P Value	Significance
1	$P < .05$	Significant change
2	$P > .05$	No significant change
3	$P < .05$	Significant change
4	$P < .01$	Significant change

4.5.2 Pro-environmental family learning

Question 9 and 10 (Table 4.8) in the parent questionnaire were included to gauge family interest in, and their views on the need for, activities based around environmental topics aimed specifically at families. These questions can be used to indicate levels of interest in engaging in environmental activities at a family level before and after the EEP. As highlighted by the children in their diaries, children had a positive response to the workshops and activities provided through the EEP. It is important to assess whether parents' views on informal family environmental education changed during the EEP to be able to report any evidence that suggests that the use of this particular EEP aided in getting parents involved. Although the primary aim of the research was to investigate child-

adult influence and environmental conversations at home, family environmental activities may form or could form a significant part of promoting ERBs.

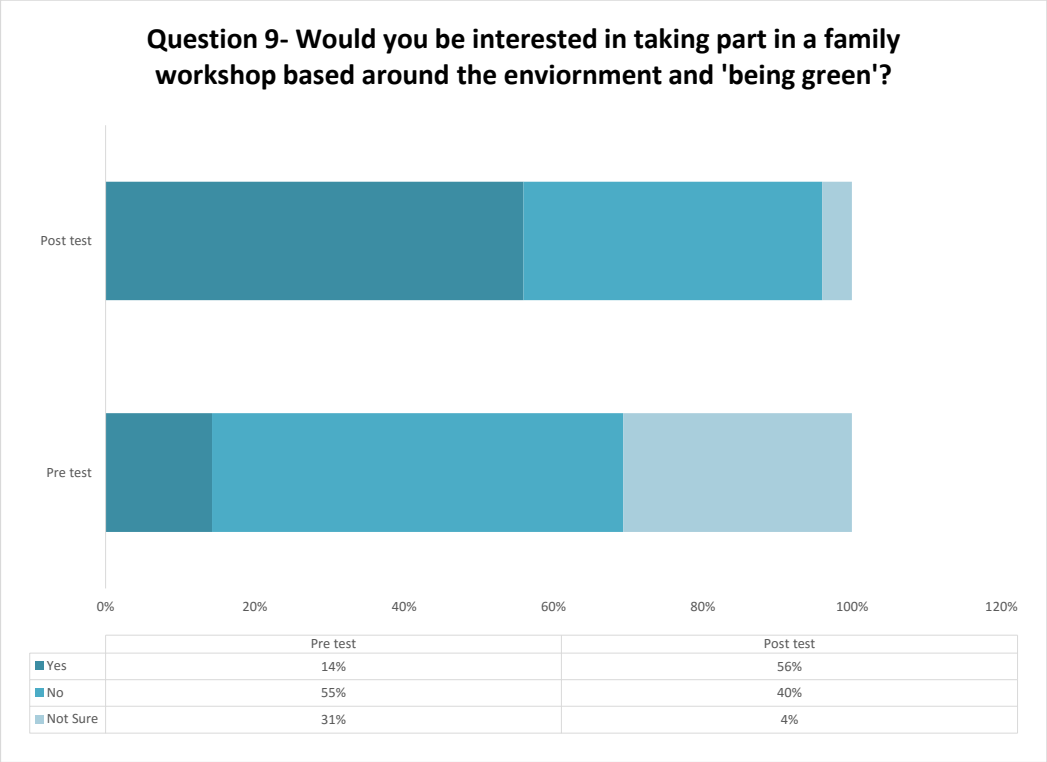
Table 4.8 Summary of question referring to families and EE.

Question 9	Would you be interested in taking part in a family workshop based around the environment and ways in which you can become more 'green'?
Question 10	Do you feel there needs to be more environmental activities put on for families and communities?

Parents were given the options of Yes, No and Not Sure in the pre and post-test questionnaire for both questions. Figure 4.13 shows that in the pre-programme results only 14% of parents said they would be interested in taking part in a family workshop compared to 56% answering yes in the post-programme survey, indicating an increase of 42%. 55% of parents said they would not want to take part in a family workshop in the pre-programme results, this decreased to 40% in the post-programme data.

The number of parents interested in taking part in family environmental workshops changed significantly ($p < .001$) after the EEP, with parents more likely to want to participate in a family workshop after the EEP. The results show that of parents who said 'no' to being interested in family workshops before the EEP, then went on to say 'yes' in the post-programme results. 56% of parents who initially said they were 'not sure' about attending a family workshop before the EEP, then went on to say 'yes' in the post programme results. This could indicate that parents understand more about what they are being asked and may have a better idea of what a workshop may entail from information told to them by their children, it could also indicate that parents have become more

interested in the subject. As well as influencing parents' behaviours, children may be able to influence parents' opinions on activities such as a family environmental workshop through informing their families about their enjoyment of the EEP they took part in.



	Pre test	Post test
Yes	14%	56%
No	55%	40%
Not Sure	31%	4%

Figure 4.13 Bar graph comparing Pre and Post-programme answers to Question 9 in relation to individual interest in taking part in family environmental workshops.

Parents were also asked a more general question about their view of the need for environmental activities for families and communities. The question was included to understand how important and relevant environmental education is to parents. Figure 4.14 shows that 67% of parents agreed in the pre-programme results that there is a need for environmental activities for families, this increased to 88% in the post-programme results.

There was a significant change ($p < .05$) in parents who agreed that there needs to be more environmental activities put on for families. 56% of parents who said that they did not feel that there needs to be more environmental activities for families and communities in the pre-

programme questionnaire, then went on to say 'yes' in the post-programme results. This indicates an overall positive sign that parents see the importance of environmental activities for families and communities. This could also indicate that parents may have got involved with activities as a result of the workshops, or seen the benefit to them and their children.

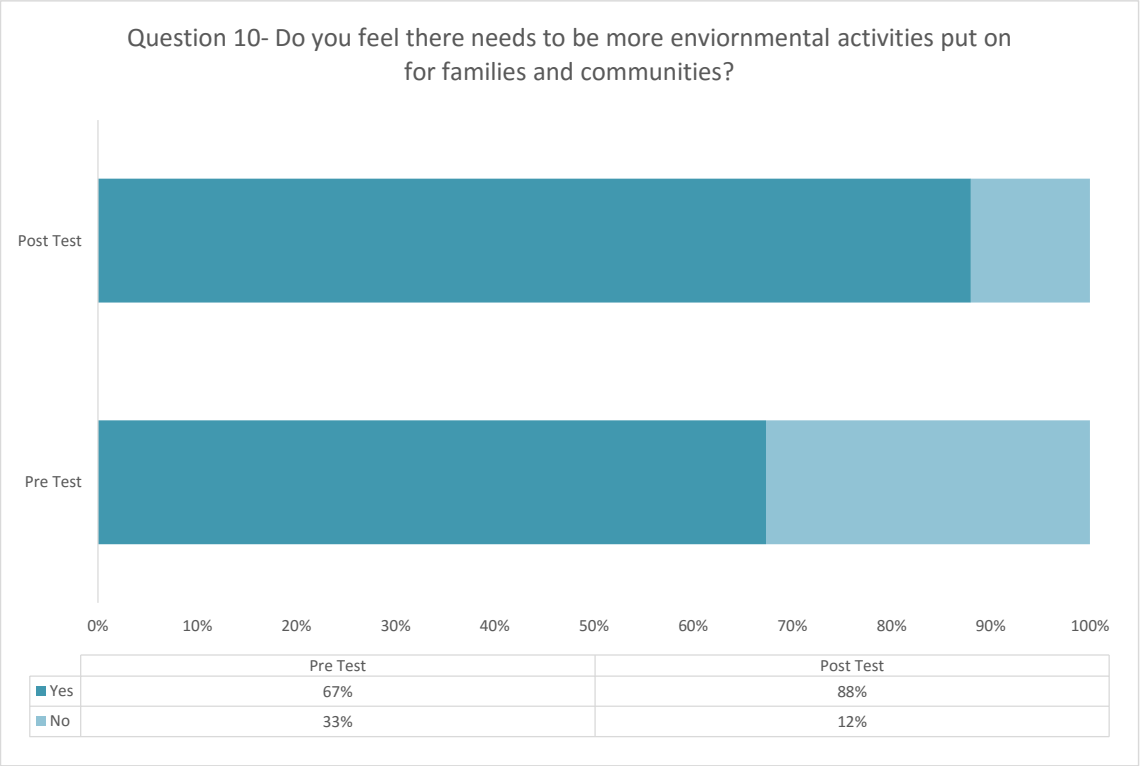


Figure 4.14 Bar graph comparing Pre and Post-programme answers to Question 10 in relation to the needs for more environmental activities for families and communities.

4.5.3 Summary

This section presented information on how parent's views about the environment and family environmental activities have changed during the course of the EEP. Although a significant increase in parents wanting to participate in environmental programmes was not an outcome described during the methodology it is a welcome benefit of this particular EEP. It shows that a combination of child-adult influence and increased conservations during the EEP can not only affect parents individual ERBs but the desire to participate in family activities. The importance of these types of activities are also heightened in parents after the EEP. The belief that parents feel responsible for looking after the environment significantly increased after the EEP, this can be linked to the increase

in behaviours carried out at home potentially influenced by their children (Q7&8). If parents feel more responsible for their actions, they are more likely to contribute to environmentally responsible behaviours and respond to their child requests to carry out ERBs in the home.

Chapter 5 Discussion

The purpose of this study was to determine the impacts of four week environmental education programme (EEP) on student learning as well as evidence of intergenerational learning (child-parent) resulting from the programme. This chapter discusses the results of this study and its wider implications to environmental education, as well as possibilities for future research. This chapter begins with a discussion of the evidence of child-to-adult intergenerational influence. This chapter also presents various outcomes of communication between children and parents and subsequent environmentally responsible behaviours which have occurred during or after the EEP.

5.1 Children and their influence

Environmental educators have the task of educating a wide audience and often find it difficult to have an impact within family home, particular reaching parents. To educate children to be more environmental responsible with their behaviours offers a chance for educators to reach further into the family home and have an impact, through intergenerational influence. The findings from this research suggest that children are capable of influencing their parents' behaviour and attitudes on environmental topics. This echoes the findings of many others in the intergenerational influence research community, such as Uzzel's (1994) early investigations which found that child-to-adult influence is a phenomenon that can occur around these issues. The findings of this study allow families to be categorised in terms of how parents and their children reported influence or being influenced during the EEP. Drawing on both the parent's questionnaires and children's reference to influence in their diaries the data shows different categories of influence. Hence the answer is not 'there is influence or there is no influence' it is more 'there is evidence of influence which varies'. This variation includes parents who were influenced by their children through the use of general conversations, the use of the green diary activities and parents who may have gained knowledge through their children to become better informed about environmental issues. Their child's

influence may result in one change of behaviour (ERB), participation in an activity (litter pick) or a change in opinion. The data from both parents and children shows that parents have got a more positive perception than children about the child's level of influence, specifically parents think children have more influence on them than children are aware of. The data suggests that the children, rather than the parents, were the ones who initiated a discussion about the environment. Hence this suggests that parents did not discuss environmental issues much without prompting, but when these issues were raised the majority of parents' felt that their behavior or decisions were influenced. Consequently, this could explain why some parents did not engage in conversations about the environment with their children, this is something that has also been reported in literature by Vaughan et al (2003) and Sutherland and Ham (1992), who said that the process of transferring environmental knowledge from school to home through students is intense but not consistent and reliable. This implies that it is dependent on the individuals involved and cannot be used as a 'one size fits all' solution for environmental education

Uzzell (1999) describes various constraints and barriers to intergenerational influence, that a child can feel they are influential but the parent does not acknowledge that there is any influence. He suggests that parents need to be eager to engage in a dialogue with their children and have a strong communicative relationship with the child in order for effective influence to occur. Surprisingly in this study, this event did not occur. Where children reported influencing their parents (n=23), in all these cases parents matched this response and indicated higher levels of influence from their children after the EEP. There are various possible explanations for this, including the involvement of parents in this programme (i.e. the at home activities) so they may feel that they are a part of the EEP and therefore are more open to their child's influence, or may be directly influenced by the material that the child is covering in the activities. It could also be evidence of high levels of pride and support for their children's learning, this can only be speculated and further information from the parents could pin point these reasons. This also accompanies the evidence from the eight

children who reported having no influence on their parents in their diary and yet their parents reported higher levels of influence. As this study was primarily interested in the occurrence of intergenerational influence (child-adult) and if it existed, it did not seek to describe in detail the reasons for the outcomes. A measure of confidence in children in future research would allow this to be investigated.

It is important to note that parents were also asked to report on other possible sources of influence for environmentally responsible behaviors. Adult family members/friends was the only other category alongside children which demonstrated a significant increase in influence after the EEP. It can be speculated that parents of other children who took part in the EEP have engaged in conversation with each other during or following the EEP, parent conversations during school drop offs and pick-ups could provide an opportunity for information to be passed between parents and there could be an element of persuasion from other parents.

5.1.1 The role of knowledge

Regarding the role of information and knowledge, information can increase knowledge about the environmental problems and behaviour alternatives and heighten individual's environmental awareness. Moreover, information may foster persuasion and commitment to environmentally responsible behaviours, and can enhance the power of role model (Steg and Vlek 2009). The findings of this study suggest that children's reported knowledge of environmental issues can be influenced by their perceptions of their parents' knowledge and vice versa. For example C27 and C1 both commented on their parents lack of knowledge in the field of energy saving and both gave reports of learning basic environmental knowledge such as turning off lights. Hence, these two types of reported knowledge seem to interact with each other. In effect, the more the children feel they know, the more confident they feel compared to their parents and the level of confidence in

their knowledge compared to their parents further boosts their perceptions of their own knowledge. Within the age group of children this study focuses on (age 9 to 10) some level of knowledge about the environment would be expected, but as many researchers have stated, this pre-existing knowledge can vary hugely in terms of extent and accuracy.

The children who referred to their increased knowledge in their diaries often continued on to report engaging in a new ERB or reiterate their desire to want to change their household ERBs. Children often reported similar knowledge increases such as 'I have learnt a lot more about why it's important to save energy to help bring down the level of carbon dioxide' and ' I didn't know anything about the rainforest being cut down, but now I know how important it is and why I have started recycling paper more'. The link between information, knowledge, stated motivation to act, and actual behavior is complex and contested. Axelrod and Lehman (1993) suggest that information provision can change people's attitudes and beliefs and these changes are sufficient enough to change their actual behaviour. Kollumuss & Agyeman (2002) reviewed the early models of pro-environmental behaviours which used to be based on a linear progression of environmental knowledge, leading to environmental attitudes which consist of environmental awareness and concern, and finally leading to pro-environmental behaviours. This simplistic approach is still followed by many NGOs and governments (Owens 2000) in the development of their own environmental education strategies. Although the findings in this study presents evidence that knowledge gained by children may assist them in influencing their parents, there are other factors which have emerged as important to include within environmental education programme in order to transfer knowledge with the aim of influencing behaviour.

Factual knowledge gained as a direct result of exposure to the four workshops was not formally assessed in this study. Importantly however, the child participants felt strongly that they had indeed learnt new information, as evidenced by what they chose to report in their diaries, suggesting that

new knowledge was acquired by the children through the EEP. It is difficult to say absolutely that any one the four workshops helped in the dissemination of knowledge and ERBs, and which provided a better route to learning than the others but this was not the aim of the study. However, there were several common ERB themes which were reported by children in their diaries, these included switching off electrical appliances, recycling of paper and switching off lights. These ERBs form part of the overall aim of the workshops and it can therefore be suggested that their knowledge has increase over the time of the EEP

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Falk & Dierking (2000) found that one of the key difficulties in measuring the effectiveness of free choice learning is that people differ greatly in their knowledge, attitudes, interests and motivations at the start of any experience. This different 'starting point' for each individual and family is likely to be a significant influencing factor on the degree of knowledge transmission between child and adult and the overall uptake of ERBs. This could explain why Duvall & Zint (2007) concluded that intergenerational environmental programmes have only a modest potential to influence parental knowledge, attitudes and behaviour. This study also highlights the importance of collecting qualitative data on learning, where quantitative results can be misleading, suggesting that no learning has occurred when in fact it has and vice versa (Ballantyne & Packer 2005). Intergenerational learning is a complex and fluid transfer of knowledge; one cannot measure every aspect of it. It is important to interpret learning outcomes in their broadest sense; these may include changes in attitudes and values about the environment in general, one's own place in the world or interactions with other people (Ballantyne & Packer 2005). In this study children appear to have increased in all areas of these outcomes.

5.1.2 Influence and Environmentally Responsible Behaviours

ERBs are crucial for improving the environment on a local and global scale. Thus, examining the distinctions of the results pertaining to ERBs and providing possible explanations may be valuable. The environmental education programme was designed in a way to promote environmentally responsible behaviours at home by using children to be the vehicle of change and influencing their parents to make positive steps to become more environmentally friendly. To investigate the existence of child influence further, parents were asked to report on specific environmentally responsible behaviors in both the pre and post programme questions. The list of ERBs included many of the key messages taught in the school workshops run with the children. They presented children with messages on how they could make minimal changes to their lifestyle in order to help the environment. Overall there was a statistically significant change in 9 out of the 13 listed behaviours through a comparison before and after the EEP.

This study with a group of school children looked at delivering workshops which contained key message covering basic everyday behaviours which could reduce the household's impact on the environment and covered positive steps to become more environmentally friendly. When asked which behaviours their children had influenced, the children significantly influenced nine of the 13 behaviours explored in the study including growing their own food, energy saving and recycling. These are the behaviours that children focused on in their diaries and which were also the focus of the workshops and showed the highest increase in uptake in parents. All the behaviours were covered at some point during the EEP, however subjects on energy saving had particular emphasis as both the energy workshop and renewable energy workshop shared the basic foundations of why we need to be careful with energy and the solutions in terms of energy saving and energy production. These are seen as low cost changes that won't significantly alter lifestyle but can collectively have a positive impact on the environment. Those behaviours which weren't influenced

by the children were the travel-related behaviours such as not driving or walking more. These can be difficult behaviours to influence particularly for those coming from longer distances and also the time of year may have impacted. During the winter when the EEP was delivered, weather may have discouraged adults from changing their behaviours. It could be seen that these travel behaviours are more constrained by lifestyle and schedules.

Within the children's diaries, 23 out of the 48 children described examples of influencing their parents in a way which they believed swayed their parents to carry out a specific ERB. All of these children believed they had influenced their parents even if it resulted in only a small change in behaviour or activity, such as turning the tv off instead of standby. Although over half of the children (55%) reported to have influenced their parents, a further 24% of children reported wanting to influence their parents, this was demonstrated in examples such as 'I am going to ask mum if we can grow vegetables' and 'I will be asking mum and dad to help save energy by switching off all the lights that they leave on'. These cannot be categorised into children who have directly influenced their parents but they do play an important role in the outcome of the EEP. Although the children did not evidence having already had an impact on their parents, the parents of these 10 children, all reported higher levels of influence from their children in the post programme results. This is very important as children may not rate their ability to influence their parents as very high so they may judge themselves to have had less influence on their parents, than the parents themselves. These ten children provide evidence that they show a willingness to change their own and their family's behaviours to become more environmentally friendly. Those children who did clearly report influencing their parents provide evidence that the EEP is giving children the knowledge and enthusiasm to encourage others within their family to adopt ERBs. It is important to note that out of the 58 children who took part in the EEP, only 42 submitted a diary, so the overall percentage of children who believed they influenced their parents may be different to the figures above.

The data from each matched parent and child was carefully examined and compared in order to consider potential reasons for those families not reporting any influence. The potential barriers to intergenerational influence were also examined. The overall enjoyment of the EEP and the types of activities the children are engaged in are two commonly described barriers (Balantayne et al 2001). Ballantyne et al. (2001) also suggest that there are various factors in a family's communication relationship that can act as barriers to an effective influence relationship.

The activities that showed the greatest similarity between child and parent reports of occurrence, and also the greatest frequency of mention, were recycling, growing vegetables, and switching off electronic devices. One explanation for this finding may be the high degree of visibility for those behaviours. For example, when a child or parent recycles at home, other family members can see. In contrast, purchasing environmentally friendly products, an ERB that was not often referred to by matched parents and children, may occur when individuals are alone shopping and family members may pay less attention to what is purchased. Additionally, turning off lights is a highly common behaviour that many subjects engaged in, making it very difficult for matched parents and children to demonstrate significant similarities in the behaviour that would distinguish them from unrelated parents and children Overall, the degree of visibility for ERBs may make behaviours more transferrable between students and parents. Future research might test this hypothesis.

5.1.3 The Role of Grounded Theory

The emphasis in grounded theory is theory development. Throughout the data collection period, I reread the transcribed data until I acquired a sense of the direction for analysis. After coding the transcription of incidents line by line and labelling certain concepts common to them (open coding) I was able to set aside codes unrelated to her research questions as well as those that appeared

frequently, and then find relationships among codes (axial coding). Through those processes, I identified the most significant and frequent codes (selective coding).

The diaries were analysed to determine whether any common features arose among the children's diaries. Searching for common patterns and themes, I discovered 5 core themes from the diaries including development of environmental knowledge and skills; Positive attitudes towards the environment; Intention and desire to act in an environmentally responsible way; Behaviour and lifestyle changes; Influence and change within family unit. The discovered codes and categories were compared with one another to determine the relationships among the different data types. Instead of verifying a theory that children influence their parents, this method allowed me to arrive at this theory which has been generated by logical deduction from the themes in the diaries.

5.2 Family Communication

Relationships between family members can be very complex. A necessary component to intergenerational influence is verbal communication between members of a family unit (Ballantyne et al. 1998). Ballantyne et al. (1998) found that students who often talk to their parents about general topics were more likely to initiate discussions about environmental topics than those who do not communicate well with their parents. A child may be more likely to share information learnt at school if they believe their ideas and thoughts are going to be heard and acknowledged. Similarly, if a child does not believe that his or her parents will listen to them, they are unlikely to report that they are able to influence their parents. This indicates that there has to be a strong existing communication between family members for effective intergenerational learning to occur. There is evidence of communication between children and parents in this study when looking at the discussion of strategies reported by children in their diaries and also the occurrence of conversations reported by adults in the pre and post-programme questionnaire.

Evidence of strong communication between parents and children in this study can be found in the discussion of strategies (visual, auditory) used by children within the children's diaries i.e. the use of at home activities with their parents. Although many of the children reported speaking to their parents (auditory strategy), six of the children gave additional details regarding the way they have approached and involved their parents. Five of these children reported using their green diary, specifically the at home activities included in the weekly activities. These children focused on using their parents for help to complete these tasks and making them a part of their activity. It is once again important to stress that these green diaries were designed to allow children to keep a diary and reflect upon their learning and the environment at home, whilst also completing a variety of environmental related activities in the diary. These were not designed to be compulsory homework, instead these 'green diaries' were an opportunity to continue their learning at home in a more relaxed manner. These six children specifically referred to the home energy audit as a way of involving their parents, in these cases not only were the parents involved but children reported using the results from the audit to bring about change in the home. For example one child stated 'I showed mum and dad the results from our home energy audit and they were surprised at how bad we were, now we are all going to try and turn the lights off and other things too'. Using at home activities as part of the overall design of the EEP has indicated the potential for using such resources to involved parents with their children's learning at home. Critically this provides structure and prompts rather than just assuming or hoping that children will talk to their parents. These activities could be seen as a vehicle for promoting environmental conversation between parent and child and also could provide an indirect method of transferring knowledge.to bring about ERBs.

Uzzell (1994) suggest that parents need to openly demonstrate support for the child's learning and the educational experiences they participate in for effective influence to occur, stating 'Parents have to be interested in their child's education'. On four occasions four different children reported their parents asking them what they had learnt or how the workshops went, demonstrating, on

some level, interest from parents in their children's learning, and prompting the opportunity for intergenerational learning or knowledge transfer.

The social status of the child within the family is an important relationship factor in successful intergenerational influence (Ballantyne et al 1998). Uzzell (1994) echoes this by stating 'Many of the barriers to children becoming catalysts of environmental change result from the children's level of status within the family and the inability of parents to recognise that their children can actually teach them about the environment'. It is the status of respect in their family and community that empowers children to feel they can use their knowledge to influence their parents and have an effect on the environment.

To consider how the children view themselves within the structure of their families, I was able to pick out several reports of influence and actions where children believed they had influenced their parents at home. During this analysis it was important to cross reference the child and adult responses to build an overall picture of the impact the EEP has had in encouraging ERBs at home. By looking at the parents' questionnaires it can be concluded that parents were significantly more likely to indicate their child's level of influence higher after the EEP than in the questionnaires completed before the EP was carried out. The majority of children from these parents authenticated these responses by writing examples of their influence on their parents (and other family members) in their diaries. Several examples of children's diaries appear to show these children enjoying a status level that allows them to demonstrate, encourage and possibly persuade their parents into adopting environmentally responsible behaviours. One child explained 'I haven't let anyone at home throw paper or anything that can be recycled in the black bin ever again. It can all be recycled and I have shown them which bins we have to use so that it gets recycled at the right place'. Another example of one of the children demonstrating their influence within the family unit states 'I went shopping with mummy and we were talking about the rainforest and everything we

get from it, so I showed mum the green frog symbol on the food [rainforest alliance] and we then bought some coffee and chocolate with it on so me and mummy are now helping to look after the rainforest a little bit'. This demonstrates that children taking part in the EEP did much more than just relay information about what they had learnt in the EEP but gave clear ideas directly to their parents in ways they can improve their environmental behaviours.

There were eight cases where there was significant increases in the level of child influence reported by parents but their children did not report any form of influence in their diary. This could be due to a number of reasons, the children may not be aware of their influence, they may not have thought to include it in their diaries or they may lack confidence in their ability to influence their parents, whereas in their parents view they are playing a role in their decisions to carry out environmentally responsible behaviours. This evidence does show that although not all children have reported influencing their parents, there is strong evidence that in the majority of cases children have influenced their parents to engage in environmentally responsible behaviours.

In previous studies in the literature relating to children's confidence on their ability to influence behaviour, researchers have addressed this kind of relationship. Although there is little research on child's confidence the literature does discuss how children have become more integrated into decision making within the family. Clulow (1993) maintains that since family relationships have become more horizontal i.e. not following a strict hierarchy from children up to parents, children have been given more freedom and more decision-making responsibilities. This allows them to make more independent decisions. In the case of environmental education this highlights the case for still using traditional methods of educating children but with more scope to have an impact on the parents of these children. Cooper (1999) also provided an example of this independence given to children, by stressing that parents now ask for their children's opinions about family purchases. This is particularly important in environmental education as small changes in lifestyles to be more

environmentally friendly can mean purchasing recycled goods, goods with less packages or purchases with particular logos i.e. rainforest alliance.

Although levels of knowledge confidence or their ability to influence were not measured in the children during this study, 92% of children who submitted a diary reported some form of learning at some point of the EEP, of these, 12 of the children reported deeper levels of knowledge and new found attitudes. For example reports of basic learning included phrases such as 'I have learnt that we need to save energy'. Children who reported a deeper knowledge often described this in more detail such as 'I have found out that because we are making so much fossil fuels, its causing climate change and this is bad because of what it could mean for the planet'. This suggests that these children feel confident in the knowledge that they have learnt as they are able to clearly write about it and are able to relay or report this learning and it could therefore be assumed, would be more confident to initiate discussion with their parents on the understanding that they will be acknowledged.

The data related to environmental conversation between parents and children collected from parent questionnaires, echo the information stated by the children. From the pre and post programme questionnaires there is a clear significant increase in environmental conversations between parents and children (43% increase) after the EEP. This increase in environmental conversation may play a part in the increased level of influence that children have on their parents to carry out environmentally responsible behaviours at home. The majority of children who report conversations with their parents indicated that they were initiating the majority of the environmental conversations. The conversations often included references to what they had learnt in the school workshops, ideas for changes in ERBs at home and general comments on the positive/negative environmental behaviours the family already undertake at home. Although the results suggest that an amount of learning had taken place by the children and the children reported

learning about their responsibilities towards the environment, it is valuable to note that in the parent questionnaire there was a significant change in who parents believed were responsible for looking after the environment. After the EEP more parents indicated that individuals are responsible for this, shifting away from the majority of parents in the pre programme questionnaire stating that industry was responsible for looking after the environment. This suggests a significant shift in parents' perceptions of their own responsibility to the environment. If children are passing on their knowledge gained during the EEP and talking to their parents (increased conversations) this could be a way of influencing adults' perceptions of environmental problems as well as increasing the likelihood of carrying out an EEP.

5.3 Programme enjoyment

Ballantyne et al. (2001) found that a lack of enjoyment of a program that children are participating in is a barrier to intergenerational influence. In other words, children who enjoyed their participation in an environmental education programme were more likely to share the information learnt in the programme with those at home compared to children who did not find the programme enjoyable.

An important factor in the enjoyment had by the children who submitted a diary, was the specific activities in which they had participated. Ballantyne et al. (2000) analysed six environmental education programmes to determine what activities result in the greatest amount of sharing by children at home. The study found that fun, hands on, locally focused projects that used a variety of teaching methods such as discussions, outdoor experiences and demonstrations were most successful for intergenerational communication (Ballantyne et al. 2000). Following on from this, 60% of the children's diaries showed evidence that a positive experience during the EEP may have enhanced the ability to engage with environmental issues but more importantly the ability to

influence their parents. Over half of the children spoke of their enjoyment and how much 'fun' they had during the workshops and their eagerness for the following workshop. Children also reported their enjoyment activities such as the energy audit and pedal power challenge (see methods section). Although the primary aim of the EEP was to enhance the knowledge and increase ERBs of children and their families, enjoyment through creative learning forms an important part of the EEP, and the success of these overall objectives. The use of such activities as the green diary including at home activities and the activities run during the workshops all appear to have played a role in the enjoyment of the programme. This is an area of research that could shed light on more specific ways to 'teach' during EEPs, although there is strong evidence that enjoyment is a factor in the child-adult influence level in this study from the high level of children reporting enjoyment and also expressing influence on their parents, future research could explore this idea further.

5.4 Intergenerational Learning in the future deign of Environmental Education Programmes

This thesis has shown that there are a range of methods that can promote two-way intergenerational learning between adults and children and that the methods have the potential to promote environmentally responsible behaviours. It has been suggested by several authors (Evans et al. 1996, Ballantyne et al. 2001, Vaughan et al. 2003) that young people have the potential to act as catalysts of environmental change, community empowerment, and social learning among their parents and other members of the community. While the intergenerational communication between children and their parents and subsequent impact on ERBs was the central focus of this research project, it also served to provide feedback specifically on the ERBs as an outcome of the programme on the participants. The children's diaries allowed the children to explore their feelings and understandings about the programme and whether they believed attending this programme has caused

any change in their behaviour and their parents' behaviours. It was clear whilst analysing the children's diaries that the programme proved to be a significant experience for these children.

There is clear evidence that these workshops in combination with other dissemination activities (i.e. green diaries) may have the ability to sway opinions of children and parents. From the children's diaries six children reported in detail about the use of the green diary activities with their parents and from the questionnaire all of the parents of these children reported conversations and an increase in influence. This shows a positive trend towards the use of these resources but more research would need to be conducted to build an overall consensus on the impact of such activities. In particular this is shown in the parents' pre and post programme answers to the question asking how they would classify the current state of the environment. After the EEP there is an increase in parents believing that the environment is in a worse state than they did before the EEP. The EEP was not designed to scare monger or relay negative thoughts instead it was designed to educate children and subsequently parents on what we can do to improve the environment. Classroom environmental education tends to lack positive emotion. Too much environmental education is problem-centered, and negative in tone and perception. We must not ignore problems; but we do have to balance the negative focus with affirmation. Environmental education has tended to ignore the psychology of the instructional problem. There is a place for moral exhortation, but by itself it is not nearly sufficient. Moral precept does not change behaviour. This problem is addressed by developing an ecological consciousness. Organizations such as Futerra (2005) and the Institute for Public Policy Research (Ereaut & Segnit, 2006), and academics such as Kloeckner (2014), Pooley and O'Connor (2000), and Moser (2010) advise that environmental messages should appeal to the emotions rather than simply providing factual information, to be more engaging. Climate change communications frequently use disaster framing to create a fear appeal intended to motivate mitigation action. This shift in parents opinion may be due to better understanding of environmental issues

and the whole society approach needed to deal with these issues. This is often a criticism of environmental education, where by there is too much focus on the problems rather than a more positive focus on solutions. The comments from children suggest they often told their parents off and offered an explanation as to why they play an important role in helping look after the environment.

This study has produced positive results that relate to the goals and objectives of environmental education. As with any study providing information, this study should be built on in an effort to answer additional questions about the impacts of environmental education as well as examining the possibilities that exist for students and parents that become involved in environmental education. The practical application of these findings to the design of environmental education programmes and different approaches to drive environmental responsible behaviours should be refined and shared in the future.

5.6 Limitations

The results from the projects suggest that the amount of intergenerational learning that took place was variable between different households and over different topics. One of the difficulties about measuring the success of intergenerational projects is that it is difficult to measure and quantify free choice learning (Falk & Dierking 2000). Some researchers have investigated the effectiveness of introducing intergenerational learning programmes into formal school programmes and wider community settings to promote a sense of community and place and to enhance environmental understanding: (Sutherland & Ham 1992, Uzzel 1994, Ballantyne et al.1998a, Ballantyne et al. 2001c, Vaughan et al. 2003). These studies have shown mixed results as to the effectiveness of intergenerational learning. Duvell and Zint (2007) reviewed the programmes mentioned above and concluded that they had only a modest potential to influence parental knowledge, attitudes and behaviour. Duvell and Zint (2007) suggests that further work is needed to look at methods in which

children can act as catalysts for promoting environmental knowledge and changed behaviours in their parents and throughout their communities. Methods to assess these changes also need to be better defined and understood. This study looked into the existence of influence and changes in parents ERBs, these methods to assess changes would build a more in depth view how the mechanisms of influence works.

The researcher effect is something that needs to be considered throughout the analysis of this particular study. This type of effect can be described as a type of response in which individuals modify or improve an aspect of their behavior in response to their awareness of being observed or in this case their diaries being explored and questionnaires reviewed. This has been minimised by comparing pre and post programme questionnaire data and also by matching up family pairs i.e. child-parent where possible to match up responses to corroborate each other, through the triangulation of results. The children's green diaries were designed with an open structure with guidance questions to allow children to freely express their feelings. There was no formal marking structure used, this was done to avoid children making artificial comments in their diaries, there was no pressure to write a 'correct' answer. It is also important to consider that if children did not report an increase in knowledge, environmental conversations with their parents or new ERBs they and their family are undertaking, this does not mean that it has not occurred. These diaries are also self-reported and the reliability of what children write will always be questioned. This study raises the question of the reliability of causal self-attributions of behavior. Problems have been identified with using self-report measures of behavior (Chao & Lam, 2011; Corral-Verdugo, 1997; Manfredo & Shelby, 1988); respondents tend to overestimate their pro environmental or prosocial behavior, perhaps because of a desire to offer socially desirable responses or because their self-identity as a "green" or "socially responsible" person leads them to assume that their behavior correlates more with their values than it actually does.

Literature has shown various lengths of environmental education programmes and the results and implications for such programmes in the past (see Table 2.3, Chapter 2). The duration of this EEP lasted 4 weeks and the final questionnaires and diaries were collected one week after the final workshop. Although there is strong evidence that this programme has indeed increased ERBs in parents indicated by an increase in children influencing their parents and increase environmental conversations between children and parents, the long term impact is uncertain. There are questions, however, regarding longevity of change: impacts may not persist (Abrahamse, Steg, Vlek, & Rothengatter, 2005). For this reason, Steg and Vlek (2009), in setting out an agenda for research into encouraging pro environmental behaviour, emphasize the need for long-term research (Howell 2014).

It is from the reports from child participants and parent questionnaires that I feel this EEP is a learning experience which has potential to not only increase the knowledge of children and the way they consider their environment, but also to change the way families relate to the environment. Parents, on the most part, were able to recognise their children as a powerful source of influence to encourage them to carry out specific ERBs. In order to tackle environmental challenges we as a society are facing, an approach which encompasses all generations is necessary. When EEPs such as this are combined with techniques to encourage intergenerational practises, these challenges may be easier to overcome. Intergenerational learning should be considered in all environmental education programmes as an additional goal, as a means of disseminating important messages beyond their immediate audiences.

Chapter 6 Conclusion

This research study has considered child-to-adult intergenerational influence and consequent behaviour changes within a specifically designed environmental education programme. The study has provided evidence that this particular environmental education programme has increased the levels of influence children have on their parents to carry out environmentally responsible behaviours. There is also a significant increase in parents undertaking ERBs after the EEP. Based on the analysis of the findings in this research project, there are several recommendations I would make for future intergenerational studies. To build a deeper understanding of the complex relationships between adult and child, particularly where barriers to influence exist, there needs to be opportunities to engage with participants over a long term project. Longer engagement would allow researchers to understand how the influence relationships change over time. This would also give researchers an opportunity to see how child's perception of their influence on their parents changes with various levels of self-confidence.

Environmental educators can benefit from this research by designing environmental education programmes in a way that over comes barriers to intergenerational influence. The length of programmes, aiming at appropriate age groups and using appropriate learning styles to emphasise environmental messages can all help maximise the probability of these messages being communicated in the home. Specific research into self-esteem as a barrier to the influence relationship is an area of study that holds the potential to open up the world of intergenerational learning further. If researchers are able to assess self confidence in relation to the desire and ability for children to influence their parents and communicate relevant information and actions into their home it opens up opportunities for environmental educators. It may indicate that increasing self-confidence in children (and possible parents) may become an aspect of environmental education design.

Further research into the use of 'at home' activities involving children and parents to work alongside existing or new education programmes would allow researchers to gain a further insight into using these types of resources. As evidence from this study shows, these types of learning activities could benefit environmental education programmes and aid in the delivery of environmental messages to children and their parents. This study shows that intergenerational learning does not have to be uni-directional from the adult; adults too can learn from children (Evans et al. 1996, Ballantyne, et al. 2001b, Vaughan, et al. 2003) and this study clearly shows evidence that children are influencing their parents after they have taken part in the EEP. In contrast the many studies on intergenerational learning (e.g. Sutherland & Ham 1992, Uzzel 1994, Ballantyne et al., 1998, Ballantyne et al. 2001, Vaughan et al. 2003) have shown mixed results as to the effectiveness of intergenerational learning. Duvell & Zint (2007) reviewed the programs mentioned above and concluded that they had only a modest potential to influence parental knowledge, attitudes and behaviour, (possibly, because of the relatively small number of studies and a number of methodological and programme limitations within them). For example, Ballantyne et al. (1998) reported that discussions between parents and children focused on a description of the program itself and did not stimulate the children to 'teach' their parents something new. Sutherland & Ham (1992) found that children typically passed on a vague, basic awareness of what they were studying. If intergenerational learning techniques are going to be introduced into the modern school curricula, we need to discover which methods are effective in achieving the desired transfer of learning.

There are possible ethical considerations as to if environmental education prgrammes should specifically target children in order to reach their parents. Much of the ethical research has been conducted in marketing and consumer buying but this can relate in some way to the delivery of EEPs and changing household behaviours. There has been a great deal written in the press over the last couple of years about changes in the child– parent purchase relationship. Concern has been voiced about the apparently growing power of children to influence their parents' buying behaviour and

purchase choices, a set of tactics sometimes characterised as 'pester power' (Tylee, 1997; Howell, 2000; Summerskill, 2001). However, the academic analysis of this phenomenon has largely consisted of a rebuttal of the moral (and, to a degree, practical) case against advertising to children, arguing that the main influence on children's buying behaviour is, in fact, familial and peer group, rather than marketing and that, in fact, advertising helps children learn to be consumers and thus has an important socialisation role to play in their development (Stanbrook, 1997; Gunter and Furnham, 1998; Chandler and Heinzerling, 1998; Macklin and Carlson, 1999; Furnham, 2000). Thus, the child– parent purchase relationship has largely been explored from psychological and consumer behaviour perspectives, rather than in an ethical or operational context.

This study shows that children report going beyond just describing what they have learnt but how their levels of concern have changed as they have developed new or improved attitudes towards the environment. From the children's diaries 19 of them described ERB they are now doing at home. The parents of these children have subsequently engaged in more environmental conversations, mainly initiated by the child, and have carried out more ERBs at home. The EEP has produced a strong basis for the design of environmental education programmes to encourage discussion between parents and children and to increase ERBs in the home.

This study has contributed to the field of intergenerational learning by analysing and discussing child to adult intergeneration influence from both the child and parents point of view. It has provided an insight into the communication that takes place between parents and children and any subsequent environmentally responsible behaviours that occur or increase during the time of the EEP. Having a greater understanding of how children view their influence on their parents can help environmental educators design and deliver programmes that reach a larger audience than their original scope. It can also aid curriculum developers in providing learning experiences in and outside of the classroom in ways in which they can experience some level influence. Environmental education can benefit from this kind of exploration into intergenerational influence as a way to

expand the reach of environmental information and provide a larger network of knowledge that can support family learning. This influence is an existing area of research which holds the potential to provide crucial support to educators faced with educating society of the environmental problems facing the world.

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Appendix 1

University Ethics Approval Letter

KEELE UNIVERSITY

ACADEMIC SERVICES

RESEARCH AND ENTERPRISE

30 November 2011

Miss Nicola Ruston
Project Support Officer
WSF27A
William Smith Building
Keele University

Dear Nicola

Re: 'Evaluating the effectiveness of environmental education programs: the impact on behaviours and attitudes of pupils and evidence of intergenerational learning – Anglesey Project'

Thank you for submitting your revised project for review.

I am pleased to inform you that your project has been approved by the Ethics Review Panel.

If there are any other amendments to your study you must submit an 'application to amend study' form to Michele Dawson. This form is available from Michele (01782 733588) or via http://www.keele.ac.uk/researchsupport/researchethics/

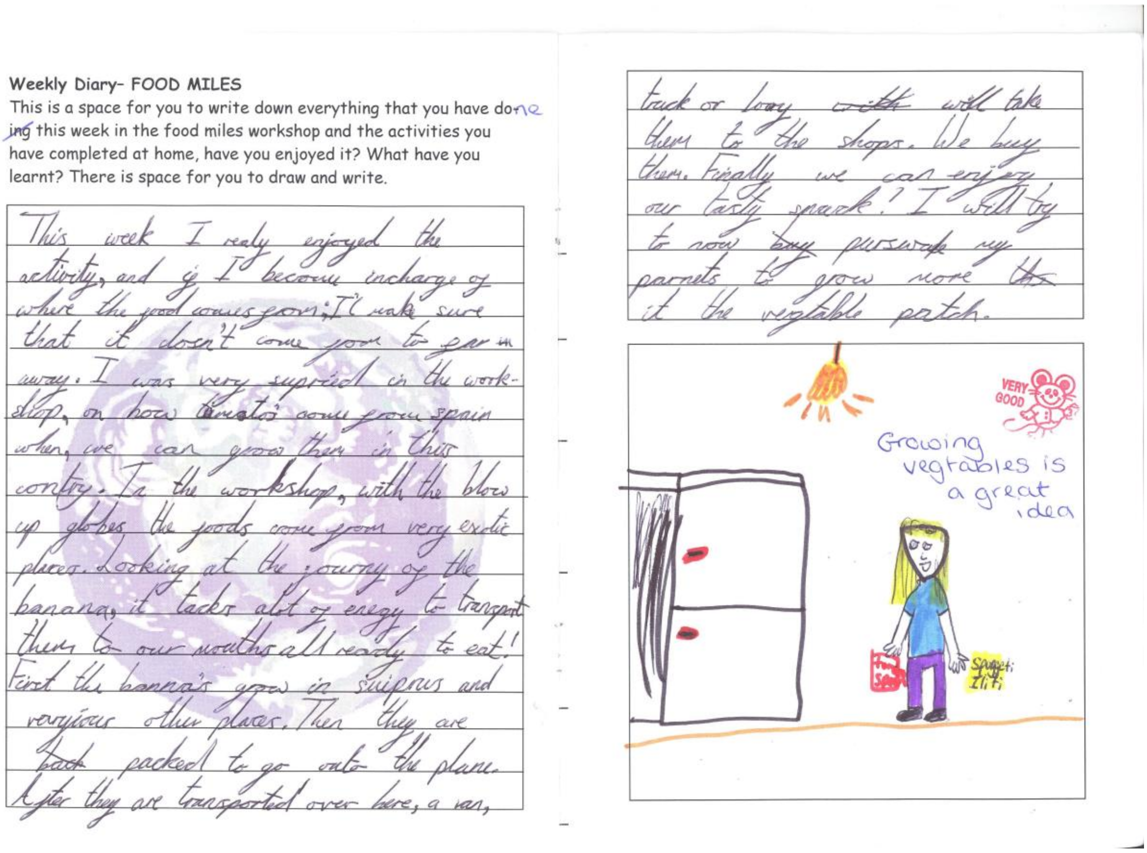
If you have any queries, please do not hesitate to contact Michele Dawson in writing to m.dawson@uso.keele.ac.uk

Yours sincerely

pp **Dr Roger Beech**
Chair – Ethical Review Panel

CC RI Manager, Supervisor

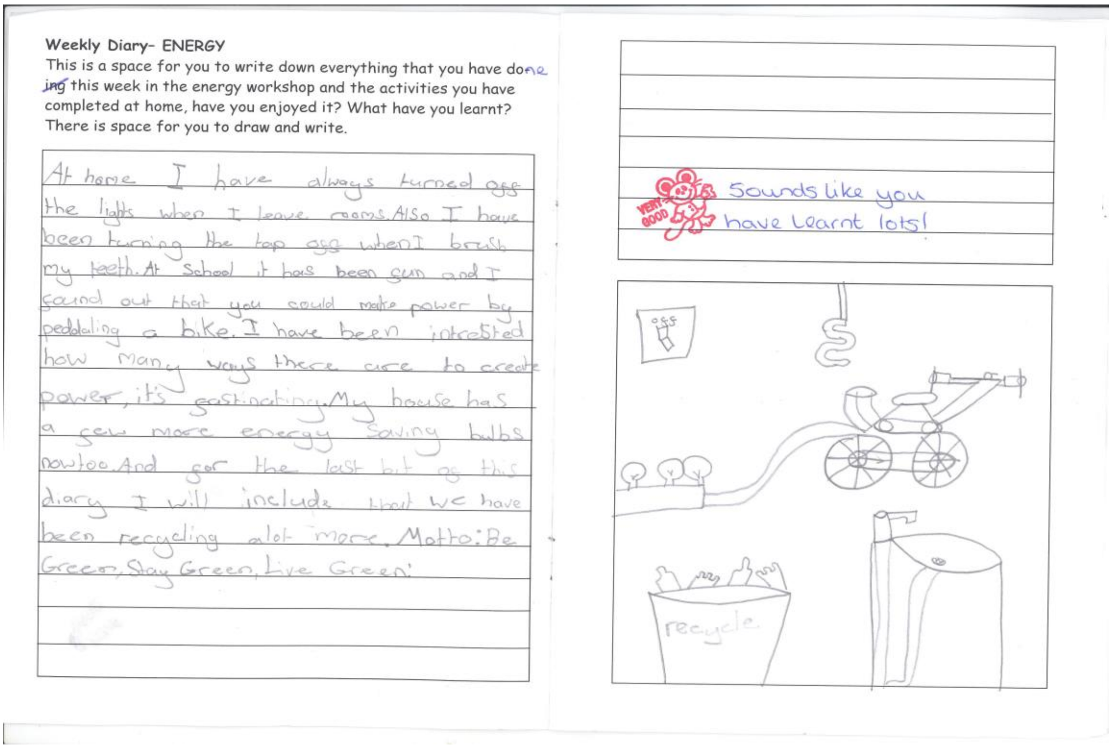
Examples of Children's Diaries



Weekly Diary– FOOD MILES

This is a space for you to write down everything that you have done this week in the food miles workshop and the activities you have completed at home, have you enjoyed it? What have you learnt? There is space for you to draw and write.

This week I realy enjoyed the activity, and if I become incharge of where the food comes from; I'll make sure that it doesn't come from to far away. I was very supried in the workshop, on how tomato's come from Spain when we can grow them in this contry. In the workshop, with the blow up globes the foods come from very exotic places. Looking at the journy of the banana, it takes alot of enegy to tranport them to our mouths all ready to eat! First the banna's grow in suipous and varyious other places. Then they are back packed to go onto the plane. After they are transported over here, a van, truck or lorry with will take them to the shops. We buy them. Finally we can enjoy our tasty snack! I will try to now buy persuade my parnets to grow more the it the vegtable patch.



Weekly Diary– ENERGY

This is a space for you to write down everything that you have done this week in the energy workshop and the activities you have completed at home, have you enjoyed it? What have you learnt? There is space for you to draw and write.

At home I have always turned off the lights when I leave rooms. Also I have been turning the tap off when I brush my teeth. At School it has been fun and I found out that you could make power by peddaling a bike. I have been intrested how many ways there are to create power, it's fastinating. My house has a few more energy saving bulbs now too. And for the last bit of this diary I will include that we have been recycling alot more. Motto: Be Green, Stay Green, Live Green!

VERY GOOD Sounds like you have Learnt lots!

Pre and Post programme Parent Questionnaire

Please take the time to fill out our questionnaire. Your response will help us improve our environmental education programmes in the future. Once completed please return it to school with your child to hand in to their teacher.

Please circle the letter next to the answer you feel is correct or best corresponds with your feelings about this statement.

1. Our environment is:

a) in good shape
b) in some trouble but can be saved with a little effort
c) in bad shape but a lot of effort might save it
d) in such bad shape little can be done about it

2) Which of the following do you feel is the worst environmental problem facing the planet?

a) Ozone depletion
b) Toxic waste
c) Global warming
d) Water pollution
e) Air pollution
f) Deforestation
g) Landfill sites overflowing

3) Who do you feel are the worst polluters?

a) Industries
b) Government
c) Individuals

4) Who should be responsible for making sure we have a healthy environment?

a) Industries
b) Government
c) Environmental groups
d) Individuals

Read the following statements and mark down your opinion by ticking the appropriate box.

5) Do you believe these following statements are myths or facts?

	Myth	**Fact**	**Half Truth**	**What! I don't understand this question at all**	**I don't care**
Carbon dioxide levels only rose after the start of the warm periods, so it does not cause global warming.					
Even small rises in sea levels will lead to more frequent flooding in coastal areas.					
It has been warmer in the past, so there is no problem at all if it's becoming warmer now.					
Antarctica is getting cooler and the ice sheets are actually getting thinker.					
For every 10 mile car journey we produce 5.5 kg of carbon dioxide.					
Volcanoes emit more carbon dioxide than human activities.					
Its too cold anyway, a bit of warmer weather would be a good idea. It will save on the gas bill and cause less pollution.					
Recycling is great, but reducing and reusing our waste is a lot better for the environment.					
It takes less emissions to transport tomatoes grown organically in Spain to the UK than it does growing them in heated greenhouses in the UK.					
£740 million is wasted every year by people leaving electronic items on standby.					

6) Do you speak about the environment at home with your child(ren)?

□ Yes

□ Sometimes

□ No

7) Have you installed or planned any energy saving measures in your home or changed your behaviour to be more environmental friendly in the past year?

□Yes

□No

If Yes: which of these factors have influenced your decisions to install or plan energy saving measures in your home or to change your behaviour to be more environmental friendly. Please can you tell me, on a scale of 1 to 5, how much each of the following have influenced you, where 5 means it has influenced you a lot and 1 means it has not influenced you at all.

TV	1□	2□	3□	4□	5□
Fuel company advice	1□	2□	3□	4□	5□
Friends advice	1□	2□	3□	4□	5□
Your Child/ren	1□	2□	3□	4□	5□
Paper/Radio	1□	2□	3□	4□	5□
Government advice	1□	2□	3□	4□	5□
	Not influenced		**Somewhat influenced**		**Influenced a lot**

8) Please tick any of the following where you feel your child has influenced your choice/ behaviour? (tick any that apply)

□Turing off the light
□Purchasing energy saving lightbulbs
□Not leaving appliances on standby
□Closing curtains to keep heat in
□Recycle more
□Don't drop litter
□Walk to school/work
□Save/not waste water
□Being careful with energy
□Not to drive as much
□Growing own vegetables
□Encouraging wildlife to garden
□Buy food from local farmers
□Other (please give details)_____
_____

9) Would you be interested in taking part in a family workshop based around the environment and ways you can become more 'green'? (Please give a reason for your choice)

□ Yes_____

_____

□ Not sure_____

_____

□ No_____

_____

10) Do you feel there needs to be more environmental activities put on for families and communities? (i.e. gardening clubs, eco days)

□ Yes

□ No

Many Thanks for your time

Thank you for filling out this form. By filling out and returning this form you are consenting for us to use this data in our research Your responses are valuable to us and may be used in our research, in which case all data will be used anonymously.

If you have any questions about this questionnaire or about the science for sustainability project please contact Nicola Ruston n.ruston@esci.keele.ac.uk

If this questionnaire is not collected during one of the workshops, please return to Nicola Ruston, William Smith Building, Keele University, Staffordshire ST55BG.

Appendix 2

Parent pre & post programme Questionnaire Frequency Results

Question 1: Statement: Our environment is; (please tick one of the following)

Pre test

Code	Response item	Frequency	Percent
1	in good shape	2	4%
2	in some trouble	23	47%
3	in bad shape	16	33%
4	in such bad shape	8	16%

49

Post test

Code	Response item	Frequency	Percent
1	in good shape	1	0%
2	in some trouble	19	38%
3	in bad shape	30	60%
4	in such bad shape	1	2%

51

Question 2: Which of the following do you feel is the worst environmental problem facing the planet?

Pre test

Code	Response item	Frequency	Percent
1	Ozone depletion	7	14%
2	Toxic waste	4	8%
3	Global warming	13	27%
4	Water Pollution	2	4%
5	Air Pollution	5	10%
6	Deforestation	12	24%
7	Landfill sites overflowing	6	12%
		49	

Post test

Code	Response item	Frequency	Percent
1	Ozone depletion	7	14%
2	Toxic waste	1	2%
3	Global warmng	22	44%
4	Water Pollution	2	0%
5	Air Pollution	4	8%
6	Deforestation	14	30%
7	Landfill sites overflowing	1	2%
		51	

Question 3: Who do you feel are the worst polluters?

Pre test

Code	Response item	Frequency	Percent
1	Industries	31	63%
2	Government	14	29%
3	Individuals	4	8%
		49	

Post test

Code	Response item	Frequency	Percent
1	Industries	18	34%
2	Government	14	28%
3	Individuals	19	38%
		51	

Question 4: Who should be responsible for making sure we have a healthy environment?

Pre test

Code	Response item	Frequency	Percent
1	Industries	23	51%
2	Government	16	33%
3	Environmental groups	2	0%
4	Individuals	8	16%
		49	

Post test

Code	Response item	Frequency	Percent
1	Industries	9	18%
2	Government	13	24%
3	Environmental groups	3	6%
4	Individuals	26	52%
		51	

Question 6: Do you speak about the environment at home with your children?

Pre test

Code	Response item	Frequency	Percent
0	yes	19	39%
1	no	30	61%
		49	

Post test

Code	Response item	Frequency	Percent
0	yes	41	82%
1	no	10	18%
		51	

Question 7 (Part 1): Have you installed or planned any energy saving measures in your home or changed you behaviour to be more environmentally friendly in the past month?

Pre test

Code	Response item	Frequency	Percent
0	yes	37	76%
1	no	12	24%
		49	

Post test

Code	Response item	Frequency	Percent
0	yes	47	94%
1	no	4	6%
		51	

(Part 2) If yes: Which of these factors have influenced these decisions?

TV

Pre test

Code	Response item	Frequency	Percent
1	Not at all Influenced	12	32%
2	Slightly Influenced	13	35%
3	Somewhat Influenced	10	27%
4	Very Influenced	1	3%
5	Extreamly Influenced	1	3%
		37	

Post test

Code	Response item	Frequency	Percent
1	Not at all Influenced	16	34%
2	Slightly Influenced	16	34%
3	Somewhat Influenced	13	28%
4	Very Influenced	1	2%
5	Extreamly Influenced	1	2%
		47	

Fuel company advice

Pre test

Code	Response item	Frequency	Percent
1	Not at all Influenced	5	14%
2	Slightly Influenced	5	14%
3	Somewhat Influenced	13	35%
4	Very Influenced	13	35%
5	Extreamly Influenced	1	3%
		37	

Post test

Code	Response item	Frequency	Percent
1	Not at all Influenced	3	6%
2	Slightly Influenced	12	26%
3	Somewhat Influenced	15	32%
4	Very Influenced	13	28%
5	Extreamly Influenced	4	9%
		47	

Friends advice

Pre test

Code	Response item	Frequency	Percent
1	Not at all Influenced	10	27%
2	Slightly Influenced	14	38%
3	Somewhat Influenced	5	14%
4	Very Influenced	7	19%
5	Extreamly Influenced	1	3%
		37	

Post test

Code	Response item	Frequency	Percent
1	Not at all Influenced	6	13%
2	Slightly Influenced	19	40%
3	Somewhat Influenced	15	32%
4	Very Influenced	5	11%
5	Extreamly Influenced	2	4%
		47	

Your child

Pre test

Code	Response item	Frequency	Percent
1	Not at all Influenced	12	32%
2	Slightly Influenced	20	59%
3	Somewhat Influenced	3	8%
4	Very Influenced	1	0%
5	Extreamly Influenced	1	0%
		37	100%

Post test

Code	Response item	Frequency	Percent
1	Not at all Influenced	1	2%
2	Slightly Influenced	8	17%
3	Somewhat Influenced	19	40%
4	Very Influenced	15	38%
5	Extreamly Influenced	4	2%
		47	100%

Paper/Radio

Pre test

Code	Response item	Frequency	Percent
1	Not at all Influenced	18	49%
2	Slightly Influenced	11	30%
3	Somewhat Influenced	4	11%
4	Very Influenced	3	11%
5	Extreamly Influenced	1	0%
		37	100%

Post test

Code	Response item	Frequency	Percent
1	Not at all Influenced	18	38%
2	Slightly Influenced	17	36%
3	Somewhat Influenced	7	15%
4	Very Influenced	4	11%
5	Extreamly Influenced	1	0%
		47	

Government advice

Pre test

Code	Response item	Frequency	Percent
1	Not at all Influenced	6	16%
2	Slightly Influenced	12	32%
3	Somewhat Influenced	16	43%
4	Very Influenced	2	8%
5	Extreamly Influenced	1	0%
		37	100%

Post test

Code	Response item	Frequency	Percent
1	Not at all Influenced	11	23%
2	Slightly Influenced	21	45%
3	Somewhat Influenced	11	23%
4	Very Influenced	3	6%
5	Extreamly Influenced	1	2%
		47	100%

Question 8: Please tick any of the following where you feel you child has influenced you to carry the environmentally responsible behaviour.

Pre test	Yes	No	
Turning off the lights	27%	73%	100%
Buying energy saving light bulbs	8%	92%	100%
Not leaving appliances on standby	2%	98%	100%
Closing curtains to trap heat	2%	98%	100%
Recycling more	39%	61%	100%
Not dropping litter	27%	73%	100%
Walking to school/work	67%	33%	100%
Saving not wasting water	4%	96%	100%
Being careful with energy	0%	100%	100%
Not to drive as much	47%	53%	100%
Growing own vegetables	6%	94%	100%
Encouraging wildlife to garden	10%	90%	100%
Buying locally produced food	8%	92%	100%

Post test	Yes	No	
Turning off the lights	42%	58%	100%
Buying energy saving light bulbs	40%	60%	100%
Not leaving appliances on standby	54%	46%	100%
Closing doors to trap heat	20%	80%	100%
Closing curtains to trap heat	16%	84%	100%
Recycling more	72%	28%	100%
Not dropping litter	26%	74%	100%
Walking to school/work	74%	26%	100%
Saving not wasting water	34%	66%	100%
Being careful with energy	38%	62%	100%

Not to drive as much	54%	46%	100%
Growing own vegtables	38%	62%	100%
Encouraging wildlife to garden	26%	74%	100%
Buying locally produced food	28%	72%	100%

Question 9: Would you be interested in taking part in a family workshop based around the environment and being green?

Pre test

Code	Response item	Frequency	Percent
1	yes	7	14%
2	no	27	55%
3	not sure	15	31%
		49	100%

Post test

Code	Response item	Frequency	Percent
1	yes	28	56%
2	no	20	40%
3	not sure	3	4%
		51	100%

Question 10: Do feel there needs to be more environmental activities put on for families and communities?

Pre test

Code	Response item	Frequency	Percent
0	yes	33	67%
1	no	16	33%
		49	

Post test

Code	Response item	Frequency	Percent
0	yes	44	88%
1	no	7	12%
		51	

The following tables were produced by SPSS during the statistical analysis of the questionnaire. They include the cross tabulations resulting from Questions 6, Question 7 (part 1 & 2) and Question 8.

Pre speaking with children about Environment * Post speaking with children about Environment Crosstabulbulation

			Post speaking with children about Environment		
			Yes	No	Total
Pre speaking with children about Environment	Yes	Count	18	1	19
		% within Pre speaking with children about Environment	94.7%	5.3%	100.0%
		% within Post speaking with children about Environment	46.2%	10.0%	38.8%
	No	Count	21	9	30
		% within Pre speaking with children about Environment	70.0%	30.0%	100.0%
		% within Post speaking with children about Environment	53.8%	90.0%	61.2%
Total		Count	39	10	49
		% within Pre speaking with children about Environment	79.6%	20.4%	100.0%
		% within Post speaking with children about Environment	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

Pre install energy saving/change in behaviour * Post install energy saving/change in behaviour Crosstabulation

			Post install energy saving/change in behaviour		
			Yes	No	Total
Pre install energy saving/change in behaviour	Yes	Count	37	0	37
		% within Pre install energy saving/change in behaviour	100.0%	.0%	100.0%
		% within Post install energy saving/change in behaviour	82.2%	.0%	75.5%
	No	Count	8	4	12
		% within Pre install energy saving/change in behaviour	66.7%	33.3%	100.0%
		% within Post install energy saving/change in behaviour	17.8%	100.0%	24.5%
Total		Count	45	4	49
		% within Pre install energy saving/change in behaviour	91.8%	8.2%	100.0%
		% within Post install energy saving/change in behaviour	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.008[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre TV level of influence for energy saving measures/ behaviour change * Post TV level influence for energy saving measures/behaviour change Crosstabulation

			Post TV level influence for energy saving measures/behaviour change					Total
			Not influenced	Slightly influenced	Somewhat Influenced	Very Influenced	Extremely Influenced	
Pre TV level of influence for energy saving measures/ behaviour change	Not at all influenced	Count	8	4	0	0	0	12
		% within Pre TV level of influence for energy saving measures/ behaviour change	66.7%	33.3%	0.0%	0.0%	0.0%	100.0%
		% within Post TV level influence for energy saving measures/behaviour change	88.9%	26.7%	0.0%	0.0%	0.0%	32.4%
		% of Total	21.6%	10.8%	0.0%	0.0%	0.0%	32.4%
	Slightly influenced	Count	1	10	2	0	0	13
		% within Pre TV level of influence for energy saving	7.7%	76.9%	15.4%	0.0%	0.0%	100.0%

		measures/ behaviour change					
		% within Post TV level influence for energy saving measures/behaviour change	11.1%	66.7%	18.2%	0.0%	0.0%	35.1%
		% of Total	2.7%	27.0%	5.4%	0.0%	0.0%	35.1%
		Count	0	1	9	0	0	10
		% within Pre TV level of influence for energy saving measures/ behaviour change	0.0%	10.0%	90.0%	0.0%	0.0%	100.0%
	Somewhat Influenced	% within Post TV level influence for energy saving measures/behaviour change	0.0%	6.7%	81.8%	0.0%	0.0%	27.0%
		% of Total	0.0%	2.7%	24.3%	0.0%	0.0%	27.0%
		Count	0	0	0	1	0	1
	Very Influenced	% within Pre TV level of influence for energy	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%

		saving measures/ behaviour change						
		% within Post TV level influence for energy saving measures/behaviour change	0.0%	0.0%	0.0%	100.0%	0.0%	2.7%
		% of Total	0.0%	0.0%	0.0%	2.7%	0.0%	2.7%
		Count	0	0	0	0	1	1
		% within Pre TV level of influence for energy saving measures/ behaviour change	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	Extreamly Influenced	% within Post TV level influence for energy saving measures/behaviour change	0.0%	0.0%	0.0%	0.0%	100.0%	2.7%
		% of Total	0.0%	0.0%	0.0%	0.0%	2.7%	2.7%
		Count	9	15	11	1	1	37
Total		% within Pre TV level of influence	24.3%	40.5%	29.7%	2.7%	2.7%	100.0%

	for energy saving measures/ behaviour change						
	% within Post TV level influence for energy saving measures/b ehaviour change	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	24.3%	40.5%	29.7%	2.7%	2.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	2.133	2	.344
N of Valid Cases	37		

Pre Child's level of influence for energy saving measures/ behaviour change * Post Child's level of influence for energy saving measures/behaviour change Cross tabulation

Pre Child's level of influence for energy saving measures/ behaviour change		Post Child's level of influence for energy saving measures/behaviour change					Total
		Not at all Influenced	Slightly Influenced	Somewhat Influenced	Very Influenced	Extremely Influenced	
Not at all Influenced	Count	1	2	4	4	1	12
	% within Pre Child's level of influence for energy saving measures/ behaviour change	8.3%	16.7%	33.3%	33.3%	8.3%	100.0%
	% within Post Child's level of influence for energy saving measures/behaviour change	100.0%	25.0%	33.3%	33.3%	25.0%	32.4%
Slightly influenced	Count	0	6	7	6	1	20
	% within Pre Child's level of influence for energy saving measures/ behaviour change	.0%	30.0%	35.0%	30.0%	5.0%	100.0%
	% within Post Child's level of influence for energy saving measures/behaviour change	.0%	75.0%	58.3%	50.0%	25.0%	54.1%
Somewhat Influenced	Count	0	0	1	2	0	3
	% within Pre Child's level of influence for energy saving	.0%	.0%	33.3%	66.7%	.0%	100.0%

	measures/ behaviour change						
	% within Post Child's level of influence for energy saving measures/behaviour change	.0%	.0%	8.3%	16.7%	.0%	8.1%
Very Influenced	Count	0	0	0	0	1	1
	% within Pre Child's level of influence for energy saving measures/ behaviour change	.0%	.0%	.0%	.0%	100.0%	100.0%
	% within Post Child's level of influence for energy saving measures/behaviour change	.0%	.0%	.0%	.0%	25.0%	2.7%
Extremely Influenced	Count	0	0	0	0	1	1
	% within Pre Child's level of influence for energy saving measures/ behaviour change	.0%	.0%	.0%	.0%	100.0%	100.0%
	% within Post Child's level of influence for energy saving measures/behaviour change	.0%	.0%	.0%	.0%	25.0%	2.7%
Total	Count	1	8	12	12	4	37
	% within Pre Child's level of influence for energy saving measures/ behaviour change	2.7%	21.6%	32.4%	32.4%	10.8%	100.0%

	% within Post Child's level of influence for energy saving measures/behaviour change	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	28.000	9	.001
N of Valid Cases	37		

Pre Fuel company level influence for energy saving measures/ behaviour change * Post Fuel company level influence for energy saving measures/behaviour change Crosstabulation

			Post Fuel company level influence for energy saving measures/behaviour change					
			Not at all influenced	Slightly influenced	Somewhat Influenced	Very Influenced	Extremely Influenced	Total
Pre Fuel company level influence for energy saving measures/ behaviour change	Not at all Influenced	Count	1	2	2	0	0	5
		% within Pre Fuel company level influence for energy saving measures/ behaviour change	20.0%	40.0%	40.0%	.0%	.0%	100.0%
		% within Post Fuel company level influence for energy saving measures/behaviour change	100.0%	20.0%	16.7%	.0%	.0%	13.5%
	Slightly Influenced	Count	0	5	0	0	0	5
		% within Pre Fuel company level influence for energy saving measures/ behaviour change	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Post Fuel company level influence for energy saving measures/behaviour change	.0%	50.0%	.0%	.0%	.0%	13.5%
	Somewhat Influenced	Count	0	3	7	3	0	13
		% within Pre Fuel company level influence for energy	.0%	23.1%	53.8%	23.1%	.0%	100.0%

		saving measures/ behaviour change						
		% within Post Fuel company level influence for energy saving measures/behaviour change	.0%	30.0%	58.3%	27.3%	.0%	35.1%
	Very Influenced	Count	0	0	3	8	2	13
		% within Pre Fuel company level influence for energy saving measures/ behaviour change	.0%	.0%	23.1%	61.5%	15.4%	100.0%
		% within Post Fuel company level influence for energy saving measures/behaviour change	.0%	.0%	25.0%	72.7%	66.7%	35.1%
	Extremely Influenced	Count	0	0	0	0	1	1
		% within Pre Fuel company level influence for energy saving measures/ behaviour change	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Post Fuel company level influence for energy saving measures/behaviour change	.0%	.0%	.0%	.0%	33.3%	2.7%
Total		Count	1	10	12	11	3	37
		% within Pre Fuel company level influence for energy	2.7%	27.0%	32.4%	29.7%	8.1%	100.0%

	saving measures/ behaviour change						
	% within Post Fuel company level influence for energy saving measures/behaviour change	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	9.000	5	.109
N of Valid Cases	37		

Pre Paper level of influence for energy saving measures/ behaviour change * Post Paper level of influence for energy saving measures/behaviour change Crosstabulation

			Post Paper level of influence for energy saving measures/behaviour change					
			Not at all Influenced	Slightly Influenced	Somewhat Influenced	Very Influenced	Extremely Influenced	Total
Pre Paper level of influence for energy saving measures/ behaviour change	Not at all Influenced	Count	12	4	2	0	0	18
		% within Pre Paper level of influence for energy saving measures/ behaviour change	66.7%	22.2%	11.1%	.0%	.0%	100.0%
		% within Post Paper level of influence for energy saving measures/behaviour change	100.0%	26.7%	33.3%	.0%	.0%	48.6%
	Slightly Influenced	Count	0	11	0	0	0	11
		% within Pre Paper level of influence for energy saving measures/ behaviour change	.0%	100.0%	.0%	.0%	.0%	100.0%
		% within Post Paper level of influence for energy saving measures/behaviour change	.0%	73.3%	.0%	.0%	.0%	29.7%
	Somewhat Influenced	Count	0	0	4	0	0	4
		% within Pre Paper level of influence for energy saving measures/ behaviour change	.0%	.0%	100.0%	.0%	.0%	100.0%
		% within Post Paper level of influence for	.0%	.0%	66.7%	.0%	.0%	10.8%

		energy saving measures/behaviour change						
	Very Influenced	Count	0	0	0	3	0	3
		% within Pre Paper level of influence for energy saving measures/ behaviour change	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Post Paper level of influence for energy saving measures/behaviour change	.0%	.0%	.0%	100.0%	.0%	8.1%
	Extreamly Influenced	Count	0	0	0	0	1	1
		% within Pre Paper level of influence for energy saving measures/ behaviour change	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Post Paper level of influence for energy saving measures/behaviour change	.0%	.0%	.0%	.0%	100.0%	2.7%
Total		Count	12	15	6	3	1	37
		% within Pre Paper level of influence for energy saving measures/ behaviour change	32.4%	40.5%	16.2%	8.1%	2.7%	100.0%
		% within Post Paper level of influence for energy saving measures/behaviour change	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	6.000	2	.050
N of Valid Cases	37		

Pre Friends level of influence for energy saving measures/ behaviour change * Post Friends level of influence for energy saving measures/behaviour change Crosstabulation

			Post Friends level of influence for energy saving measures/behaviour change					Total
			Not at all Influenced	Slightly influenced	Somewhat Influenced	Very Influenced	extremely Influenced	
Pre Friends level of influence for energy saving measures/ behaviour change	Not at all Influenced	Count	4	5	1	0	0	10
		% within Pre Friends level of influence for energy saving measures/ behaviour change	40.0%	50.0%	10.0%	0.0%	0.0%	100.0 %
		% within Post Friends level of influence for energy saving measures/behaviour change	100.0%	35.7%	7.7%	0.0%	0.0%	27.0%
		% of Total	10.8%	13.5%	2.7%	0.0%	0.0%	27.0%
	Slightly influenced	Count	0	8	6	0	0	14
		% within Pre Friends level of influence for energy saving measures/ behaviour change	0.0%	57.1%	42.9%	0.0%	0.0%	100.0 %
		% within Post Friends level of influence for energy saving measures/behaviour change	0.0%	57.1%	46.2%	0.0%	0.0%	37.8%
		% of Total	0.0%	21.6%	16.2%	0.0%	0.0%	37.8%
	Somewhat Influenced	Count	0	1	4	0	0	5
		% within Pre Friends level of influence for energy saving measures/ behaviour change	0.0%	20.0%	80.0%	0.0%	0.0%	100.0 %
		% within Post Friends level of influence for energy saving	0.0%	7.1%	30.8%	0.0%	0.0%	13.5%

		measures/behaviour change						
		% of Total	0.0%	2.7%	10.8%	0.0%	0.0%	13.5%
		Count	0	0	2	5	0	7
		% within Pre Friends level of influence for energy saving measures/ behaviour change	0.0%	0.0%	28.6%	71.4%	0.0%	100.0 %
	Very Influenced	% within Post Friends level of influence for energy saving measures/behaviour change	0.0%	0.0%	15.4%	100.0%	0.0%	18.9%
		% of Total	0.0%	0.0%	5.4%	13.5%	0.0%	18.9%
		Count	0	0	0	0	1	1
		% within Pre Friends level of influence for energy saving measures/ behaviour change	0.0%	0.0%	0.0%	0.0%	100.0%	100.0 %
	Extreamly Influenced	% within Post Friends level of influence for energy saving measures/behaviour change	0.0%	0.0%	0.0%	0.0%	100.0%	2.7%
		% of Total	0.0%	0.0%	0.0%	0.0%	2.7%	2.7%
		Count	4	14	13	5	1	37
		% within Pre Friends level of influence for energy saving measures/ behaviour change	10.8%	37.8%	35.1%	13.5%	2.7%	100.0 %
Total		% within Post Friends level of influence for energy saving	100.0%	100.0%	100.0%	100.0%	100.0%	100.0 %

measures/behaviour change						
% of Total	10.8%	37.8%	35.1%	13.5%	2.7%	100.0 %

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	11.571	4	.021
N of Valid Cases	37		

Pre Governments level of influence for energy saving measures/ behaviour change * Post Governments level of influence for energy saving measures/behaviour change Crosstabulation

			Post Governments level of influence for energy saving measures/behaviour change					
			Not at all influenced	Slightly Influenced	Somewhat Influenced	Very Influenced	extremely Influenced	Total
Pre Governments level of influence for energy saving measures/ behaviour change	Not at all Influenced	Count	4	2	0	0	0	6
		% within Pre Governments level of influence for energy saving measures/ behaviour change	66.7%	33.3%	.0%	.0%	.0%	100.0%
		% within Post Governments level of influence for energy saving measures/behaviour change	80.0%	11.8%	.0%	.0%	.0%	16.2%
	Slightly Influenced	Count	1	10	1	0	0	12
		% within Pre Governments level of influence for energy saving measures/ behaviour change	8.3%	83.3%	8.3%	.0%	.0%	100.0%
		% within Post Governments level of influence for energy saving measures/behaviour change	20.0%	58.8%	9.1%	.0%	.0%	32.4%
	Somewhat Influenced	Count	0	5	10	1	0	16
		% within Pre Governments level of influence for energy	.0%	31.3%	62.5%	6.3%	.0%	100.0%

		saving measures/ behaviour change						
		% within Post Governments level of influence for energy saving measures/behaviour change	.0%	29.4%	90.9%	33.3%	.0%	43.2%
	Very Influenced	Count	0	0	0	2	0	2
		% within Pre Governments level of influence for energy saving measures/ behaviour change	.0%	.0%	.0%	100.0%	.0%	100.0%
		% within Post Governments level of influence for energy saving measures/behaviour change	.0%	.0%	.0%	66.7%	.0%	5.4%
	extremely Influenced	Count	0	0	0	0	1	1
		% within Pre Governments level of influence for energy saving measures/ behaviour change	.0%	.0%	.0%	.0%	100.0%	100.0%
		% within Post Governments level of influence for energy saving measures/behaviour change	.0%	.0%	.0%	.0%	100.0%	2.7%
Total		Count	5	17	11	3	1	37
		% within Pre Governments level of influence for energy	13.5%	45.9%	29.7%	8.1%	2.7%	100.0%

	saving measures/ behaviour change						
	% within Post Governments level of influence for energy saving measures/behaviour change	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	4.000	3	.261
N of Valid Cases	37		

Cross tabulation and statistical analysis of individual Environmentally Responsible Behaviours (Question 8)

Pre child influence to switch lights off * Post child influence to switch lights off Crosstabulation

			Post child influence to switch lights off		
			Yes	No	Total
Pre child influence to switch lights off	Yes	Count	11	2	13
		% within Pre child influence to switch lights off	84.6%	15.4%	100.0%
		% within Post child influence to switch lights off	55.0%	6.9%	26.5%
	No	Count	9	27	36
		% within Pre child influence to switch lights off	25.0%	75.0%	100.0%
		% within Post child influence to switch lights off	45.0%	93.1%	73.5%
Total		Count	20	29	49
		% within Pre child influence to switch lights off	40.8%	59.2%	100.0%
		% within Post child influence to switch lights off	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.065[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to purchase energy saving lightbulbs * Post child influence to purchase energy saving lightbulbs Crosstabulation

			Post child influence to purchase energy saving lightbulbs		
			Yes	No	Total
Pre child influence to purchase energy saving lightbulbs	Yes	Count	4	0	4
		% within Pre child influence to purchase energy saving lightbulbs	100.0%	.0%	100.0%
		% within Post child influence to purchase energy saving lightbulbs	20.0%	.0%	8.2%
	No	Count	16	29	45
		% within Pre child influence to purchase energy saving lightbulbs	35.6%	64.4%	100.0%
		% within Post child influence to purchase energy saving lightbulbs	80.0%	100.0%	91.8%
Total		Count	20	29	49
		% within Pre child influence to purchase energy saving lightbulbs	40.8%	59.2%	100.0%
		% within Post child influence to purchase energy saving lightbulbs	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence closing curtains/conserving heat * Post child influence closing curtains/conserving heat Crosstabulation

			Post child influence closing curtains/conserving heat		
			Yes	No	Total
Pre child influence closing curtains/conserving heat	Yes	Count	1	0	1
		% within Pre child influence closing curtains/conserving heat	100.0%	.0%	100.0%
		% within Post child influence closing curtains/conserving heat	12.5%	.0%	2.0%
	No	Count	7	41	48
		% within Pre child influence closing curtains/conserving heat	14.6%	85.4%	100.0%
		% within Post child influence closing curtains/conserving heat	87.5%	100.0%	98.0%
Total		Count	8	41	49
		% within Pre child influence closing curtains/conserving heat	16.3%	83.7%	100.0%
		% within Post child influence closing curtains/conserving heat	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.016[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence leaving appliances on standby * Post child influence leaving appliances on standby Crosstabulation

			Post child influence leaving appliances on standby		
			Yes	No	Total
Pre child influence leaving appliances on standby	Yes	Count	1	0	1
		% within Pre child influence leaving appliances on standby	100.0%	.0%	100.0%
		% within Post child influence leaving appliances on standby	3.8%	.0%	2.0%
	No	Count	25	23	48
		% within Pre child influence leaving appliances on standby	52.1%	47.9%	100.0%
		% within Post child influence leaving appliances on standby	96.2%	100.0%	98.0%
Total		Count	26	23	49
		% within Pre child influence leaving appliances on standby	53.1%	46.9%	100.0%
		% within Post child influence leaving appliances on standby	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to recycle more * Post child influence to recycle more Crosstabulation

			Post child influence to recycle more		
			Yes	No	Total
Pre child influence to recycle more	Yes	Count	18	0	18
		% within Pre child influence to recycle more	100.0%	.0%	100.0%
		% within Post child influence to recycle more	52.9%	.0%	36.7%
	No	Count	16	15	31
		% within Pre child influence to recycle more	51.6%	48.4%	100.0%
		% within Post child influence to recycle more	47.1%	100.0%	63.3%
Total		Count	34	15	49
		% within Pre child influence to recycle more	69.4%	30.6%	100.0%
		% within Post child influence to recycle more	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to not drop litter * Post child influence to not drop litter Crosstabulation

			Post child influence to not drop litter		Total
			Yes	No	
Pre child influence to not drop litter	Yes	Count	13	0	13
		% within Pre child influence to not drop litter	100.0%	.0%	100.0%
		% within Post child influence to not drop litter	100.0%	.0%	26.5%
	No	Count	0	36	36
		% within Pre child influence to not drop litter	.0%	100.0%	100.0%
		% within Post child influence to not drop litter	.0%	100.0%	73.5%
Total		Count	13	36	49
		% within Pre child influence to not drop litter	26.5%	73.5%	100.0%
		% within Post child influence to not drop litter	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		1.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to walk to school/work * Post child influence to walk to school/work Crosstabulation

			Post child influence to walk to school/work		
			Yes	No	Total
Pre child influence to walk to school/work	Yes	Count	32	1	33
		% within Pre child influence to walk to school/work	97.0%	3.0%	100.0%
		% within Post child influence to walk to school/work	88.9%	7.7%	67.3%
	No	Count	4	12	16
		% within Pre child influence to walk to school/work	25.0%	75.0%	100.0%
		% within Post child influence to walk to school/work	11.1%	92.3%	32.7%
Total		Count	36	13	49
		% within Pre child influence to walk to school/work	73.5%	26.5%	100.0%
		% within Post child influence to walk to school/work	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.375[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to save water * Post child influence to save water Crosstabulation

			Post child influence to save water		
			Yes	No	Total
Pre child influence to save water	Yes	Count	2	0	2
		% within Pre child influence to save water	100.0%	.0%	100.0%
		% within Post child influence to save water	12.5%	.0%	4.1%
	No	Count	14	33	47
		% within Pre child influence to save water	29.8%	70.2%	100.0%
		% within Post child influence to save water	87.5%	100.0%	95.9%
Total		Count	16	33	49
		% within Pre child influence to save water	32.7%	67.3%	100.0%
		% within Post child influence to save water	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to save energy * Post child influence to save energy Crosstabulation

			Post child influence to save energy		Total
			Yes	No	
Pre child influence to save energy	Yes	Count	2	0	2
		% within Pre child influence to save energy	100.0%	.0%	100.0%
		% within Post child influence to save energy	11.1%	.0%	4.1%
	No	Count	16	31	47
		% within Pre child influence to save energy	34.0%	66.0%	100.0%
		% within Post child influence to save energy	88.9%	100.0%	95.9%
Total		Count	18	31	49
		% within Pre child influence to save energy	36.7%	63.3%	100.0%
		% within Post child influence to save energy	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to not drive as much * Post child influence to not drive as much Crosstabulation

			Post child influence to not drive as much		
			Yes	No	Total
Pre child influence to not drive as much	Yes	Count	22	0	22
		% within Pre child influence to not drive as much	100.0%	.0%	100.0%
		% within Post child influence to not drive as much	84.6%	.0%	44.9%
	No	Count	4	23	27
		% within Pre child influence to not drive as much	14.8%	85.2%	100.0%
		% within Post child influence to not drive as much	15.4%	100.0%	55.1%
Total		Count	26	23	49
		% within Pre child influence to not drive as much	53.1%	46.9%	100.0%
		% within Post child influence to not drive as much	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.125[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to grow own vegetables * Post child influence to grow own vegetables Crosstabulation

			Post child influence to grow own vegetables		
			Yes	No	Total
Pre child influence to grow own vegetables	Yes	Count	3	0	3
		% within Pre child influence to grow own vegetables	100.0%	.0%	100.0%
		% within Post child influence to grow own vegetables	17.6%	.0%	6.1%
	No	Count	14	32	46
		% within Pre child influence to grow own vegetables	30.4%	69.6%	100.0%
		% within Post child influence to grow own vegetables	82.4%	100.0%	93.9%
Total		Count	17	32	49
		% within Pre child influence to grow own vegetables	34.7%	65.3%	100.0%
		% within Post child influence to grow own vegetables	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	49	

a. Binomial distribution used.

Pre child influence to encourage wildlife to garden * Post child influence to encourage wildlife to garden Crosstabulation

			Post child influence to encourage wildlife to garden		
			Yes	No	Total
Pre child influence to encourage wildlife to garden	Yes	Count	5	0	5
		% within Pre child influence to encourage wildlife to garden	100.0%	.0%	100.0%
		% within Post child influence to encourage wildlife to garden	35.7%	.0%	10.2%
	No	Count	9	35	44
		% within Pre child influence to encourage wildlife to garden	20.5%	79.5%	100.0%
		% within Post child influence to encourage wildlife to garden	64.3%	100.0%	89.8%
Total		Count	14	35	49
		% within Pre child influence to encourage wildlife to garden	28.6%	71.4%	100.0%
		% within Post child influence to encourage wildlife to garden	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.004[a]
N of Valid Cases	49	

a. Binomial distribution used.

McNemar- Bowker test results for question 1-4

Q1

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	13.000	3	.005
N of Valid Cases	49		

Q2

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	12.000	7	.101
N of Valid Cases	49		

Q3

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	15.000	3	.002
N of Valid Cases	49		

Q4

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	20.286	5	.001
N of Valid Cases	49		

Appendix 3

Themes emerging from children's diaries

Core Theme 1	**Development of Environmental Knowledge and Skills**
Analytical codes	*Key themes*
Knowledge about the environment	**Basic environmental knowledge**
The associated problems with the environment	
Recalling/recounting what has been learnt	**Learning level**
Recounting lesson activities	
Prior Knowledge	
Gaining the verbal, mental and physical abilities needed to engage in targeted behaviours	**Action skills and ability to act**
Developed skills relevant to identifying, preventing and addressing environmental problems.	
	Personal interest
Positive experience of EEP	

Core Theme 2	**Positive Attitudes Towards the Environment**
Analytical codes	*Key themes*
Emotional tendencies –Environmental beliefs in line with environmental responsibility	**Moral beliefs**
Improved attitude towards nature and the built environment	
How they relate to their environment	
Sense of responsibility towards environment	**Individual responsibility**
How they can impact on their environment	
Newly formed responsibilities	

Core Theme 3	**Intention and Desire to act in an Environmentally Responsible Way**
Analytical codes	*Key themes*
Intention to act in a specific way towards the environment	**Intention to want to help the environment**
Accomplish a goal that fosters environmental protection or improvement	
Mental intent to do something	
Sense of Responsibility Towards the Environment	
A need for Improvement and Investment in Energy Efficiency Measures	
Desire to carry out an environmentally responsible behaviour	**Desire & Ideologies**
Whole society approach	
Desire to help others understand the need for environmental change	
Core Theme 4	**Behavioural and Lifestyle Changes**
Analytical codes	*Key themes*
Acting in a way that benefits the environment	**Active lifestyle changes**
Change of lifestyle habit-simple lifestyle changes	
Evidence of Household Improvement and Investment in Energy Efficiency Measures	
Participating in restoration activities outside school	**Participation in environmental activities**
Taking action aligned with environmental protection	

Child playing a role of active citizen.

Core Theme 5	**Influences and Change within Family Unit**
Analytical codes	*Key Themes*
Family conversations about the environment-to increase knowledge/ awareness	**Family Conversation**
Children advocating lifestyle changes for all the family	**Advocating for environmental change and participation within family unit**
Children promoting participation in environmental activities for all the family	
Environmental discipline within family unit	