Education for sustainability
Investigating pro-environmental orientation in 10-12 year olds in UK schools

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MA thesis for Environment and Natural Resources
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Abstract

This thesis asserts that at the root of our ‘unsustainable behaviour’ are our values. Based on current value-behaviour theory, this thesis argues that in order to live sustainably we need to foster a ‘frame of mind’, which is based on intrinsic values that widen and deepen our boundaries of concern. We need to become ‘pro-environmentally orientated’.

Schools and education are known to have an impact on an individual’s values. There is currently a plethora of education for sustainable development (ESD) practices prevalent in the UK that aim to encourage pro-environmental attitudes and behaviour, but what are the levels of pro-environmental orientation of students receiving different ESD provision? Further, what are the characteristics of ESD provision that correspond to higher pro-environmental orientation?

Seven UK schools took part in a questionnaire-based study that assessed 10-12 year old students’ level of pro-environmental orientation using an adapted New Ecological Paradigm (NEP) scale. School ESD provision was assessed through two questionnaires derived from the SEED/ENSI Quality Criteria for ESD-Schools, observational field notes and school documents.

The results suggested schools that reinforce intrinsic values have students with higher levels of pro-environmental orientation. However, the results also emphasised the complexity of value-behaviour theory and the influence of confounding variables. The findings imply the need for current ESD practice in the UK to be re-examined in terms of value-behaviour theory. In addition, there is a need for a more in depth study of the influence of intrinsic values and the presentation of sustainability as a frame of mind, on the environmental orientation of students.
Útdráttur

Þessi ritgerð færir rök fyrir því að rætur ‘ósjálfbærrar hegðunar’ séu þau gildi sem við hófum. Ég byggi á kenningu um tengsl gilda og hegðunar og færi ég rök fyrir því að til að lífa með sjálfbærum hætti verðum við að taka upp hugarfar sem byggir á innri gildum sem víkka út og dýpka mörk þess sem við látum okkur varða. Afstaða okkar verður að vera umhverfisvæn.

Skólar og menntun hafa áhrif á þau gildi sem nemendur hafa. Í dag má finna fjölmargar leiðir í menntun til sjálfb ærrar þróunar (ESD) í skólum í Bretlandi sem miða að því að hvetja til umhverfisvænna viðhorfa og hegðunar. En hvaða áhrif hafa ólíkar leiðir á afstöðu nemenda til umhverfisins? Og ennfremur, hvað einkennir þær leðir í sjálfbær nimenntunum sem virðast stuðla að jákvæðastri umhverfisvitund?

Sjö skólar í Bretlandi tóku þátt í rannsókn þar sem notaðir voru spurningalistar byggðir á New Ecologica Paradig (NEP) til að meta hversu umhverfisvæn viðhorf 10–12 ára nemenda væru. Leðir skólanna í menntun til sjálfbærni voru metnar með tveimur spurningalistum sem byggðir voru á SEED/ENSI Gæðaviðmiðum fyrir ESD-skóla, vettvangsnótum og gögnum frá skólunum.

Dedication

For my parents, who sowed the seeds of my own pro-environmental orientation, and who have supported me in wherever it has led me.
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1 Introduction

1.1 Planet Earth

We are in a race between education and catastrophe (H.G. Wells).

Humans are placing Earth’s ecological systems under unprecedented strain - population growth, climate change, species extinction and habitat loss; the continuous decline of the health of the seas and oceans; soil erosion and pollution are now threatening the stability of the world’s ecosystems and our very existence (Vig, 2005; Moran, 2006; Orr, 2004). Clearly, business as usual is not an option. This thesis argues that we need to reassess how we relate to nature and planet earth, to learn how to live in such a way as to allow the continuing co-evolution of human and non-human nature (Huckle, 2006, p. 5).

This thesis begins with a brief discussion of sustainability and education (section 1.2) – how sustainable development and education for sustainable development (ESD) have emerged, the basics of what ESD entails, and how ESD relates to environmental education. This is then followed by a look at calls for a deeper shift in education, and in how humankind relates to and values nature (section 1.3). This is supported by an exploration of how our basic values relate to sustainability and sustainable behaviour and what current value theory implies for ESD (Chapter 2). Current UK ESD practice is then briefly outlined (section 2.4). Chapter 2 ends with stating the primary questions this thesis seeks to address, as well as an outline for the remainder of the thesis (section 2.5).

1.2 Background - Sustainability and education

1.2.1 Education for sustainable development (ESD)

Back in 1983, the World Commission on Environment and Development (WCED) was convened by the United Nations in response to the growing amount of evidence of the environmental decline in the world’s ecosystems. This resulted in the publication of Our Common Future (also known as the Brundtland report) in 1987, which defined ‘sustainable
development’ as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 43).

Since the publication of the report, numerous conferences and meetings have taken place regarding sustainable development e.g. the 1992 Earth summit, which resulted in the Rio declaration and Agenda 21 – international agreements and blueprints for local action on the environment and sustainable development. Consistently throughout these discussions and reports, education is seen as a prominent tool in achieving sustainability e.g. Chapter 23 of Agenda 21 states:

Both formal and non-formal education are indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making (UNDSD, 2009, Paragraph 36.3, Agenda 21).

The UN considers education one of the key means of implementing sustainable development and in 2002, the World Summit on Sustainable Development proclaimed 2005-2014 the Decade of Education for Sustainable Development (DESD), and designated UNESCO as the lead agency for its promotion. UNESCO has stressed that in order to address the social, economic, cultural and environmental problems we face in the 21st century, we need to integrate Education for Sustainable Development (ESD) into all education and learning (UNESCO, 2010a). The UNESCO website for the DESD details “themes” of ESD: Sustainable Urbanization, Sustainable Consumption, Peace and Human Security, Rural Development, Cultural Diversity, Gender Equality, Health Promotion and Environment (UNESCO, 2010b). The DESD also seeks to promote education that involves:

- Interdisciplinary and holistic learning rather than subject-based learning
- Values-based learning
- Critical thinking rather than memorizing
• Multi-method approaches: word, art, drama, debate, etc.

• Participatory decision-making

• Locally relevant information, rather than national

Although there are different definitions and approaches to ESD, there are several common themes that reoccur again and again in both the literature and in practice:

• Democracy, equality and respect: In order to achieve sustainability, citizens must be equipped to be active and participate in decision-making. ESD must prepare students for their future role in society by encouraging participation, self-governance, as well as actively practicing democracy - including developing respect for differing opinions and the ability to share decision-making in an atmosphere of conflicting interests. Respect for others should extend towards other students, other individuals, other cultures and the environment.

• Approaches to teaching: If the aim of ESD is to prepare students to live sustainably, it must enable students to construct their own learning and develop their own ideas, values and perspectives. Experiential, problem-based and co-operative learning approaches encourage the development of the knowledge and skills for living sustainably.

• Subject matter, skills and values: Students need to acquire the knowledge to make informed decisions. However, with an unforeseeable future, it is perhaps more important to learn the skills to acquire knowledge, in order to continue learning. In ESD, subject matter can be tailored to the issue or problem being addressed. It is often helpful to have cross-disciplinary projects that highlight the complexity, interconnectedness and conflicting nature of many ESD topics. ESD must also develop the skills and values needed to live sustainably, by learning through real-life situations e.g. a local environmental issue or a global human rights problem; and learning both actively (e.g. participating in change in the school or community) and through theoretical problems. ESD should focus on past, present and future issues in order for students to be fully informed and also become creative problem solvers.
• School climate: Schools should aim to embrace sustainability, to ‘practice what they preach’ - not only in order to be more sustainable themselves, but also because the school itself can form a large part of the learning experience. By involving the whole school: students, teachers, non-teaching staff and parents; the values and skills for sustainability can be lived, practiced experienced and learnt each school day. Breiting, Mayer & Mogensen (2005, p. 37) suggest that the school climate should be such ‘that every one feels that she/he can contribute with innovative ideas and proposals without fear’ e.g. where the school community collectively decides what actions to take to improve its sustainability.

• Community and society: ESD is not limited to schools and should be developed in local communities, in businesses and institutions, and the way society is structured generally. In terms of the school however, involvement in the community through case studies or collaborations can be memorable learning experiences. Linking education to the locality can make learning more meaningful. It can also provide opportunities for enacting actual change e.g. creating a public nature-based recreation space, or lobbying the local council to install more bike racks in the town centre. Also, in this way, sustainability is brought from the school into the community and made visible and relevant.

1.2.2 How environmental education has evolved

The battle against environmental degradation is not new - ESD clearly has strong links with environmental education (EE). In many instances, ESD has amalgamated EE with human rights education, cultural diversity education, citizenship education, etc. When looking at the current focus in ESD, it is useful to understand how the emphasis of EE has changed over time.

In most western, industrialised nations, the approach to EE has developed over time (Figure 1) moving from an emphasis on knowledge towards action competence (see also Kollmuss & Agyeman 2002, p. 241). Breiting (2000) described how it became apparent that teaching merely the facts of environmental problems and ecology (‘a’ Figure 1) did not seem to have the desired affect on actions, or behaviour - there was too little focus on how to actually deal with the issues; on practical solutions (Sterling, 2009, p. 19).
Approach ‘b’ (Figure 1) was introduced to provide a more practical basis to environmental issues, but was limited by its prescriptive quality – how can you teach for environment problems in an unknowable future? The approach seen in ‘c’ (Figure 1) is that which is the most prevalent in current ESD literature e.g. that of DESD, with a focus on developing the learner’s democratic skills, attitude and engagement related to environmental issues.

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No problem can be solved from the same consciousness that created it. We have to learn to see the world anew (Einstein).
In official state documents, Sustainable Development is often divided into ‘sections’ or ‘targets’ e.g. sustainable building regulations or renewable energy targets. Huckle (2006, p. 26) comments that the “philosophy underpinning dominant (modern) approaches to sustainable development [is] based on associated forms of science and management”, which suggests an undertone of what Orr criticised as attempting to manage planet Earth (2004, p. 9). Bonnett makes an interesting point in this regard when discussing ESD:

If we are to enable pupils to address the issues raised by sustainable development rather than preoccupy them with what are essentially symptoms masquerading as causes, we must engage them in those kinds of enquiry which reveal the underlying dominant motives that are in play in society; motives which are inherent in our most fundamental ways of thinking about ourselves and the world (Bonnett, 2002, p. 19).

Supportive of this view, Huckle (2006, p. 5) remarks that ESD is “too reluctant to examine the real causes of unsustainable development that lie within modern institutions and ideas”, the sense being that at the root of unsustainable development is the human-environment relationship.

Bonnett (2003, p. 683) argues that sustainability involves a “frame of mind”. Huckle (2006, p. 5) too argues that we must foster “sustainability as a frame of mind underpinned by values that support the development of both human and non-human nature”. To be sustainable requires a particular awareness, outlook and ethical basis. In the words of David Orr (2004, p. 27): “The crisis we face is first and foremost one of mind, perception, and values”. It can be argued that sustainability is based on values, which lead to sustainable behaviours and lifestyles. Sustainability in terms of behaviours and lifestyles will vary with situation, with society and environment, but the basic values will be essentially the same. Koichiro Matsuura declared that for him sustainable development is “a moral principle as much as it is a scientific concept” (UNESCO, 2004, as cited in Schreiner, Henriksen and Hansen, 2005). Working groups at the SEED conference on building capacity and empowerment in students agreed:
Emotions, aesthetics and feelings are all involved in actions, and therefore it is important that these are part of ESD. Empathy and solidarity are key notions in relation to SD which is why ESD is not only a cognitive process (Jensen, 2005, p. 16).

In his book on Sustainable Education, Stephen Sterling warns against ESD simply being an ‘add-on’ to education in its current form. The dominant aims and roles of modern western industrialised education are ‘instrumentalist’ and ‘managerialist’, based on the perceived demands of a globalized economy (Sterling, 2009, p. 27). Modern western industrialised education is based on the development of vocational qualities i.e. knowledge and skills for the workforce. Sterling argues that the current mechanistic education paradigm “overlaid by a utilitarian market philosophy, cannot much assist us towards sustainable lifestyles” (2009, p. 17). Similarly, Orr (2004, p. 12) states that the world does not need more “successful people” but more people who “live well in their places” and “of moral courage willing to join the fight to make the world habitable and humane”.

What is needed, Sterling (2009) proposes, is a totally new educational paradigm, one that is based on ecological and ‘whole systems thinking’, one that asserts both humanistic and ecological values and one that emphasises participation, empowerment and self-organisation. Sterling explains that education based on an ecological paradigm must “widen and deepen our boundaries of concern” by encouraging students to include the ‘other’ (neighbours, communities, environments) in their thinking, and develop a view which recognises that “human and natural systems are co-dependent and co-determining” (2009, p. 53). Orr (2004, p. 30) states that we need to foster “ecological intelligence” which has a broad view of the world and a long-term perspective, instead of the highly specialised, narrowly focussed, short-term cleverness that has been encouraged by industry and capitalism. Sterling claims that learning “is the change of mind on which change towards sustainability depends; the difference in thinking that stands between a sustainable or chaotic future” (2009, p. 12).
2 Values and ESD

Related to the arguments for ‘sustainability as a frame of mind’ are current ideas in value and behaviour theory. Chapter 2 will look at current theories regarding values and how they are thought to affect behaviour, and what this implies for ESD. Section 2.1 explains current value-behaviour theory – how values affect behaviour. Section 2.2 examines values in more detail – how they interact, how they relate to our goals, how they are engaged and how they can be strengthened. Section 2.3 discusses what this knowledge means for ESD.

2.1 Value-behaviour theory

A report by the Public Interest Research Centre (PIRC) states that “values represent our guiding principles: our broadest motivations, influencing the attitudes we hold and how we act” (Holmes et al., 2011, p. 8). The authors argue that social and environmental concern and action are based on more than simply access to the facts, and “both seem to be motivated above all by a particular set of underlying values” (Holmes et al., 2011, p. 9). This reflects the development of the EE movement discussed in Section 1.2.2 - simply providing knowledge does not result in changed behaviour (Crompton, 2010; Kollmuss & Agyeman, 2002).

Values can be described as deeply rooted, abstract motivations that act as guiding principles in people’s lives (Schwartz, 2007). They can also be seen as referring to goals e.g. social equity, fairness and helpfulness are all values. Values transcend specific situations or actions, e.g. honesty is relevant in many different situations. This ‘trans-situational’ quality distinguishes values from narrower concepts like norms, attitudes and opinions - concepts that usually refer to specific actions, objects, or situations (Schwartz, 2007).

Our values have been shown to influence our attitudes e.g. our political persuasions; whether and how far we think companies should be accountable for their social and environmental impacts; how concerned we are about environmental damage; as well as influencing our behaviour e.g. our career choices; how much we walk or cycle; how empathetic we are; our purchasing decisions – how much we spend and on what; and whether and how far we behave altruistically (Holmes et al., 2011;
Schwartz, 2011). There is a wide range of influences that affect individuals in particular moments as well as across entire lifetimes e.g. past experience, cultural and social norms, and the money at our disposal. However, our values are a fundamental guiding force - abstract ideals, such as equality, social justice, wealth, unity with nature, that shape our thoughts and attitudes, as well as our actions and behaviour (Holmes et al., 2011).

Exactly how values, attitudes, behaviour and other influences interact to form pro-environmental or sustainable individuals remains unclear. Various theories have been developed in this regard, predominantly from within the psychology and behavioural science field. Stern (2000, pp. 411-412) reviewed various theories relating to what he called the ‘determinants of environmentalism’. Stern defined environmentalism as the “propensity to take actions with pro-environmental intent” (2000, p. 411). He reported three main existing theories:

- Environmentalism as worldview: Some behavioural theorists consider environmentalism as a matter of worldview. The most prominent example in social psychology of an environmental worldview is the New Ecological (originally ‘New Environmental’) Paradigm (NEP). The NEP was envisioned during the 1970s, when it was argued that at the root of environmental problems were our fundamental views about nature and our relationship to it (Dunlap et al., 2000, p. 427). The prevalent values or system of thought within modern industrialised societies e.g. commitment to abundance, progress, prosperity, individualism, etc.; were seen to be resulting in a negative impact on the environment. The standard values, attitudes and beliefs, widely held throughout society can be described as being elements of the Dominant Social Paradigm (DSP) of the time. However, during the 1970s it was suggested that a new alternate worldview was emerging, which challenged the DSP by rejecting the anthropocentric notion that nature has no value beyond human use and acknowledged that modern industrialised societies were disrupting ecosystems and exceeding ecological limits – this new worldview was named the NEP (Dunlap & Van Liere, 1978; Dunlap et al., 2000; Manoli et al., 2007). Some behavioural theorists suggest that by adopting this NEP worldview, individuals become pro-environmentally orientated, becoming more inclined to act environmentally.

- Environmental concern and behaviour linked to general theories of values: Some behavioural theorists suggest values form the basis of
environmentalism. Research has found that self-transcendent or altruistic values (values that focus a person’s concern beyond their immediate social circle) are stronger among people who engage in pro-environmental activities. Conversely, environmental concern has been found to be less evident in individuals with individualistic or competitive social orientations.

• Theories of altruistic behaviour/ Norm activation theory: Altruistic behaviour theories have also been utilised to try to explain environmentalism. Altruism can be defined as the concern for, or the caring about, the welfare of others. Therefore, ensuring environmental quality for all can be seen as altruistic. Moral norm-activation theory proposes that altruistic behaviour (including pro-environmental behaviour) occurs in response to personal norms that are activated in individuals who believe that particular conditions pose threats to others (awareness of adverse circumstances, or AC) and that actions they could initiate could advert those consequences (ascription of responsibility to self, or AR).

Based on these theories, Stern (2000) and colleagues developed the ‘Value-belief-norm’ theory of environmentalism (p. 412), which combines values theory with both norm-activation theory and the NEP perspective. In simple terms, Stern’s theory postulates that values affect beliefs, which in turn influence our personal norms – in this case, our sense of obligation to take pro-environmental actions. This sense, or ‘norm’, creates a personal disposition that influences all kinds of behaviour taken with pro-environmental intent (see Figure 2 below).
**Figure 2 Value-belief-norm theory of environmentalism, adapted from Stern (2000, p. 412)**

Arrows represent postulated direct effects. Direct effects may also be observed on variables more than one level downstream from a causal variable. 

a. Biospheric values can be equated with biocentric values (ethics relating to the inherent value of non-human species) 

b. Measures of egoistic values have been negatively correlated with indicators of environmentalism.
However, behaviour-specific norms and other social-psychological factors (e.g. perceived costs and benefits of action, beliefs about the efficacy of particular actions) can affect particular pro-environmental behaviours (Stern, 2000, p. 413). This can be explained by an adapted ‘ABC theory’: Behaviour (B) is an interactive product of personal-sphere attitudinal variables (norms, beliefs and values) (A) and contextual factors (C) (Stern, 2000, p. 415; see also Figure 3 below). When contextual factors are neutral the association between attitude and behaviour is strongest. It approaches zero however when contextual forces are strongly positive or negative, “effectively compelling or prohibiting the behaviour in question” (Stern, 2000, p. 415). For behaviours that are more difficult, time-consuming or expensive, the less attitudinal factors seem to influence them. Other factors affecting behaviour are personal capability (the person’s actual ability to perform a behaviour) and habit or routine (Stern, 2000, p. 415).

![Figure 3 Adapted ABC model of behaviour, adapted from Stern, 2000, p. 415](image)

In their paper ‘Mind the Gap – why do people act environmentally and what are the barriers to pro-environmental behavior?’ in which the authors review numerous theories on pro-environmental behaviour, Kollmuss & Agyeman (2002) state that “values and attitudes clearly play an important role in determining pro-environmental behaviour” (p. 253). However, their proposed ‘Model of pro-environmental behavior’ (p. 257), which depicts interactions between values, knowledge, emotions, personality, habit, as well as social, cultural and economic influences (to name a few), demonstrates the complexity of, as well as the uncertainty surrounding, the process leading to pro-environmental behaviour.
In summary, current thinking in value-behaviour theory places values at the base of environmentalism and pro-environmental behaviour, as demonstrated by Stern’s (2000) value-belief-norm theory described above. However, the process that leads to pro-environmental behaviour is a complex one, influenced by many factors. What can be taken from the current understanding is that all else being equal, the extent that an individual holds pro-environmental values will determine how pro-environmental that individual will act. Therefore it should follow that fostering pro-environmental values in individuals is likely to increase their pro-environmental behaviour.

2.2 Value interactions

This section will look at values in more detail - how they are thought to interact with each other, how they relate to our goals and how they can be engaged and strengthened.

2.2.1 A dynamic system

Research has shown that concern and behaviours related to problems such as biodiversity loss, human rights and sustainability, are all associated with a set of related values (Holmes et al., 2011, p. 42). Psychologists identified a number of consistently occurring human values, which tend to cluster in remarkably similar ways across cultures (Crompton, 2010, p. 9). Some values were unlikely to be prioritised strongly at the same time by the same individual; others were often prioritised strongly at the same time (Schwartz, 1994). Crompton (2010, p. 9) remarks: “A person’s values comprise an integrated and dynamic system, such that activating one particular value affects other values (activating compatible values and suppressing opposing values)”. The relationships between values were mapped according to their associations, shown in Figure 4 below. The closer any one value ‘point’ is to another, the more likely that both will be of similar importance to the same person. By contrast, the further a value is from another, the less likely that both will be seen as similarly important. Every person will hold each value to some extent, but they will in general tend to prioritise one over the other. Values can thus be said to have neighbours and opposites (Holmes et al., 2011, p. 12). Based on these patterns of association - as well as their broad similarities - the values were then classified into ten groups (Holmes et al., 2011, p. 12), as seen in the coloured sections and corresponding labelled boxes in Figure 4 and in Table 1 below.
Table 1 Value groups, adapted from Holmes et al., 2011, pp. 14-15

<table>
<thead>
<tr>
<th>Value Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIVERSALISM</td>
<td>Understanding, appreciation, tolerance and protection for the welfare of all people and for nature.</td>
</tr>
<tr>
<td>BENEVOLENCE</td>
<td>Preservation and enhancement of the welfare of people with whom one is in frequent personal contact.</td>
</tr>
<tr>
<td>TRADITION</td>
<td>Respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide the self.</td>
</tr>
<tr>
<td>CONFORMITY</td>
<td>Restraint of actions, inclinations and impulses likely to upset or harm others and violate social expectations or norms</td>
</tr>
<tr>
<td>SECURITY</td>
<td>Safety, harmony and stability of society, of relationships, and of self.</td>
</tr>
<tr>
<td>POWER</td>
<td>Social status and prestige, control or dominance over people and resources.</td>
</tr>
<tr>
<td>ACHIEVEMENT</td>
<td>Personal success through demonstrating competence according to social standards</td>
</tr>
<tr>
<td>HEDONISM</td>
<td>Pleasure and sensuous gratification for oneself.</td>
</tr>
<tr>
<td>STIMULATION</td>
<td>Excitement, novelty and challenge in life.</td>
</tr>
<tr>
<td>SELF-DIRECTION</td>
<td>Independent thought and action – choosing, creating, exploring.</td>
</tr>
</tbody>
</table>

The main features of values and their interaction can be summarised (adapted from Holmes et al., 2011, pp. 18-19):

- Values are universal - values are not character types and each of us is motivated by each value, but to differing degrees.

- Engaging values - Values can be temporarily ‘engaged’, when brought to mind by certain experiences, situations or communications, which in turn tends to affect our attitudes and behaviours e.g. if a person is reminded of benevolence values, they
are more likely to respond positively to requests for help or donations.

• The bleed-over effect - Values that appear next to each other in the value map (Figure 4) are more likely to be prioritised to the same extent by a person. Also, when one value is temporarily engaged, it tends to ‘bleed over’, strengthening neighbouring values and associated behaviours. This relationship can produce some surprising results. People reminded of generosity, self-direction and family, for example, have been found to be more likely to support pro-environmental policies than those reminded of financial success and status (Maio et al., 2009).

• The seesaw effect - Values on opposite sides of the value map (Figure 4) are rarely held strongly by the same person. When one value is temporarily engaged, opposing values (and behaviours associated with them) tend to be suppressed. As with a seesaw, when one value rises, the other tends to fall.
Figure 4 Values map - neighbours and opposites (Holmes et al., 2011, p. 13)
2.2.1.1 Intrinsic vs. extrinsic goals

Another way to think about our values is to look at how they relate to our goals. Our goals are a way of measuring and categorising the things we aim for in our lives. Like values, goals can also be grouped according to the compatibilities and conflicts between them (Kasser et al., 2005). Two of these groupings - intrinsic and extrinsic - are similar to the self-transcendence and self-enhancement value groupings (see Figure 4 and Table 1). Extrinsic values are centred on external approval or rewards; intrinsic values on more inherently rewarding pursuits (see Table 2 below).

Table 2 Intrinsic vs. extrinsic values, adapted from Holmes et al., (2011, p. 21)

<table>
<thead>
<tr>
<th>INTRINSIC – values that are inherently rewarding to pursue</th>
<th>EXTRINSIC – values that are centred on external approval or rewards</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. affiliation to family and friends, connection with nature, concern for others, self-acceptance, social justice, creativity.</td>
<td>e.g. wealth, material success, concern about image, social status, prestige, social power, authority.</td>
</tr>
</tbody>
</table>

2.2.1.2 Changing values and strengthening values

Researchers have proposed that one way in which values become strengthened is through their repeated engagement or ‘activation’ (Holmes et al., 2011, p. 30; Crompton, 2010, p. 11). This means that throughout our lives, our values are constantly being shaped by our experiences e.g. time spent in forests and parks may promote appreciation for nature and other intrinsic values (Holmes et al., 2011, p. 30).

Particular values can also be strengthened by our exposure to them through various aspects of our society such as influential peers, in the media, and in education e.g. extrinsic values/goals may be strengthened through a competitive work/education environment; and advertising appealing to status, success, and fashion culture (Holmes et al., 2011, p. 30; Crompton, 2010, p. 11). In relation to ESD, Holmes et al., (2011, p. 30) remark:
A classroom in which the setting is open and accepting of different viewpoints, students are treated as equals, and independence is encouraged may reinforce intrinsic values. In contrast, one which prioritises unquestioning respect for the teacher’s authority and is heavy on penalties is likely to engage security, tradition and conformity values.

Paul Hart (2000) researched teachers’ and children’s participation in environmental education, and commented that schools could be seen as micro-societies that teach children, explicitly and implicitly, about the way the world works and their place in it. Hart remarked that environmental education is about grounding students’ learning in basic virtues such as respect, responsibility and caring. Crompton (2010, p. 35) commented that people tend to attach more importance to the values of those around them e.g. parents, teachers and peers. Therefore, it seems that the underlying values, or ethos, of the school and classroom are highly influential in terms of students’ value development and linked behaviour.

2.3 Implications of value theory for ESD

The implications of the findings described above are central to the practice of education towards sustainability, and towards more sustainable peoples and behaviours. The values experienced by students in education have a direct impact on their own values. Bonnett (1997) commented that central to environmental education are the attitudes and values embedded in classroom practices and resources.

In determining a person’s concern about ‘bigger-than-self’ problems (e.g. climate change, social justice, environmental issues) the research seems to suggest that the relative importance an individual attaches to extrinsic as opposed to intrinsic values is important (Crompton, 2010, p. 10). Exposure to intrinsic values strengthens not only the particular value being engaged e.g. social justice, but also the ‘neighbouring’ values e.g. protecting the environment, equality and peace (see Figure 4 above). Therefore, given how important values seem to be in determining behaviour, reinforcement of intrinsic values should be central to ESD. Being that activation of extrinsic values reinforces them also, a whole school approach towards a focus on intrinsic values, in addition to classroom and individual practices, seems necessary. This of course links to the idea of ‘sustainability as a frame of mind’ (see section 1.3) with an awareness of the basis of unsustainable behaviour and the underlying motives and philosophy of our societies.
2.3.1 The importance of knowledge and action competence

Of course, knowledge and skills building are a vital too – knowing the facts and having the ability to act are essential for pro-environmental behaviours e.g. Stern gives the example that “many people in the United States believe that avoiding the use of spray cans protects the ozone layer, even though ozone-destroying substances have been banned from spray cans for two decades” (2000, p. 408). Although these people are acting with pro-environmental intent, and indeed believe that they are behaving pro-environmentally, they are limited by a lack of knowledge, or at least out-dated knowledge, and their behaviour actually has no specific pro-environmental consequences.

In terms of Stern’s ‘Value-belief-norm’ theory (see section 2.1), knowledge would seem to link to the belief of ‘Adverse effects to valued objects’. In other words, we need factual knowledge, awareness, in order to form the beliefs that influence our actions. Similarly, the belief labelled ‘Perceived ability to reduce threat’ links to the idea of action competence and also ideas in ESD regarding problem solving and solutions – without the skills and tools to address these problems and issues, people are likely to become apathetic, pessimistic, or feel powerless. Stern (2000, p. 414) also states “Environmentalist personal norms and the predisposition to proenvironmental action can be influenced by information that shapes these beliefs”. The importance of knowledge is further supported by Kollmuss & Agyeman (2002). Crompton (2010, p. 8) remarked: “Active public engagement with these problems is of crucial importance”. Action competence is linked not only to the ability to affect specific issues e.g. through lobbying governments or business for change, but also to the ability to influence the values prevalent in society.

Schreiner, Henriksen & Hansen (2005) argued against the idea that education should be limited to equipping student with knowledge and skills, and leaving it up to the students themselves to decide how to apply them; that some values such as equity, human rights and environmental protection should be universal. In their view, ‘empowerment’ is a prerequisite for action and includes content-specific knowledge and cognitive skills, as well as motivational patterns and personal value orientations (Schreiner et al., 2005). Stern reported (2000, p. 419) that “By far the most effective behaviour change programmes involve combinations of intervention types” e.g. a combination of moral
approaches that appeal to values and aim to change worldviews, 
education to change attitudes and provide information, rewards and 
penalties for behaviours, community management, shared views and 
expectations.

2.3.2 Focussing on values in ESD

Although ‘development of values’ is often mentioned in ESD literature 
(UNESCO, 2010a; UNESCO, 2010b; Breiting et al., 2005; Bennedict, 1991), 
it is not clear what this actually means, or how this should be approached 
or taught. Although there is a general sense that values play a role in 
sustainability, in creating sustainable citizens, educators appear unclear on 
exactly how values play a role, or how to approach teaching them. The 
lack of literature on value education as part of ESD is perhaps potentially 
due to the lack of a definite understanding on value acquisition. The 
complexity of value acquisition makes the task of determining how to 
teach or foster the development of pro-environmental/pro-sustainability 
values daunting. However, it is an undeniable factor in decision-making 
and needs to be addressed far more sufficiently. As Holmes et al. (2011, p. 
59) state: “If values are as important as the evidence suggests, we cannot 
afford not to work to strengthen intrinsic values”. Intrinsic values, that are 
commonly held, need to be brought to the forefront of education, and 
society more generally. Maio (2011, p. 5) cautions that “People are not 
always motivated and able to link their abstract values to particular 
actions” and values compete with each other for attention e.g. intrinsic vs. 
extrinsic, therefore education needs to foster a frame of mind where 
intrinsic values and concerns are readily accessible and constantly 
reinforced and strengthened.

Crompton (2010, p. 13) states that there is no such thing as ‘value-
neutral policy’ and Orr (2004, p. 12) similarly argues: “all education is 
environmental education ... by what is included or excluded”. By not 
attempting to foster intrinsic values, by focussing on education as a means 
of ensuring ‘success’ in the market place or academia, many current 
educational institutions continue to strengthen extrinsic values – values 
that have been linked to unsustainable behaviour (Crompton, 2010; 
Holmes et al., 2011; Maio, 2011; Stern, 2000).

2.4 ESD in UK schools – current practice

There is a growing movement among concerned educators towards a 
more ecological, sustainable and holistic education. Sterling (2009, p. 63)
commented that there already exist schools and movements that incorporate a more integrative conception of education, many of which are based on the theories of educational thinkers and philosophers e.g. Rudolph Steiner and John Dewey. In mainstream schools, movements such as the Eco-schools initiative have gained popularity in recent years, schools are working with NGOs on sustainability issues, and many schools now have a sustainable development policy.

This section will briefly look at some of the more visible or established ESD practices, and related practices, in UK schools. The purpose of this section is not to give a detailed account of all current ESD practices in the UK, but to give a general overview. The UNECE acknowledged “as values, lifestyles and attitudes are established from an early age, the role of education is of particular importance for children” (UNECE, 2005, p. 5), with this in mind, this thesis will focus on ESD in UK schools. However, as value theory proposes, values continue to be shaped and strengthened by life experiences and the values promoted around us, it is therefore vital that value education permeates all parts of society.

2.4.1 The UK Government and ESD

The current coalition government’s approach to ESD is based on “the belief that schools perform better when they take responsibility for their own improvement” (Department for Education, 2011). The Department for Education’s website states “We want schools to make their own judgements on how sustainable development should be reflected in their ethos, day-to-day operations and through education for sustainable development” (ibid). At the base of the short paragraph on the website detailing the extent of the government’s involvement in UK ESD there is a link to the previous government’s National Framework for Sustainable Schools.

2.4.1.1 National Framework for Sustainable Schools

The UK sustainable schools initiative outlines the practical aims of ESD in terms of actions individual schools can take. It simplifies this to two main objectives: To develop:

1. A commitment to care

2. An integrated approach to its improvement

The sustainable schools initiative explains that:
Sustainable schools have a caring ethos – care for oneself, for each other (across cultures, distances and generations) and for the environment itself (far and near) ... a sustainable school takes an integrated approach. It explores sustainable development through its teaching provision and learning (curriculum); in its values and ways of thinking (campus); and in its engagement of local people and partners (community) (DCSF, 2009).

The initiative offers eight “doorways”, or topics, through which schools can establish or develop their sustainability practices (Sustainability and Environmental Education, 2011):

- Food and drink
- Building and grounds
- Energy and water
- Inclusion and participation
- Travel and traffic
- Local well-being (community)
- Purchasing and waste
- Global dimension

The first five, starting with the left column, could be seen as predominantly developing a more sustainable school campus, but also these developments could be used to encourage student inclusion, participation and action, as well as involving the community e.g. through the promotion of recycling or introducing a CO2 reducing travel plan. The initiative appears to be both topic/issue based and action based i.e. the school community changes its own environment to a more sustainable one, which in turn educates the students by ‘learning through doing’. The approach also uses case examples in the curriculum to show interconnectedness and the global dimension. The initiative hopes that
these ‘actions’ will help develop sustainable ‘values and ways of thinking’ (DCSF, 2009).

2.4.2 NGOs and initiatives

2.4.2.1 Eco-schools

Eco-Schools is an international award programme that provides a framework for schools to become more sustainable and helps to embed the principles of sustainability into the heart of school life. The programme focuses on nine key topics (Eco-Schools, 2011a):

- Energy
- Transport
- Water
- Biodiversity
- School grounds
- Litter
- Waste
- Global citizenship
- Healthy living

There are currently 16,712 schools registered across England, 11,354 of which have gained an award (Eco-Schools, 2011b). The schools are predominantly primary schools. Eco-Schools is run in 53 countries around the world, linking more than 40,000 schools (Eco-schools, 2011c). The basis of the programme is to learn by doing, and to use schools’ policies, buildings and grounds as learning tools.

2.4.2.2 Global Action Plan (GAP)

GAP developed an ‘Action Plan’ for schools that involves the formation of an ‘Action Team’ comprised of teachers, students, school site managers, caretaking staff and governors. GAP trains the team to:
• Measure their school’s environmental impact
• Set improvement targets
• Communicate effectively
• Build partnerships with local community organisations

The GAP website states that “Students are encouraged to come up with imaginative solutions and lead the way in implementing them, gaining skills in decision-making and project management” (Global Action Plan, 2011). GAP has worked with over 300 UK schools (ibid).

2.4.2.3 WWF-UK

The WWF ‘One Planet School’ programme aims to promote a care ethic in UK schools – care for each other, care for the planet, now and in the future. The WWF-UK website lists five main focus areas WWF-UK, 2011):

• Building understanding and skills
• Exploring values and attitudes
• Offering tools, resources, and activities
• Facilitating discussion
• Encouraging action.

The website provides online resources e.g. practical guides for implementing ESD in schools, teacher information packs on certain topics and classroom resources. Each term, WWF publishes a free poster resource for schools focusing on a key sustainability topic, which aims to promote discussion and provide background knowledge. They also have the ‘Linkingthinking’ series, which is a selection of resources aimed at promoting ways of thinking and problem solving skills that are more “holistic, systemic, ecological, inclusive and integrative” (Sterling et al., 2005, p. iv).

2.4.3 ‘Alternative’ schools

2.4.3.1 Human Scale Education (HSE)

Human Scale Education was set up in 1985, with the aim of promoting small, human scale learning communities within the state maintained and
independent sectors of education (HSE, 2011a). The Human Scale Education Movement (UK) works with schools and parents “to promote human scale learning environments where children and young people are known and valued as individuals” (HSE, 2011b). The movement focuses on the importance of relationships in the design of schools, with the intention of developing smaller learning environments, providing a foundation for innovative pedagogy, impacting on social justice and fostering schools which are rooted in families and communities (HSE, 2011b).

2.4.3.2 Steiner education

Steiner education (also known as Waldorf education) is a humanistic approach to pedagogy based upon the educational philosophy of the Austrian philosopher Rudolf Steiner. Learning is interdisciplinary, integrating practical, artistic, and conceptual elements, with an emphasis on the role of imagination in learning. Equal attention is given to the physical, emotional, intellectual, cultural and spiritual needs of each pupil and is designed to correspond with the different phases of the child's development (Steiner Waldorf Schools Fellowship, 2011a). The core subjects of the curriculum are taught in thematic blocks and all lessons include a balance of artistic, practical and intellectual content (Steiner Waldorf Schools Fellowship, 2011a). The educational philosophy's overarching goals are to provide young people the basis on which to develop into free, morally responsible and integrated individuals. There are currently 35 registered Steiner Schools across the UK, with many more affiliated institutions and early learning centres (Steiner Waldorf Schools Fellowship, 2011b). There are over 2,000 Steiner schools worldwide (Bund der Freien Waldorfschulen, 2011).

2.4.4 ‘Outdoor learning’

2.4.4.1 Field Studies Council (FSC)

The FSC states that ‘the more we know about the environment, the more we can appreciate its needs and protect its diversity and beauty for future generations’ (FSC, 2011a). Through its seventeen outdoor centres in natural areas across the UK, the FSC focuses on providing outdoor experiences for school students, with an emphasis on fieldwork based on the requirements of the national curriculum. It also provides programmes such as ‘Eco-venture’, which encourage students to explore the natural environment and ecology with a sense of fun and adventure, and also to contemplate their role in the ecosystem and in society (FSC, 2011b).
Every year the FSC welcomes over 2,500 schools (over 100,000 visitors) to its national network of Centres (FSC, 2011c)

2.4.4.2 Forest schools

The philosophy of Forest Schools is to encourage and inspire individuals by providing the opportunity for positive outdoor experiences.

By participating in engaging, motivating and achievable tasks and activities in a woodland environment each participant has an opportunity to develop intrinsic motivation, sound emotional and social skills. These, through self-awareness can be developed to reach personal potential (Archimedes Training ltd, 2011).

Children regularly visit the same woodland area, where they have the opportunity to learn about the natural environment, how to handle risks and most importantly to use their own initiative to solve problems and cooperate with others. Forest Schools will aim to develop (Archimedes Training ltd, 2011):

- Self-Awareness
- Self-Regulation
- Intrinsic motivation
- Empathy
- Good social communication skills
- Independence
- A positive mental attitude, self-esteem and confidence

The forest schools website states that Children need time to thoroughly explore their thoughts, feelings and relationships. Forest schools involve a reflective practice that develops an ‘understanding of the world, the environment and everything within it through the use of emotions, imagination and senses’ (ibid).
2.4.5 Summary

It is hoped that the above account of current ESD practice, and related practices, in the UK, has given an idea of the current state of affairs. There are many more initiatives and practices taking place provided by individuals in schools acting independently. There is a plethora of ESD practices and initiatives prevalent in the UK, but which of them foster this frame of mind change that would seem necessary to achieve a true sustainability? Which practices manage to strengthen intrinsic values e.g. protecting the environment, unity with nature or social justice?

Sterling (2009, p. 14) argued that “while education for sustainable development has in recent years won a small niche, the overall education paradigm otherwise remains unchanged”. Sterling (2009) further argues that most mainstream education continues to “sustain unsustainability” (p. 14), by “uncritically reproducing norms, by fragmenting understanding ... by an inability to explore alternatives, by rewarding dependency and conformity, and by servicing the consumerist machine” (p. 15). This ties in with value theory (see sections 2.2 and 2.3), and the comments by Orr (2004, p. 12) discussed above – that by continuing to promote extrinsic values, and/or by failing to promote intrinsic values, the dominant, mainstream, unsustainable education paradigm is reinforced and strengthened. That said, there do exist environmentally aware students, and also schools that can be seen as pioneers in the ESD field e.g. Crispin school in Street, Somerset, and The Small School in Hartland, Devon (Sterling, 2009, pp. 67-69). As Paul Hart (2000) commented, the complex interaction between a teacher’s values, and I would add practices, as well as those of the school, and their pupils’ social and environmental consciousness needs to be explored.

2.5 Research Purpose

It can be argued that in order for humans to live sustainably, we need to foster a frame of mind that is based on intrinsic values that “widen and deepen our boundaries of concern” (Sterling, 2009, p. 53), that sees the human-environment relationship as co-dependent and co-determining and that understands the interconnectedness of the world’s ecological and social systems. We need to become ‘pro-environmentally orientated’.

As values theory states, schools and education can have an impact on an individual’s values. Being that there are currently many varying approaches and practices to ESD, some of whose effectiveness is debated (Sterling, 2009; Bonnett 2002, 2003; Huckle, 2006) it seems prudent to
explore if current ESD practices influence students’ ‘pro-environmental orientation’. Further, an exploration into the characteristics of those practices that corresponds to higher ‘pro-environmental orientation’ may help inform more meaningful and effective practice. This research project therefore aims to answer two primary questions:

1. What are the levels of ‘pro-environmental orientation’ of students receiving differing ESD provision?

2. What are the characteristics of ESD provision that corresponds to higher pro-environmental orientation?

2.5.1 Thesis outline

This thesis will now turn to more practical measures to address the research questions stated above, and to investigate environmental values and pro-environmental orientation in relation to ESD practices in UK schools generally. The following Methodology section explains how school-based fieldwork was designed – sampling methods used (section 3.1), instrument selection and adaptation (section 3.2), data collection methods (section 3.3), and data analysis and statistical methods used post-data collection (section 3.4).

The Results chapter details relevant findings from the data analysis and statistical procedures. It includes test results concerning the reliability of the instrument used and any statistically significant results found within the data. These results are then discussed in detail in the Discussion (chapter 5).

The major conclusions of the research are then presented (chapter 6), as well as the implications of the findings (section 6.2), the limitations of the study (section 6.3) and proposed future research (section 6.4).
3 Methodology

This study employs a mix method research approach, using a quantitative survey design (with group comparison) in addition to qualitative data (e.g. observations) and interpretation.

This research does not attempt to make generalisations about the population as a whole; ‘environmental orientation’ and value acquisition are complex areas with multiple variables involved, therefore the results of this study are sample specific. This small-scale study aims only to scratch at the surface, to explore the research area and lay foundations for future research. However, it may be possible to make certain inferences from the more general findings of this study sample that may be applicable to the population as a whole.

3.1 Subjects/sample

A purposeful sampling method was used in this study. Internet research was conducted to identify schools where ESD programmes/related ESD practices were being employed e.g. Eco-schools, Steiner schools, schools with sustainability policies. This research was somewhat limited by the lack of available data regarding some ESD programmes, particularly NGOs and outdoor centres and initiatives working with schools. A total of 40 schools (23 of which were Steiner schools) were identified using maximum variational sampling, whereby schools were selected in order to produce a variety of ESD practices or characteristics across the sample. Schools were also selected in order to produce a variation in other factors i.e. countryside vs. city based schools, and independent vs. state schools. Maximum variation sampling was used to enable a greater variety of ESD practices and related approaches to be included in the study, and thus make for a more informative comparison of differing ESD practices in relation to environmental orientation.

Of the 40 schools selected, 10 non-Steiner schools and 10 Steiner schools were then selected as being most convenient in terms of accessibility, financial and time constraints (‘convenient sampling’). These 20 schools were then emailed, with a follow-up email sent 3 weeks later. Of those 20 schools, 7 agreed to take part in the study. Relevant details of these schools are described below.
Within each school the Year 6 class (students aged 10-11 years old) was purposely sampled, as it is the most suitable age range for the chosen instrument/measure (the NEP scale for children, see section 3.2.1 below) i.e. students aged 10-12 years old.

All schools and participants were kept anonymous. Students and staff were specifically asked not to write their names on their questionnaires. Schools were allocated a letter and students a number for identification and data entry purposes e.g. school A, student A1, student A2. Descriptions of the schools were kept to key facts in order to avoid identification. Schools were fully informed of the nature of the study at first contact, and given background information, as well as copies of the instruments to be used. Prior to administering the student questionnaires, the purpose of the study was communicated to the students. The students were informed that the questionnaire was not a test and there were no ‘right’ or ‘wrong’ answers.

3.1.1 School sample

3.1.1.1 School A
School A is a small (172 pupils on roll), mainstream, rural, village-based school situated in the south west of England. It is a registered Eco-school and was awarded the Green Flag in 2010. The school has assigned a teaching assistant (shared with other schools in the area) to oversee the Eco-schools programme.

3.1.1.2 School B
School B is an independent, fee-paying, alternative ‘small-scale’ school for children aged between 3 and 16. There are 19 pupils on roll. The school is a member of Human Scale Education (see section 2.4.3). The school is spread across three sites, all of which are situated within a designated national park area. There is an emphasis on outdoor learning and play within the national park.

3.1.1.3 School C
School C is a village-based, mainstream state school situated in southern/mid England. The school has 204 pupils on roll. It is a registered Eco-school, and was awarded the Green Flag in 2009.
3.1.1.4 School D
School D is a mainstream, town-based, state school, situated in southern/mid England. The school has 162 pupils on roll. It is a registered Eco-school, and was awarded the Green Flag in 2011.

3.1.1.5 School E
School E is a mainstream, city-based, state school, situated in south England. The school has 256 pupils on roll. It is a registered Eco-school, and was awarded the Green Flag in 2006, 2008 and 2010.

3.1.1.6 School F
School F is an independent, fee-paying, alternative, Steiner school (see section 2.4.3). The school has 299 pupils on roll, inclusive of the secondary school i.e. ages 3-17. The school is situated in the countryside and has extensive outdoor grounds.

3.1.1.7 School G
School G is an independent, fee-paying, town-based, boarding school situated in southwest England. The school has 154 pupils on roll in the 7-13 age range. It is an Eco-school, and was awarded a Green Flag in 2010. The school has extensive grounds, including an onsite SSSI (Site of Special Scientific Interest).

3.2 Instruments/Measures

3.2.1 Measuring environmental orientation in children - The New Ecological Paradigm (NEP) Scale for children
An extensive survey on existing instruments that attempt to assess the environmental orientation/values/worldview of individuals was carried out. This consisted predominantly of searching peer-reviewed journals, as well as universities’ environmental psychology on-line material. The instrument needed to be suitable for use with school children.

It was decided that an adapted version of the revised NEP Scale developed by Dunlap et al. (2000) would be most suitable for use with this study. The adapted version of the scale, which is suitable for children aged 10-12 year olds, was developed by Manoli, Johnson and Dunlap (2007).

The NEP Scale was originally published in 1978 (see section 2.1), but revised in 2000. It is the most widely used instrument for studying environmental orientation in adults (Manoli et al., 2007, p. 4; Stern, 2000, p. 411). The original NEP scale has been widely used as a reliable research
instrument since its publication (Dunlap et al., 2000) as well as being included in various theoretical models regarding environmental beliefs and behaviours (Stern, 2000; Dunlap et al., 2000). The NEP scale has been found to have predictive validity i.e. significant relationships have been found between the NEP scale and various behaviour intentions; and known group validity i.e. known environmentalists consistently score higher on the NEP scale than the general public, or members of non-environmental interest groups (Dunlap et al., 2000, p. 429). Therefore, the original scale can be considered to have good reliability and validity.

The revision of the scale involved modernising some out-dated terminology, balancing pro- and anti-NEP items/questions, and broadening the scale to include ideas of ‘human exemptionalism’, the idea that humans, unlike other species, are exempt from the constraints of nature; and a belief in a potential ‘eco-crisis’ or set of catastrophic environmental changes (see Dunlap et al., 2000). As Dunlap et al. (2000, p. 436) state, initial findings suggest the revised scale is consistent with the original scale in terms of predictive and known group validity.

Manoli et al. (2007) carried out research in order to develop a child suitable NEP Scale. This involved interviewing children aged 10-12 to check for vocabulary and comprehension issues with the scale. Items were then altered appropriately and the new scale tested and continually modified with several different sample groups. These results were analysed using EFA (exploratory factor analysis) and also CFA (confirmatory factor analysis) revealing a ‘best-fit’ 10-item scale, which could be separated into 3-dimensions or individual scales, representing ‘Rights of Nature’, ‘Human exemptionalism’ and the ‘Eco-crisis’; or used as a unidimensional scale (Manoli et al., 2007, p. 9).

Although the NEP scale for children is a newly adapted instrument, the fact that it is has been empirically tested, published in a peer-reviewed journal and adapted from a well validated instrument - and indeed developed with the aid of Riley Dunlap, one of the co-authors of the original NEP scale – suggests that this is a reliable instrument for the purposes of this study.

A copy of the NEP scale questionnaire can be found in section 3.2.4.1.

3.2.2 Measuring ESD schools provision – Questionnaire development

As yet, there is no indicator for ESD in UK schools (see Huckle, 2009; Reid, Nikel & Scott, 2006, for a discussion into the development of ESD
indicators); therefore it was necessary to adapt an existing ‘instrument’ to fit the research purpose of assessing ESD provision. This section describes the development of that instrument in detail.

The SEED/ENSI Quality Criteria for ESD schools (Breiting et al., 2005) was adapted into a set of questions designed to assess the ESD provision of the schools. Three examples of the development of the questions are shown below, using a summary of the original Quality Criteria and showing the adaptation into the questionnaire items/questions. The development of the remaining questions is shown in Appendix A.

It should be noted that the original Quality Criteria was not designed as an assessment/evaluation tool or ‘indicator’ of ESD. It was developed as a guide for schools seeking to implement or improve their ESD provision. However, in this adapted form, it provides a framework for comparing ESD provision.

Breiting et al. (2005, p. 11) devised twenty-five quality criteria, which they divided into three main groups:

1. Quality criteria regarding the quality of teaching and learning processes
2. Quality criteria regarding the school policy and organisation
3. Quality criteria regarding the school’s external relations
Table 3 Quality criteria showing three groups, adapted from Breiting et al., (2005, p.13)

<table>
<thead>
<tr>
<th>Quality criteria regarding the quality of teaching and learning processes</th>
<th>Quality criteria regarding school policy and organisation</th>
<th>Quality criteria regarding the school’s external relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Area of visible outcomes at school and in local community</td>
<td>11. Area of school climate</td>
<td>15. Area of networking and partnerships</td>
</tr>
<tr>
<td>3. Area of perspectives for the future</td>
<td>12. Area of school management</td>
<td></td>
</tr>
<tr>
<td>4. Area of a ‘culture of complexity’</td>
<td>13. Area of reflection and evaluation of ESD initiatives at school level</td>
<td></td>
</tr>
<tr>
<td>5. Area of critical thinking and the language of possibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Area of value clarification and development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Area of action-based perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Area of participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Area of subject matter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2.2.1 Quality criteria regarding the quality of teaching and learning processes

1. Area of teaching-learning approaches/processes

Sustainable development requires active, creative and critical citizens that are good at overcoming problems and conflicts in co-operation, and able to combine theoretical knowledge with practical innovations and ideas. As a consequence the teaching and learning approach must have the learner at the centre and provide contexts to develop students’ own ideas, values and perspectives. Teachers must consider students as active agents in the construction of their knowledge (Breiting et al., 2005, p. 15).

- The teachers listen to and value the concerns, experiences, ideas and expectations of the students, and their plans are ‘flexible’ and open for changes.

- The teachers encourage cooperative learning and experiential learning.

- The teaching takes into account the value of practical activities by linking them to students’ concept development and theory construction.

- The teachers facilitate students’ participation and provide contexts for the development of students’ own learning, ideas and perspectives.

- The teachers search for ways to evaluate and assess students’ achievement consistent with the above mentioned criteria.

(Breiting et al., 2005, p. 15)
Derived questions:

<table>
<thead>
<tr>
<th>Q</th>
<th>How often does discussion and open student questioning occur in class?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>How often does your teaching plan change? (i.e. How often do you allow your lesson plan to be flexible?)</td>
</tr>
<tr>
<td>1b</td>
<td>How often does cooperative learning occur in class?</td>
</tr>
<tr>
<td>1c</td>
<td>How often does experiential learning occur in class?</td>
</tr>
<tr>
<td>1d</td>
<td>How often are practical activities linked to the students’ concept development and theory construction?</td>
</tr>
<tr>
<td>1e</td>
<td>How often are students provided with the opportunity for self-learning and the development of their own ideas and perspectives?</td>
</tr>
</tbody>
</table>

3.2.2.2 Quality criteria regarding the school policy and organisation

10. Area of school policy and planning

ESD can be a leading motive for reflection and innovation, which can help to develop the school into a dynamic ‘learning organization’. The very nature of ESD implies an atmosphere of exchange of ideas and reflections based on wishes and visions of the future. ESD can empower and engage all stakeholders at the school. At all schools the principal will have a key role to help release the many resources and energies of people at the school. In the planning process, a joint agreement on where to go is
mandatory - aim, process and organization should be elaborated as a shared vision involving all stakeholders of the school.

The new experiences, reflections, innovations that ESD bring will be incorporated in the school culture and change the way people interact, discuss and do things (Breiting et al., 2005, pp. 34-35).

- The school includes a focus on ESD in its mission and annual action plan.
- The school leadership encourages teachers to use future perspectives to plan their long-term ESD work.
- The school allocates appropriate school time for the students’ work with SD, as well as for the teachers’ reflections and clarifications on ESD issues at the school.
- The school establishes a procedure to respond to teachers’ needs for further education relevant for ESD.

(Breiting et al., 2005, p. 35)

Derived question(s):

<table>
<thead>
<tr>
<th>Q</th>
<th>Agree</th>
<th>To some extent agree</th>
<th>Moderately agree</th>
<th>Disagree</th>
</tr>
</thead>
</table>

10a The school includes a focus on ESD in its mission and annual action plan

10b The school allocates appropriate school time for the students’ work with SD.

10c The school allocates appropriate time for the teachers’ reflections and clarifications on ESD issues at the school.
3.2.2.3 Quality criteria regarding the school’s external relations

14. Area of community cooperation

One of the main ideas in ESD is to be locally relevant and to construct ‘local situational knowledge’. In this way, schools are no more institutions separated from the real world, proposing abstract general knowledge, but become institutions active in the society, recognized as relevant stakeholders in the development of the community.

A first step is to use the features and problems of the community as resources for fieldwork and active learning. A further step is to propose the school as an important voice for the planning of local sustainable development, and another step is to offer the school’s facilities and competencies for community studies and action in the direction of sustainability. In this process the schools become ‘core social centres’ with open doors, sources of expertise, sharing responsibilities with others community bodies. Teachers and students gain visibility and recognition, and the latter start practising their future role as active citizens (Breiting et al., 2005, pp. 42-43).

- The school involves the community as a resource for teaching/learning in meaningful ways.
- The school uses the community as an arena for genuine action.
- The school enables the local community to address its concerns to the school and serve as a ‘community-centre’.

(Breiting et al., 2005, p. 43)
Derived question(s):

Q  

<table>
<thead>
<tr>
<th>Agree</th>
<th>Moderately agree/To some extent</th>
<th>Disagree</th>
</tr>
</thead>
</table>

14a   The school involves the community as a resource for teaching/learning in meaningful ways.

14b   The school uses the community as an arena for genuine action.

14c   The school enables the local community to address its concerns to the school and serve as a ‘community-centre’.

It was decided to divide the questions into two questionnaires – one to be given to the class teacher (the ‘Class Teacher Questionnaire’) and one to be given to the school principle or another suitable school representative (the ‘School Questionnaire’). This was due to the different nature or level of the derived questions i.e. some related to teaching practice, and it was therefore appropriate that the students’ class teacher respond; whereas some questions related to whole school issues, and it was therefore more appropriate for a whole school representative to respond. A copy of both the Class Teacher Questionnaire and the School Questionnaire can be found in section 3.2.4.2 and section 3.2.4.3 respectively.

3.2.3 Field notes

A field journal was kept during the study, detailing observations and reflective field notes made after each school visit. Personal thoughts relating to the broad ideas and themes of this study were recorded i.e. any observations made relating to ESD, intrinsic values, teacher-student relations, teaching approaches, etc. This included observations made during the administering of the questionnaire, on teacher-student interactions, on teaching approaches, during post-questionnaire teaching
sessions, during any tours of the schools grounds, and general observations on the school made during the visit.

3.2.4 Copies of instruments

3.2.4.1 NEP Scale questionnaire for children

Adapted from Manoli et al. (2007)

Listed below are sentences about the relationship between humans and the environment. For each one, please tick whether you STRONGLY AGREE, AGREE, are NOT SURE, DISAGREE or STRONGLY DISAGREE with it.

1. Plants and animals have as much right as people to live.
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

2. There are too many (or almost too many) people on earth.
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

3. People are clever enough to keep from ruining the earth.
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

4. People must still obey the laws of nature
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

5. When people mess with nature it has bad results
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

6. Nature is strong enough to handle the bad effects of our modern lifestyle
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

7. People are supposed to rule over the rest of nature
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

8. People are treating nature badly
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

9. People will some day know enough about nature to be able to control it
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐

10. If things don’t change we will have a big disaster in the environment soon
   - Strongly Agree ☐  Agree ☐  Not sure ☐  Disagree ☐  Strongly Disagree ☐
### 3.2.4.2 Class teacher Questionnaire

Adapted from the SEED/ENSI Quality Criteria for ESD schools (Breiting, Mayer & Morgensen, 2005)

<table>
<thead>
<tr>
<th>Q</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>How often does discussion and open student questioning occur in class?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1b</td>
<td>How often does your teaching plan change? (i.e. How often do you allow your lesson plan to be flexible?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c</td>
<td>How often does cooperative learning occur in class?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1d</td>
<td>How often does experiential learning occur in class?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1e</td>
<td>How often are practical activities linked to the students’ concept development and theory construction?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1f</td>
<td>How often are students provided with the opportunity for self-learning and the development of their own ideas and perspectives?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Are physical / technical changes in the school and in the local community used as a means of teaching and learning? (e.g. development of the schools grounds?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>How often do students work with scenarios/case studies/visions for the future?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3b</td>
<td>How often are past actions linked with present or future conditions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>How often do students explore different points of view regarding a problem, including conflicts of interest before trying to find a solution?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>How often are students asked to give arguments for different positions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>How often are students given the opportunity to clarify and discuss their own values and attempt to understand other values?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>How often are students given the opportunity to fully-participate in ‘actions’ i.e. investigate an issue before collectively developing an action. (An example of an action could be the introduction of fair-trade products in the school canteen)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>How often do students take part in the decision making process - appropriate to the students’ age and capacities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>How often is academic subject matter taught through a focus on problems and issues?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.2.4.3 School questionnaire

Adapted from SEED/ENSI Quality Criteria for ESD schools (Breiting, Mayer & Morgensen, 2005)

<table>
<thead>
<tr>
<th>Q</th>
<th>Agree</th>
<th>Moderately agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10a</td>
<td>The school includes a focus on ESD in its mission and annual action plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10b</td>
<td>The school allocates school time for the students’ work with SD.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10c</td>
<td>The school allocates time for the teachers’ reflections and clarifications on ESD issues at the school.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a</td>
<td>The school leadership has a particular role in facilitating a school atmosphere in which every one feels that she/he can contribute with innovative ideas and proposals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11b</td>
<td>The whole school community, especially parents, are informed of the relevance of ESD for students’ general learning and are involved in the school development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a</td>
<td>The school makes a regular audit concerning the school’s needs in the direction of sustainability, involving students, teachers and staff.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12b</td>
<td>The school decides every year what are the new challenges and what actions to take for a continuous improvement of the school management.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12c</td>
<td>The school strives to be an example of careful management of resources – communicating its efforts to the internal and external community.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The school allocates school time for teachers’ reflections and research on their ESD issues.

3.3 Data Collection

Visits were made to five schools, and the questionnaire administered to each student within the Year 6 class, resulting in between 9-30 students in each sample. The research and the questionnaire were briefly explained beforehand, and an emphasis was made that the questionnaire was not a test, there were no ‘right’ or ‘wrong’ answers, and the students should answer with their own opinion.

Class teacher and school questionnaires were often completed at the same time as, or shortly after the student questionnaire was administered, or sent via email after the visit.

Observations made during the visits were recorded in a field journal, along with reflective field notes written after the visits (see section 3.2.3 above).

It was not possible to visit two of the schools; therefore in these instances the student questionnaire was administered by the class teacher, following instructions sent by email. The completed questionnaires, as well as the responses to the class teacher and school questionnaires, were obtained by post.

Further information on all of the schools and their ESD programmes was obtained from their official websites, related websites e.g. Steiner education sites; along with any material provided by the schools themselves e.g. ESD report to the school Governors.

3.4 Data analysis and statistical procedures

Various analyses were performed on the data set, and these will be described below. However, many of the statistical tests follow directly from one to another i.e. the results/data produced by one test has implications for the next test, therefore further statistical explanation is provided in the Results chapter and in Appendix B.

3.4.1 Reliability of NEP scale questionnaire

The first statistical analysis tested the reliability of the NEP scale questionnaire, to find out whether the instrument successfully measures what it should measure. Reliability means that a measure, in this case the NEP scale questionnaire, should consistently reflect the construct it is
measuring (Field, 2009, p. 673). The usual way to test for reliability is based on the idea that individual items/questions (or sets of items/questions) should produce results consistent with the overall questionnaire. A student who is very pro-environmentally orientated should get a high NEP scale score; if the NEP scale is reliable then if random items/questions were selected, the student’s score on those items/questions should also be high (Field, 2009, p. 674). Cronbach’s alpha (a) is the most common measure of scale reliability and was used in this case – values around 0.7 are generally considered acceptable, however, when dealing with psychological constructs, values below 0.7 can, realistically, be expected because of the diversity of the constructs being measured (Field, 2009, p. 675).

3.4.2 Single-variable vs. multi-variable scale - Principle component analysis of NEP scale questionnaire

Manoli et al. (2007) recommended splitting the NEP scale into three subscales - dividing the questions of the scale into sets corresponding to facets of the scale i.e. The Rights of Nature (Questions 7, 1 and 4), Human Exemptionism (Questions 6, 9 and 11) and Eco-crisis (Questions 10, 2, 8 and 5). In Dunlap et al.’s (2000) revised the NEP scale and the authors specifically encouraged researchers to factor-analyse the entire set of items to determine if the three widely used dimensions emerged (pp. 430-431). They advised that the decision to treat the NEP as a single or as multiple variables should not be made before data collection, but ought to be based on the results of the particular study. If substantially meaningful dimensions did not emerge, however, and the entire set of items (or at least a majority of them) were found to produce an internally consistent measure, then they recommended treating the NEP scale as a single variable (Dunlap et al., 2000, p. 431).

Principle component analysis (PCA) is used to find common underlying dimensions within the data (Field, 2009, p. 637). In this case, it explores the relationships or correlations between the questions of the questionnaire, in order to determine if the questionnaire is more accurate as a measure of one latent variable e.g. ‘pro-environmental orientation’ or whether a multiple latent variable model is more accurate, as proposed by Manoli et al. (2009).

3.4.2.1 Preliminary tests

Preliminary tests were carried out in order to determine if and how the PCA should be carried out. The Kaiser-Meyer-Olkin measure and Bartlett’s
test for sphericity were performed to test the suitability of the data for PCA. An initial analysis was then run to obtain eigenvalues for each component in the data, in order to determine the number of components to be retained in the final analysis.

3.4.2.2 Rotation

A technique called factor rotation is used to discriminate between factors more clearly, thus making interpretation easier. There are two types of rotation: Orthogonal rotation and Oblique rotation. Orthogonal rotation should be used when the factors are unrelated or independent before rotation. Oblique rotation allows that factors are related or correlated (Field, 2009, p. 642). Previous NEP scale studies have used orthogonal rotation (Manoli et al., 2009; Dunlap et al., 2000). It was decided to run the PCA using both Orthogonal (Varimax method) and Oblique (Direct Oblimin method) rotation, and then examine the component correlation matrix for correlations between factors.

3.4.2.3 PCA

A PCA was then conducted on nine items from the original ten-item scale with Oblique rotation (Direct Oblimin) (see Results chapter for statistical explanation). Cronbach’s alpha was also determined for each of the factors. The outcome of the tests can be found in the results section.

3.4.3 Descriptive and Frequency data for NEP scale scores

Descriptive data was determined e.g. how NEP scale scores differ in terms of mean, median, mode, range, standard deviation, maximum score, minimum score, kurtosis and skew. Frequency data i.e. the number of students scoring a particular NEP scale score in each school was determined. In addition, the percentage of total NEP scores that particular score formed for each school, as well as the cumulative percent, was determined.

3.4.4 Comparing NEP scale scores between schools

A Comparison of NEP scale scores between schools addresses the question that is central to this thesis: Do different schools have notably different NEP scale scores? Statistical methods were used to test for a significant difference between the mean NEP scale score of each school.
3.4.4.1 Tests for normality

Parametric statistical tests require that certain ‘assumptions’ about the data be met, in order for them to be accurate. If data do not meet these assumptions, the output from statistical analysis can contain errors. The four assumptions are:

1. Normally distributed data

2. Homogeneity of variance (variance in schools NEP scale scores should be approximately equal)

3. Data should be measured at least at the interval level

4. Independence i.e. observations are not correlated – in this case, one school should not influence another school.

It is essential that preliminary tests on these assumptions be carried out prior to statistical analysis. The Kolmogorov-Smirnov test was used to test for normal distribution and Levene’s test was used to test for homogeneity of variance (whether the variance of NEP scale scores for each school was roughly equal).

3.4.4.2 ANOVA

One-way independent ANOVA (Analysis of Variance) was carried out on the data to determine if there was a significant difference in the mean NEP scale score of each school.

A significant F-ratio indicates that one or more of the differences between the mean NEP scale scores for each school are statistically significant. In order to find out which groups differ, it is necessary to carry out further analysis, in the form of post hoc tests. Hochberg’s GT2 and Gabriel’s pairwise test procedure were designed to cope with unequal group sizes, and were therefore considered the most appropriate for this data.

Because the group sizes are unequal, both tests use the harmonic mean of the group sizes to carry out the statistic, and in doing so cannot guarantee that Type I error levels are accurate, meaning that a significant result may be delivered when in fact there is no real significance.

3.4.4.3 Kruskal-Wallis test and Mann-Whitney tests

It was decided to support the above parametric tests by carrying out their non-parametric counterparts – the Kruskal-Wallis test and the Mann-
Whitney test, which do not rely upon assumptions of normality. As with ANOVA, the Kruskal-Wallis test only states there is a difference between schools, not where that difference is, therefore it also requires post-hoc statistical analysis. The non-parametric Mann-Whitney test was used to compare the means of two schools. As multiple Mann-Whitney tests carried out on the same data set results in a reduced p value, or significance level, only those schools which seemed to be different by examining the descriptive and frequency data, and were also shown to be significantly different in the Hochberg’s GT2 and Gabriel’s pairwise test, were tested. For those Mann-Whitney tests a Bonferroni correction was applied (significance level = 0.05/number of tests performed)

3.4.4.4 Cohen’s d

The effect size of each significant relationship was then calculated using Cohen’s d. Cohen’s d measures the strength of the relationship between two variables, here being the NEP scale score and the school. The reporting of effect sizes allows for the interpretation of the substantive significance of a research result.

3.4.5 Comparing NEP scale scores with School and Teacher question responses

The Teacher and School Questionnaires, based on the Quality Criteria devised by Breiting et al. (2005), were designed to assess the ESD provision at each school. By comparing the responses found in the Teacher and School Questionnaires with the corresponding NEP scale scores, it was possible to explore the relationship between certain ESD provision characteristics and corresponding NEP scale scores. The corresponding NEP scale scores were grouped for each response on both the Teacher and School Questionnaires i.e. NEP scale scores were grouped for students whose teacher and school representative/principal responded either ‘Rarely’, ‘Occasionally’ or ‘Frequently’ in the former case and ‘Disagree’, ‘Moderately agree/To some extent’ or ‘Agree’ in the latter case. The grouped NEP scale scores were then analysed for significant differences.

3.4.5.1 Test for normality

The Kolmogorov-Smirnov test was carried out to test for a normal distribution.
3.4.5.2 Kruskal-Wallis tests and Mann-Whitney tests

Kruskal-Wallis tests and follow-up Mann-Whitney tests were conducted for both the school and teacher questionnaire responses in relation to NEP scale scores.

3.4.6 Field notes

Field notes were examined for any notable differences, or notable circumstances that may inform interpretation of the statistical results or results generally.
4 Results

The results chapter will present the descriptive statistics from the data set i.e. mean, standard deviation, etc.; as well as more complex statistical analysis exploring the relationships between the NEP scale score results and different schools; teacher question responses; and school question responses. It is divided into the following sections:

• Section 4.1 summarises results from the statistical analysis carried out on the reliability of the NEP Scale questionnaire. This included Principle Component Analysis (PCA) to determine the suitability of the scale as a single-variable as opposed to multi-variable scale. Additional data from the statistical procedures can be found in Appendix B.

• Section 4.2 presents the descriptive statistics and frequency data for each school, as well as for the whole data set.

• Section 4.3 compares the NEP scale scores between schools, to explore whether there is a relationship between schools and the corresponding NEP scale scores of their students. This section begins with tests of normality and variance for each individual school.

• Section 4.4 compares the NEP scale scores in relation to the Teacher and School question responses, in order to explore whether there is a relationship between different teacher and school responses (indicative of ESD practice) and the corresponding NEP scale scores of their students. This section begins with a test of normality for the whole data set.

Note: Further explanation of statistical analysis can be found in the Methodology chapter (section 3.4)
4.1 Reliability of the NEP scale questionnaire

4.1.1 Cronbach’s alpha (single-variable scale)

The NEP scale had a reliability below 0.7, Cronbach’s α = 0.628. Four of the ten items/questions (Question 3, 4, 9 and 10) had Corrected Item-Total Correlations below the recommended 0.3. However, the analysis revealed that deleting Question 3 would increase Cronbach’s α from 0.628 to 0.653.

Reliability analysis was then repeated with Question 3 removed, the NEP scale therefore now having only 9 items/questions. As previously stated, the new value for Cronbach’s α = 0.653. With three of the nine items/questions (Question 4, 9 and 10) still having Corrected Item-Total correlations below 0.3.

4.1.2 Single-variable vs. multi-variable scale

4.1.2.1 Principle Component Analysis (PCA)

A PCA was conducted on the nine items with Oblique rotation (Direct Oblimin). Table 12 and Table 13 in Appendix B show the factor loadings after rotation obtained from the pattern matrix (shared variance ignored) and from the Structure Matrix (shared variance not ignored) respectively.

The factors or ‘dimensions’ that emerged from the PCA above do not correspond to those found by Manoli et al. (2007) or those discussed by Dunlap et al. (2000). The factors that do emerge are not substantially meaningful, and several items/questions load heavily on different factors.

However, all nine items/questions load heavily on the first unrotated factor (see Table 14 in Appendix B). Most items have Corrected Item-Total correlations above 0.3 and if combined into a single measure result in an alpha of 0.653 - higher than any of the alpha values for the PCA factor solutions. It therefore seemed appropriate to treat the NEP scale as a single-variable measure, as opposed to a multi-variable measure.
### 4.2 Descriptive and Frequency data for NEP scale scores

#### Table 4: Descriptive data for NEP scale scores

<table>
<thead>
<tr>
<th></th>
<th>School A</th>
<th>School B</th>
<th>School C</th>
<th>School D</th>
<th>School E</th>
<th>School F</th>
<th>School G</th>
<th>Whole dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>28</td>
<td>9</td>
<td>27</td>
<td>19</td>
<td>30</td>
<td>15</td>
<td>24</td>
<td>152</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>36.3571</td>
<td>34.0000</td>
<td>33.2593</td>
<td>32.3684</td>
<td>34.2667</td>
<td>37.1333</td>
<td>34.4167</td>
<td>34.841</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>36.0000</td>
<td>33.0000</td>
<td>35.0000</td>
<td>34.0000</td>
<td>34.0000</td>
<td>37.0000</td>
<td>36.5000</td>
<td>35.0000</td>
</tr>
<tr>
<td><strong>Mode</strong></td>
<td>35.00</td>
<td>33.00</td>
<td>37.00</td>
<td>34,00(^a)</td>
<td>34.00</td>
<td>36,00(^a)</td>
<td>36,00(^a)</td>
<td>37.00</td>
</tr>
<tr>
<td><strong>Variance</strong></td>
<td>11.794</td>
<td>11.250</td>
<td>18.661</td>
<td>20.246</td>
<td>17.375</td>
<td>8.695</td>
<td>19.906</td>
<td>18.174</td>
</tr>
<tr>
<td><strong>Skewness</strong></td>
<td>-.121</td>
<td>1.457</td>
<td>-.587</td>
<td>-.868</td>
<td>-.309</td>
<td>.139</td>
<td>-.609</td>
<td>-.484</td>
</tr>
<tr>
<td><strong>Kurtosis</strong></td>
<td>-.626</td>
<td>1.435</td>
<td>.389</td>
<td>.281</td>
<td>2.330</td>
<td>-1.115</td>
<td>.746</td>
<td>.720</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>13.00</td>
<td>10.00</td>
<td>19.00</td>
<td>16.00</td>
<td>23.00</td>
<td>9.00</td>
<td>19.00</td>
<td>23.00</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>29.00</td>
<td>31.00</td>
<td>23.00</td>
<td>22.00</td>
<td>22.00</td>
<td>33.00</td>
<td>25.00</td>
<td>22.00</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>42.00</td>
<td>41.00</td>
<td>42.00</td>
<td>38.00</td>
<td>45.00</td>
<td>42.00</td>
<td>44.00</td>
<td>45.00</td>
</tr>
</tbody>
</table>
Table 5 Frequency data for NEP scale score (continued on next page)

| NEP | School A | | School B | | School C | | School D |
|-----|----------|--------|----------|--------|----------|--------|
|     | f  | %  | P   | f  | %  | ≤% | f  | %  | P   | f  | %  | P   |
| 22,00 |    |     |     |    |     |     |    |     |     |    |     |     |
| 23,00 | 1  | 3.7 | 3.7 | 1  | 5.3 | 5.3 |    |     |     |    |     |     |
| 24,00 | 1  | 3.7 | 7.4 | 1  | 5.3 | 10.5 |    |     |     |    |     |     |
| 25,00 |    |     |     |    |     |     |    |     |     |    |     |     |
| 28,00 | 1  | 3.7 | 11.1 | 2  | 10.5 | 21.1 |    |     |     |    |     |     |
| 29,00 | 1  | 3.6 | 3.6 | 28 | 100.0 |    |    |     |     |    |     |     |
| 30,00 |    |     |     | 5  | 18.5 | 29.6 | 2  | 10.5 | 31.6 |    |     |     |
| 31,00 | 1  | 3.6 | 7.1 | 2  | 22.2 | 22.2 | 2  | 7.4 | 37.0 | 1  | 5.3 | 36.8 |
| 32,00 | 2  | 7.1 | 14.3 | 1  | 11.1 | 33.3 | 2  | 7.4 | 44.4 | 1  | 5.3 | 42.1 |
| 33,00 | 2  | 7.1 | 21.4 | 3  | 33.3 | 66.7 | 1  | 5.3 | 47.4 |    |     |     |
| 34,00 | 2  | 7.1 | 28.6 | 1  | 11.1 | 77.8 | 1  | 3.7 | 48.1 | 3  | 15.8 | 63.2 |
| 35,00 | 4  | 14.3 | 42.9 | 3  | 11.1 | 59.3 | 3  | 15.8 | 78.9 |    |     |     |
| 36,00 | 3  | 10.7 | 53.6 | 4  | 14.8 | 74.1 |    |     |     |    |     |     |
| 37,00 | 2  | 7.1 | 60.7 | 6  | 22.2 | 96.3 | 2  | 10.5 | 89.5 |    |     |     |
| 38,00 | 3  | 10.7 | 71.4 | 1  | 11.1 | 88.9 |    |     |     |    |     |     |
| 39,00 | 2  | 7.1 | 78.6 |    |     |     | 2  | 10.5 | 100.0 |    |     |     |
| 40,00 | 2  | 7.1 | 85.7 |    |     |     |    |     |     |    |     |     |
| 41,00 | 2  | 7.1 | 92.9 | 1  | 11.1 | 100.0 |    |     |     |    |     |     |
| 42,00 | 2  | 7.1 | 100.0 |    |     |     | 1  | 3.7 | 100.0 |    |     |     |
| 43,00 |    |     |     |    |     |     |    |     |     |    |     |     |
| 44,00 |    |     |     |    |     |     |    |     |     |    |     |     |
| 45,00 |    |     |     |    |     |     |    |     |     |    |     |     |
| Total | 28 | 100.0 | 09 | 100.0 | 27 | 100.0 | 19 | 100.0 |     |    |     |     |

f = Frequency, % = Percentage of total NEP scores, P = Cumulative percent. Figures in bold are NEP scale scores of 36 or above, indicating a pro-environmental orientation (see section 5.1 for further explanation).
Table 5 continued

<table>
<thead>
<tr>
<th>NEP</th>
<th>School E</th>
<th>School F</th>
<th>School G</th>
<th>Whole dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>P</td>
<td>f</td>
</tr>
<tr>
<td>22,00</td>
<td>1</td>
<td>3.3</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>23,00</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>24,00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25,00</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>28,00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29,00</td>
<td>2</td>
<td>6.7</td>
<td>10.0</td>
<td>1</td>
</tr>
<tr>
<td>30,00</td>
<td>1</td>
<td>3.3</td>
<td>13.3</td>
<td>1</td>
</tr>
<tr>
<td>31,00</td>
<td>2</td>
<td>6.7</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>32,00</td>
<td>4</td>
<td>13.3</td>
<td>33.3</td>
<td>1</td>
</tr>
<tr>
<td>33,00</td>
<td>1</td>
<td>3.3</td>
<td>36.7</td>
<td>2</td>
</tr>
<tr>
<td>34,00</td>
<td>5</td>
<td>16.7</td>
<td>53.3</td>
<td>2</td>
</tr>
<tr>
<td>35,00</td>
<td>3</td>
<td>10.0</td>
<td>63.3</td>
<td>2</td>
</tr>
<tr>
<td>36,00</td>
<td>2</td>
<td>6.7</td>
<td>70.0</td>
<td>3</td>
</tr>
<tr>
<td>37,00</td>
<td>4</td>
<td>13.3</td>
<td>83.3</td>
<td>2</td>
</tr>
<tr>
<td>38,00</td>
<td>2</td>
<td>6.7</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>39,00</td>
<td>1</td>
<td>3.3</td>
<td>93.3</td>
<td>3</td>
</tr>
<tr>
<td>40,00</td>
<td>1</td>
<td>3.3</td>
<td>96.7</td>
<td></td>
</tr>
<tr>
<td>41,00</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>42,00</td>
<td>1</td>
<td>6.7</td>
<td>100.0</td>
<td>1</td>
</tr>
<tr>
<td>43,00</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>44,00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45,00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

f = Frequency, % = Percentage of total NEP scores, P = Cumulative percent. Figures in bold are NEP scale scores of 36 or above, indicating a pro-environmental orientation (see section 5.1 for further explanation).
4.3 Comparing NEP scale scores between schools

4.3.1 Tests for normality

4.3.1.1 Test for normal distribution - Kolmogorov-Smirnov test

The NEP scores for school A, D (28) = 0.082, ns; School D, D (19) = 0.168, ns; School E, D (30) = 0.108, ns; School F, D (15) = 0.137, ns; and School G, D (24) = 0.129, ns, can be assumed normal. However, the distribution of NEP scores for School B, D (9) = 0.284, p < .05; and School C, D (27) = 0.168, p < .05, were both significantly non-normal.

4.3.1.2 Test for homogeneity of variance - Levene’s test

For NEP scores, the variances can be assumed equal (homogenous) for Schools A-G, F (6, 145) = 0.66, ns.

4.3.2 Test for difference between mean NEP scale scores for different schools

4.3.2.1 ANOVA

The assumptions for AVOVA are the same for all parametric tests based on the normal distribution. However, ANOVA is considered quite robust to violations or normality (Field, 2009, p. 360), but only when group sizes - in this case number of students per school sample - are equal. As the majority of the schools did not violate the assumption of normality, One-way independent ANOVA was performed, but group size difference was taken into account when choosing a post-hoc test.

ANOVA analysis showed that NEP scale scores were significantly affected by school, F(6, 145) = 4.16, p = < .01.

Both Hochberg’s GT2 test and Gabriel’s pairwise test (post-hoc tests) showed significant differences between School A and School D, p< .05; School F and School D, p < .05; and School G and School D, p < .05.

4.3.2.2 Kruskal-Wallis test

The Kruskal-Wallis test showed that the NEP scale scores were significantly affected by school, H(6) = 21.88, p < .01, which supports the finding of the ANOVA test.

4.3.2.3 Mann-Whitney tests

Tests were carried out between Schools A and D; Schools F and D; Schools G and D and Schools F and C. A Bonferroni correction was applied and so
all effects are reported at a .0125 level of significance. The comparisons were chosen by examining the descriptive data for each school as well as the box plot comparing schools (see Figure 6 in the Appendix).

NEP scores in School A (median = 36) were significantly higher than in school D (median = 34) $U = 131.5$, $d = 1.00$.

NEP scores in School F (median = 37) were significantly higher than in school D (median = 34) $U = 56.00$, $d = 1.25$.

NEP scores in School G (median = 36.5) were significantly higher than in School D (median = 34) $U = 113.50$, $d = 0.90$.

NEP Scores in School F (median = 37) were significantly higher than in School C (median = 34) $U = 99.50$, $d = 1.05$.

4.3.2.4 Cohen’s $d$

The effect size of each significant relationship was then calculated using Cohen’s $d$. The results can be seen above donated by ‘$d$’. All values are above 0.8 donating a large effect size for each.
### Table 6 Significant differences between schools’ students' NEP scale scores

<table>
<thead>
<tr>
<th>School</th>
<th>A Mainstream school, rural village location, Eco-school, notably enthusiastic teacher, paid sustainability/Eco-school TA</th>
<th>B HSE or small school, focus on relationships, set in national park, high amount of outdoor learning/experiences. Fee-paying.</th>
<th>C Mainstream, village based Eco-school</th>
<th>D Mainstream, small town based Eco-school</th>
<th>E Mainstream, city based Eco-school</th>
<th>F Alternative and holistic education based school (Steiner school), with a focus on moral development. Fee-paying.</th>
<th>G Independent school, Eco-school. Extensive outdoor grounds. Fee paying.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>C</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>E</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>F</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>G</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Crossed sections correspond to significant differences between schools’ student NEP scale scores e.g. looking at column D: School D has significantly different student NEP scale scores to Schools A, F and G. Descriptions of schools are subjective. TA = Teaching Assistant, HSE = Human Scale Education
4.4 Comparing NEP scale scores with School and Teacher question responses

4.4.1 Tests for normality

4.4.1.1 Kolmogorov-Smirnov test

The distribution of NEP scale scores, $D (152) = 0.93$, $p < .01$, was significantly non-normal. Therefore, non-parametric tests were used.

4.4.2 Tests for difference between corresponding NEP scale scores for different Teacher Question responses

4.4.2.1 Kruskal-Wallis tests

The Kruskal-Wallis (K-W) tests showed that NEP scale scores were significantly affected by teacher responses to the Teacher Questions displayed in Table 7.

Table 7 Significant K-W test results for teacher questionnaire responses

<table>
<thead>
<tr>
<th>Teacher Question</th>
<th>df</th>
<th>$H$ (test statistic)</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1e How often are practical activities linked to the students’ concept development and theory construction?</td>
<td>1</td>
<td>4.29</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>1f How often are students provided with the opportunity for self-learning and the development of their own ideas and perspectives?</td>
<td>1</td>
<td>4.29</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>5 How often are students asked to give arguments for different positions?</td>
<td>1</td>
<td>5.09</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>6 How often are students given the opportunity to clarify and discuss their own values and attempt to understand other values?</td>
<td>1</td>
<td>5.09</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>8 How often do students take part in the decision making process - appropriate to the students’ age and capacities.</td>
<td>1</td>
<td>4.39</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>9 How often is academic subject matter taught through a focus on problems and issues?</td>
<td>2</td>
<td>10.93</td>
<td>$P &lt; .01$</td>
</tr>
</tbody>
</table>

4.4.2.2 Mann-Whitney tests

Mann-Whitney (M-W) tests were performed in order to determine significant differences between two different responses e.g. between
teachers who responded ‘Frequently’ and those who responded ‘Rarely’. The effect size for each was determined using Cohen’s d, where $0.2 \leq$ small effect, $0.5 \leq$ medium effect and $0.8 \leq$ large effect. Significant results are shown in Table 8 below.

Table 8 Significant M-W test results for teacher questionnaire responses

<table>
<thead>
<tr>
<th>Teacher Question</th>
<th>Teacher Response</th>
<th>School(s)</th>
<th>Median NEP</th>
<th>Mean NEP</th>
<th>U</th>
<th>p value</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1e How often are practical activities linked to the students’ concept development and theory construction?</td>
<td>Occasionally</td>
<td>G</td>
<td>36.5</td>
<td>36.42</td>
<td>1127.50</td>
<td>.05</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>A, B, C, D, E, F</td>
<td>35.0</td>
<td>34.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1f How often are students provided with the opportunity for self-learning and the development of their own ideas and perspectives?</td>
<td>Occasionally</td>
<td>G</td>
<td>36.5</td>
<td>36.42</td>
<td>1127.50</td>
<td>.05</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>A, B, C, D, E, F</td>
<td>35.0</td>
<td>34.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 How often are students asked to give arguments for different positions?</td>
<td>Occasionally</td>
<td>F</td>
<td>37.0</td>
<td>37.13</td>
<td>663.50</td>
<td>.05</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>A, B, C, D, E, G</td>
<td>35.0</td>
<td>34.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher Question</td>
<td>Teacher Response</td>
<td>School(s)</td>
<td>Median NEP</td>
<td>Mean NEP</td>
<td>U</td>
<td>p value &lt;</td>
<td>d</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>-----------</td>
<td>------------</td>
<td>----------</td>
<td>-------</td>
<td>-----------</td>
<td>-----</td>
</tr>
<tr>
<td>6 How often are students given the opportunity to clarify and discuss their own values and attempt to understand other values?</td>
<td>Occasionally</td>
<td>F</td>
<td>37.0</td>
<td>37.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>A, B, C, D, E, G</td>
<td>35.0</td>
<td>34.59</td>
<td>663.50</td>
<td>.05</td>
<td>0.69</td>
</tr>
<tr>
<td>8 How often do students take part in the decision making process - appropriate to the students’ age and capacities.</td>
<td>Occasionally</td>
<td>G</td>
<td>36.5</td>
<td>36.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>A, B, C, D, E, F</td>
<td>35.0</td>
<td>34.55</td>
<td>1127.50</td>
<td>.05</td>
<td>0.43</td>
</tr>
<tr>
<td>9 How often is academic subject matter taught through a focus on problems and issues?</td>
<td>Occasionally</td>
<td>F</td>
<td>37.0</td>
<td>37.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>A, B, C, D, E</td>
<td>35.0</td>
<td>34.20</td>
<td>493.5</td>
<td>.0167</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Note: Question 9 had three different responses from teachers, so three M-W tests were initially performed to test for all possible significant differences. A Bonferroni correction was applied, so effects are reported at a 0.0167 significance level (i.e. 0.05/3).
4.4.3 Tests for difference between corresponding NEP scale scores for different School Question responses

4.4.3.1 Kruskal-Wallis tests

The Kruskal-Wallis (K-W) tests showed that NEP scale scores were significantly affected by School responses to the Teacher Questions displayed Table 9.

Table 9 Significant K-S results for school questionnaire responses

<table>
<thead>
<tr>
<th>School Question</th>
<th>df</th>
<th>H (test statistic)</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>10a The school includes a focus on ESD in its mission and annual action plan</td>
<td>1</td>
<td>4.29</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>11a The school leadership has a particular role in facilitating a school atmosphere where everyone feels that she/he can contribute with innovative ideas and proposals.</td>
<td>1</td>
<td>4.39</td>
<td>$P &lt; .05$</td>
</tr>
<tr>
<td>13b The school clarifies and develops quality criteria for ESD according to its vision of ESD, and uses them for internal evaluation.</td>
<td>2</td>
<td>12.67</td>
<td>$P &lt; .01$</td>
</tr>
<tr>
<td>14c The school enables the local community to address its concerns to the school and serve as a ‘community-centre’.</td>
<td>2</td>
<td>15.56</td>
<td>$P &lt; .001$</td>
</tr>
<tr>
<td>15a The school co-operates with other schools in order to develop, exchange and compare ideas and information relevant for ESD.</td>
<td>1</td>
<td>6.47</td>
<td>$P &lt; .05$</td>
</tr>
</tbody>
</table>

4.4.3.2 Mann-Whitney tests

Mann-Whitney (M-W) tests were performed in order to determine significant differences between two different responses e.g. between principals/school reps who responded ‘Disagree’ and those who responded ‘Agree’. The effect size for each was determined using Cohen’s $d$, where $0.2 \leq$ small effect, $0.5 \leq$ medium effect and $0.8 \leq$ large effect. Significant results are shown in Table 10.
Table 10 Significant M-W test results for school questionnaire responses

<table>
<thead>
<tr>
<th>School Question</th>
<th>School Response</th>
<th>School(s)</th>
<th>Median NEP</th>
<th>Mean NEP</th>
<th>U</th>
<th>p value &lt;</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>10a The school includes a focus on ESD in its mission and annual action plan</td>
<td>Moderately agree / To some extent</td>
<td>G</td>
<td>36.5</td>
<td>36.42</td>
<td>1127.50</td>
<td>.05</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>A, B, C, D, E, F</td>
<td>35.0</td>
<td>34.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11a The school leadership has a particular role in facilitating a school</td>
<td>Moderately agree / To some extent</td>
<td>G</td>
<td>36.5</td>
<td>36.42</td>
<td>1127.50</td>
<td>.05</td>
<td>0.43</td>
</tr>
<tr>
<td>atmosphere in which everyone feels that she/he can contribute with innovative</td>
<td>Agree</td>
<td>A, B, C, D, E, F</td>
<td>35.0</td>
<td>34.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ideas and proposals.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13b The school clarifies and develops quality criteria for ESD according to its</td>
<td>Disagree</td>
<td>G</td>
<td>36.5</td>
<td>36.42</td>
<td>311.50</td>
<td>.0167</td>
<td>.80</td>
</tr>
<tr>
<td>vision of ESD, and uses them for internal evaluation.</td>
<td>Agree</td>
<td>C, D</td>
<td>34.0</td>
<td>32.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13b The school clarifies and develops quality criteria for ESD according to its</td>
<td>Moderately agree / To some extent</td>
<td>A, B, E, F</td>
<td>35.0</td>
<td>35.48</td>
<td>1290.50</td>
<td>.0167</td>
<td>.63</td>
</tr>
<tr>
<td>vision of ESD, and uses them for internal evaluation.</td>
<td>Agree</td>
<td>C, D</td>
<td>34.0</td>
<td>32.89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note: Questions 13b and 14c had three different responses from schools, so three M-W tests were initially performed to test for all possible differences. A Bonferroni correction was applied, so effects are reported at a 0.0167 significance level (i.e. 0.05/3).
5 Discussion

This chapter will discuss what the results section revealed and what meaning can be drawn from the data. Section 5.1 will discuss more general findings, such as observations on the dataset from all schools (section 5.1.1), ambiguities within the NEP scale questionnaire, revealed whilst administering the questionnaire and in data analysis (section 5.1.2) and the issues of ‘conflicting values’ apparent in some students (section 5.1.3). These general findings are relevant to all the subsequent findings discussed.

Next, the data is used to inform a comparison of NEP scale scores between schools (section 5.2). This section relates directly to this thesis’s first research question: What are the levels of ‘pro-environmental orientation’ of students receiving differing ESD provision? Confounding variables that are likely to have affected the research results are then discussed (section 5.2.6).

The data is then used to discuss the NEP scale scores, firstly in relation to the Class Teacher Questionnaire (section 5.3) and secondly in relation to the School Questionnaire (section 5.4).

Following the discussion section, the major conclusions of the research are presented in Chapter 6, along with the limitations of the study (section 6.3) and suggestions for further research (section 6.4).

5.1 General findings

5.1.1 Pro-environmental orientation overall

Previous studies (see Manoli et al., 2007; Dunlap et al., 2000) have used the mid-point of the NEP scale score, in this case a score of 22 or 23, to divide individuals into those with ‘pro-environmental orientation’ supporting the ‘New Ecological Paradigm (NEP)’ (Dunlap & Van Liere, 1978) or ‘contra-environmental orientation’ supporting the ‘Dominant Social Paradigm (DEP)’ (ibid) i.e. those with a score of 23 or above would be considered pro-environmental. However, being that the questionnaire contains a somewhat neutral ‘Not sure’ category, it seems more appropriate to consider students as having a ‘pro-environmental orientation’ if they score 36 or above – and therefore on the whole either
‘Agree’ or ‘Strongly Agree’ with pro-environmental statements or conversely ‘Disagree’ or ‘Strongly Disagree’ with contra-environmental statements. 71 students, or roughly 47% of students, had scores of 36 or above. Therefore, the complete data set suggested that roughly half of the students were, to an extent, pro-environmentally orientated.

5.1.2 Ambiguities within the NEP scale questionnaire for children

It became apparent particularly during the research collection, but also during the statistical analysis of data, that the students were often uncertain about the meaning or interpretation of the questions/scale items. However, some of these ‘misinterpretations’ were quite interesting. As discussed in section 4.1.1, Question 3 was removed during statistical analysis due to a low correlation with other items, which could be linked to the fact that students seemed to interpret the question differently to that intended by the questionnaire/scale developers (Manoli et al., 2007). The intended interpretation of Question 3 (‘People are clever enough to keep from ruining the earth’), one assumes, is meant to probe feelings of human arrogance and human exemptionalism; the premise being that it is unwise, or unecologically-minded, to think that humans will be able to use their ‘cleverness’ to avert disaster without having to address the fundamental issues of the human-environment relationship. Cleverness is used here as opposed to ecological intelligence, as explained by Orr (2004) and Stirling (2009). However, it seemed that some students in this study interpreted this question in a more optimistic light – in the sense that humans are capable of averting disaster if only we would use our intelligence in the right way i.e. to act, or be, sustainable – we could be ecologically intelligent. 40% of students with ‘pro-environmental’ NEP scale scores overall, answered Question 3 contra-environmentally. This may point towards a more positive, optimistic attitude towards sustainability among children, potentially in response to increased learning on sustainability issues.

Although a certain amount of leeway can be given for differing values within a predominantly pro-environmental orientation, the 0.65 coefficient alpha (Cronbach’s alpha) may in fact indicate that there were other misinterpretations of the scale items/questions. The statements in the student questionnaire can be considered quite abstract, or at least open to interpretation.
In correspondence with one of the class teachers, the teacher remarked that the students, and herself, had been unsure of Question 4: ‘People must still obey the laws of nature’. It was decided to interpret it as “people should not interfere with genetics in plants or animals” (Personal communication, June 21, 2011) whereas the intended interpretation was probably more in relation to ideas of entropy and thermodynamics and perhaps systems thinking – all complex ideas, and arguably beyond the comprehension of 10-12 year olds. Question 2: ‘There are too many (or almost too many) people on earth’ can only be interpreted as intended if the students have a reasonable knowledge of population growth issues and even then they may be more inclined to believe that sustainability relies more upon living well with the earth, rather than limiting its number of inhabitants.

Misconceptions or differing interpretations are much more likely with a questionnaire-based study than, say, an interview or discussion, which allow for further clarification and elaboration. With a questionnaire, there is no guarantee that one individual’s interpretation is the same as another’s. Ideally, the questionnaire would have been supported with qualitative data, such as interviews or discussions, which unfortunately were not within the scope of this thesis.

5.1.3 Conflicting values

In one school, a discussion followed the administering of the questionnaire. The class teacher focused the discussion on Question 1: ‘Plants and animals have as much right as people to live’. Many students agreed with this statement initially, but when questions such as whether eating meat was acceptable were discussed, or whether they would kill a wasp that was trying to sting them, or had stung them, or kill a spider in their house, the students became less sure. This in itself does not suggest that the question is an unreliable indicator, rather it can be seen as showing that other values may be activated when making a choice about appropriate behaviour e.g. values of cleanliness, health or security - security based values, found to be opposite to universal or benevolent based values (see the Values map - Figure 4). This may suggest that although intellectually, or idealistically, some students may feel strong intrinsic values (‘universal values’) emerge when contemplating Question 1, in a practical capacity, with other factors involved, other values e.g. extrinsic values, may be activated, and the ‘seesaw effect’ may affect behaviour (see section 2.2.1). This also ties in with Stern’s (2000) value-
belief-norm behaviour model, which places importance on ‘personal norms’ and contextual factors, as well as beliefs and values (see section 2.1). As discussed in section 2.1, past experience, cultural and social norms and contextual factors (see Figure 3) all influence behaviour. These ‘other factors’ can result in an individual having a person specific mix-match version of the NEP’s pro-environmental orientation profile or sustainability more generally. This in itself could be an argument for strengthening intrinsic and pro-environmental values, so that person specific inconsistencies may be brought to light and thoughtfully considered by the individual.

It is worth noting also, there may be an element of sustainability as a ‘subject’ i.e. students are told that plants and animals are equal, but they do not understand why, or have the intrinsic values to support this view. Therefore, when confronted with conflicting or inconsistent values, there is uncertainty. Sustainability in an ‘educational setting’ is discussed in section 6.3.1 below.

5.2 Comparing NEP scale scores between schools

5.2.1 Overview

This section will discuss both the descriptive statistics and the significant results from the Mann-Whitney tests. Schools that have a notable or significant difference between them are compared. Descriptive and frequency data can be found in Section 4.2. There is also a more visual representation of the data in the form of a box-plot of NEP scale scores by school in Appendix C (Figure 6)

The standard deviation for the collection of results from each school will be discussed. The standard deviation (SD) is a universal measure of how much dispersion, or variation, there is from the mean of the dataset. A low SD indicates that the data points tend to be very close to the mean, whereas a high SD indicates that the data points are spread out over a large range of values. It is particularly useful in this study, as it enables the comparison of variation between samples of different size. In relation to this research, the SD can give an idea of how varied the NEP scale scores of students were in each school – possibly indicating how much of an affect the school ESD programme is having. The percentage of scores above and below the ‘pro-environmental’ indicator score of 36 (see section 5.1.1) will also be discussed.
Significant Mann-Whitney test results inform which comparisons are made, and hence the section layout below. These tests indicate whether there is a significant difference between the NEP scale scores of each school. Table 6 shows a comparison of each school, indicating where there are significant differences between schools’ student NEP scale scores (based on the Mann-Whitney tests detailed in Section 4.3.2).

5.2.2 Comparing Schools F, C and D

School F was found to have significantly different NEP scale scores to Schools C and D (U = 99.50, d = 1.05 and U = 56.00, d = 1.25 respectively (see section 4.3.2). The effect of ‘school’ in both these instances was considered ‘large’ according to Cohen’s d. The differences in students’ NEP scale scores between these schools can be seen quite clearly in Table 5 in section 4.2.

5.2.2.1 School F

School F had a mean NEP scale score of 37.13, and median of 37, both being higher than all other schools. It also had the lowest standard deviation, 2.95 (to 2.s.f), the lowest range, of 9, and the lowest minimum score (33) with a maximum of 42. This indicates, that compared to other schools, School F had less variation in scores between students, indicating that the ‘environmental orientation’ of students was less varied. 10 students, 73.3%, had scores above 36, indicating ‘pro-environmental orientation’. This is a higher percentage than in all other schools.

School F can be described as being a non-mainstream school with a holistic educational practice and a strong moral framework supportive of intrinsic value development – it is a Steiner school (see section 2.4.3.2)

Both Armon (1997) and Hether (2001) researched the effect of Steiner education on moral development. Hether (2001) carried out comparative research on the moral development of Steiner high school students and their non-Steiner educated contemporaries. Hether (2001, p. 18) administered a ‘Defining Issues Test’ (DIT), which consists of six moral dilemma stories followed by multiple-choice questions about what the protagonist ought to do to resolve the dilemmas. The students were then asked to rate the importance of twelve issues that are relevant in deciding on the course of action, and, finally, to rank the four most important of those issues. Hether (2001) found that Steiner educated students scored higher than non-Steiner educated students, and in addition made non-
prompted comments regarding the limitations of the survey. Hether (ibid) then undertook qualitative research at a number of Steiner schools and devised features or themes of the education that she considered encouraged moral development. The themes most relevant to ESD are:

• An emphasis on educating the whole person

• The integral role of the arts

• Preserving a sense of wonder about the natural world

Hether (2001, p. 23) also highlighted an important aspect of moral education relevant to ESD:

Steiner unequivocally establishes a connection between moral reasoning and moral action. Children from Waldorf [Steiner] school backgrounds realize in a concrete way that words in and of themselves do not make something so, and that, in the moral domain especially, it is taking action that counts.

This suggests an overall strengthening of the different aspects within Stern’s (2000) Value-belief-norm behaviour model (see section 2.1), in the sense that values or ‘morals’ are strengthened, and in addition the importance, and linkage, of ‘beliefs’ and ‘personal norms’ are indicated.

Armon (1997) carried out a comparative study to investigate what constitutes moral education in Waldorf (Steiner) classrooms. In the abstract she stated:

Findings reveal that teachers guide students artistically to balanced thinking, feeling, and willing in the pursuit of truth, beauty and goodness. The overarching goal is to help children build a moral impulse within so that they can choose, in freedom, what it means to live morally.

Armon (1997, p. 6) stated that the focussed interest of Steiner school teachers in the moral development of their students was in itself an important factor in the moral development of the students. By taking an interest in the student, the teacher “draws on compassion and enters into a deeper understanding of the child” (ibid). Steiner school teachers are encouraged to be reflective and ‘meditative’ on their practice and on their individual students as well as develop balance in regard to their own
thinking and feeling, which Armon (1997, p. 19) argues educates students morally through the teacher’s visible work in the classroom. This links to the theory of value strengthening discussed in Section 2.2 (Crompton, 2010; Holmes et al., 2011), whereby intrinsic values can be strengthened by the behaviour of the teacher and the way s/he interacts with the class e.g. an open, interactive teaching style as opposed to an authoritarian style.

The moral education of Steiner schools also comes from the school ethos and climate. In a study by Woods, Ashley and Woods (2005) for the then UK government’s Department for Education and Skills (DfES), the authors reported the “close attention” that is given to everyone (including pupils) as “individuals and as members of the community” (p. 5). Another notable aspect of Steiner schools is in the means of leadership and management. Woods et al. (2005, p. 7) reported that the schools do not have a formal hierarchy amongst teachers and in the vast majority of schools the spiritual life of the school, as well as the responsibility for the school’s educational activities and management belongs to the teachers themselves. This ties in with fostering a classroom and school climate based on intrinsic, inclusive values, rather than on more authoritarian, extrinsic values (Holmes et al., 2011, p. 30).

These results would seem to support value theory and arguments for a worldview or frame of mind change/approach. It should be noted however, that confounding variables are also likely to have an affect. This type of school is likely to attract parents with differing values to those of a mainstream school. Steiner schools are also known to encourage close relationships with parents (Woods et al., 2005, p. 17), therefore increasing the likelihood of consistent value strengthening.

5.2.2.2 School C and School D and the potential limitations of the Eco-schools programme

School C had the second lowest mean NEP scale core of 33.26 and median of 35. It had a standard deviation of 4.32 (to 2.s.f), with a range of 19 (minimum = 23 and maximum = 42). This indicates that there was a higher than average amount of variation in scores (average SD = 3.88). 11 students, 40.7%, had scores above 36, indicating that less than half of School C’s students can be considered ‘pro-environmental’.

School D had the lowest mean NEP scale score of 32.37, and median of 34. It had the highest standard deviation of 4.50 (to 2.s.f), with a range of 16 (minimum = 22 and maximum = 38). This indicates that School D had the highest amount of variance in scores. 13 students, 21.1%, had scores
above 36, indicating that less than a quarter of School D’s students can be considered ‘pro-environmental’.

Schools C and D were both categorised as mainstream schools, both had been awarded the Green Flag from the Eco-schools programme – the highest award. As described in section 2.4.2, the Eco-schools programme centres around nine topics, and is based on the idea of learning by doing e.g. learning about energy, then monitoring the energy use in the schools and introducing measures to reduce energy use. Faye Benedict (1991) stated that the most effective way to change attitudes and behaviour is not just by imparting knowledge, but also by allowing students to experience the issues directly and take action to solve the problem, much in line with current thinking regarding ESD and action competence. She also argued “active learning...or experiential learning is the key to achieving the emotional, ethical and behavioural goals of environmental education” (Bennedict, 1991, p. 28). However, current value theory would seem to suggest that values, rather than actions, affect values. Further, it is these values that are most likely to affect behaviour (Holmes et al., 2011; Crompton, 2010)

Interestingly, the Eco-schools website lists the ‘benefits’ of joining the Eco-schools programme as “saving money, recognition and publicity, links to the curriculum, links to the community and school improvements” (Eco-schools, 2011d). Of course, the benefits are aimed at appealing to teachers and schools, and don’t necessarily translate into the student element of the Eco-schools programme, but by presenting the programme as ‘instrumental’ and by appealing to extrinsic values (i.e. wealth and social recognition), which may or may not be passed onto the students, the programme may not be strengthening intrinsic values or prompting a frame of mind change. Of course, many teachers using the Eco-schools programme are likely to implement the programme in such a way as to emphasise the frame of mind and intrinsic value elements, but it doesn’t appear to be essential to the programme. There is an element of sustainability as a combination of science and management within the Eco-schools programme (Huckle, 2006, p. 26).

The significant difference between the students’ NEP scale scores from School F and Schools C and D may be in relation to the ESD provision/ ESD related practices at the schools. The results appear to support both value theory and the argument for sustainability as a frame of mind, in that the focus of school F on a more holistic, intrinsic value related education, rather than a problem or action focussed ESD programme, produces
significantly higher student NEP scale scores, which according to value theory and Stern’s (2000) Value-Behaviour-Norm theory, forms the basis of more pro-environmental behaviour.

5.2.3 Comparing Schools A and D

School A and School D were found to have significantly different NEP scale scores ($U = 131.5$, $d = 1.00$). The effect of ‘school’ in this instance was considered ‘large’ according the Cohen’s d.

This finding is particularly interesting, as both are mainstream schools following the Eco-schools programme, both having been awarded the ‘Green flag’ – the highest award. This finding could suggest that the programme or framework being followed may be less important than other factors such as intrinsic value strengthening, or presenting sustainability as a frame of mind – processes that can happen alongside ESD programmes if they are not embedded in them. Of course, there are numerous other factors and confounding variables that could have affected the results, such as location and socio-economic background, etc. – which will be discussed further in section 5.2.6 below. Though there do not appear to be obvious differences in this particular case, lending strength to the current value theory interpretation.

5.2.3.1 School A

School A had a mean NEP scale score of 36.36, and a median of 36. It had a standard deviation of 3.43 (to 2.s.f), with a range of 13 (minimum = 29, maximum = 42). School A therefore had a less than average amount of variation in student NEP scale scores (average SD = 3.88). 16 students, 57.1%, had scores above 36, indicating that more than half of School A’s students can be considered ‘pro-environmentally orientated’. School A can be categorised as a mainstream, rural based Eco-school.

From field notes, it was recorded that the class teacher of School A was notably keen on sustainability, and had been responsible for introducing the Eco-schools programme at the school. A teaching assistant had been assigned (shared between a few other schools) in order that enough time could be allocated to organising the Eco-school programme – indicating a high priority level.

Following the administering of the test, a teaching session was given on ‘Deforestation opinions’, whereby small groups of students were given a set of cards with a different opinion regarding deforestation written on each. Each group were then asked to order the cards from ‘Agree’ to
‘Disagree’. A class discussion followed the activity, whereby it was clear that the students were very well practiced at taking part in discussions and showing respect towards each other’s views.

The class teacher was very keen on students ‘experiencing’ the negative side of unsustainability, and gave an example of a class visit to a landfill site. This type of experience is likely to have more of an affect on students’ environmental orientation than, for example, by encouraging recycling through information posters, etc.; by showing the detrimental effects of not recycling, by appealing to individuals’ intrinsic values of responsibility, of protecting the environment and of the unity of nature (see values map Figure 4 and section 2.2).

The class teacher appeared to display and actively encourage intrinsic values through both her teaching style, and her own concerns regarding sustainability and the environment. This finding would seem to support current value theory.

5.2.3.2 School D

The descriptive statistics for School D can be seen above in section 5.2.2.2. The high amount of variance among School D students’ NEP scale scores may suggest a less influential role of the ESD programme. As described in section 5.2.2.2 above, a possible limitation of the eco-schools programme is that it may be centred on the premise of sustainability as science and management. Without grounding the programme in intrinsic values or sustainability as a frame of mind, the impact on ‘pro-environmental orientation’ may be limited. Students may be well practiced at recycling, or monitoring and reducing electric or water use, but they may not be adept at addressing the ‘root causes’ of these problems (Bonnett, 2003; Huckle, 2006), or seeing sustainability as a way of thinking. This would likely reveal itself in the NEP scale questionnaire, as it addresses worldview rather than practical sustainability.

Field notes taken during the visit to School D did not indicate a notable strengthening of intrinsic values or sustainability presented as a frame of mind. However, the visit was short, and therefore much will be missing from the experience, compared to what takes place at the school. Also, the class teacher was not the usual class teacher, so interpretation was limited and difficult. It was interesting that the day of the visit, the class students had a self-directed study day, meaning the students themselves had planned their agenda for the day. This would indicate a more open style of teaching, which could be seen as supportive of intrinsic values such as self-direction. However, this may have been in part due to the
usual class teacher being absent, and may not be a frequently advocated learning method.

The notable enthusiasm of School A’s class teacher, the importance placed on sustainability within the school indicated by the allocation of a teaching assistant, the foundation of intrinsic values in classroom interactions and class activities, are likely to have influenced the significantly higher NEP scale score compared to School D. Schools D’s relatively high amount of variance could indicate that the school ESD programme is not having a strong influence on students’ pro-environmental orientation.

5.2.4 Comparing School G and School D

School G and School D were found to have significantly different NEP scale scores (U = 99.50, d = 1.05). The effect of ‘school’ in this instance was considered ‘large’ according the Cohen’s d.

5.2.4.1 School G

School G had a mean NEP scale score of 36.42 (to 2.s.f) and a median of 37. It had a standard deviation of 4.46 (to 2.s.f), with a range of 19 (minimum = 25, maximum = 44). School G therefore had a higher than average (average SD = 3.88) amount of variation in NEP scale scores. 16 students, 66.7%, had scores above 36, indicating that roughly two-thirds of School G’s students can be considered ‘pro-environmentally orientated’ – this is the second highest percentage (School F having 73.3%). As already mentioned above (see section 5.2.2), School D had a similar SD (4.50), but a fewer percentage of students, 21.1%, with scores above 36.

School G can be categorised as an independent, fee-paying school. It has been awarded the green flag in the Eco-schools programme. Unfortunately it was not possible to visit School G, therefore field notes, which may have informed interpretation of the results, were not taken. However, the school sent a copy of the school Green Team’s action plan 2010/11 and relevant details from the Governors’ report 2010-11. Many of the planned activities of the green team can be linked to the Eco-schools programme. However, the governors’ report revealed a high level of outdoor focussed education e.g. visits to the local natural environment including AONBs (Area of Outstanding Natural Beauty) and the onsite SSSI (Site of Special Scientific Interest). In addition, regular community environmental work had taken place through a pilot scheme, where students were involved in habitat preservation and learnt about ecology.
This may influence the students’ intrinsic values such as ‘protecting the environment’, ‘a world of beauty’ and ‘unity with nature’ (see Values map Figure 4). Holmes et al. (2011, p. 30) stated that time spent in forests and parks may promote appreciation for nature and other intrinsic values.

An interesting paragraph in the governors’ report emphasises the importance of the ‘hidden curriculum’ and the message staff send to the students in terms of the example they set, and how this can be involved in fostering environmentally responsible values in the students. This links to the idea of strengthening intrinsic values – in this case by advocating and promoting sustainability and related intrinsic values by example and behaviour.

It is worth noting, that the relatively large SD of School G, would seem to indicate that the ESD at the school could be more influential. Information provided by the school indicated that the sustainability programme was very much developing and was perceived as somewhat “piecemeal” at the time of this study (Personal communication, June, 2011). It could also indicate that other factors are influencing the environmental orientation of the students, e.g. higher socio-economic background or parental influence (see section 5.2.6 below).

School D has been discussed in detail in previous sections (see sections 5.2.2.2 and 5.2.3.2). The lack of qualitative data on the schools makes interpretation difficult, however, it does seem as if School G has a more ‘all-inclusive’ approach to sustainability at school, using the Eco-schools programme as a base only. However, further research would need to be carried out to clarify this.

5.2.5 Schools B and E

5.2.5.1 School B

School B had a mean NEP scale score of 34, and median of 33. There was a standard deviation of 3.35 (to 2.s.f), with a range of 10 (minimum = 31, maximum = 41). School B therefore had a lower than average (average SD = 3.88) amount of variation in NEP scale scores. 2 students, 22.2%, had scores above 36, indicating that less than a quarter of School B’s students can be considered ‘pro-environmentally orientated’. School B can be described as a small school (i.e. HSE school see section 2.4.3), located in a national park.

Unfortunately, the nature of small schools mean that obtaining adequate sample sizes is problematic, and the small sample size obtained
in this study limits interpretation. Given a larger sample size, significant results may have emerged. The small sample size also makes interpretation of results more difficult e.g. only 22.2% of students had a NEP scale score of 36 or more, the second lowest percentage after School D; yet, School B also had the second highest minimum NEP scale score.

Field notes recorded a relaxed, open learning environment, with close relationships between students and with their teacher – encouraged by the small number of students. Before the visit, the students had been walking in the national park. The teacher commented that time spent in the national park did not necessarily involve following a teaching plan, and often the students were simply allowed to experience and enjoy the environment – an activity likely to strengthen intrinsic values such as ‘unity with nature’ and ‘a world of beauty’, therefore encouraging values such as ‘protecting the environment’ and ‘equality’. This coupled with the open learning style in the classroom would serve to strengthen universal values as a whole, and according to value theory and Stern’s (2000) value-belief-norm behaviour model, increasing ‘pro-environmentalism’.

It was expected that NEP scale scores would be significantly higher at School B, due to the more holistic education approach. However, although there was a relatively high minimum score, NEP scale scores were still predominantly below 36. The small sample size however, makes interpretation difficult.

### 5.2.5.2 School E

School E had a mean NEP scale score of 34.27 (to 2.s.f) and a median of 34. There was a standard deviation of 4.17 (to 2.s.f), with a range of 23 (minimum = 22, maximum = 45). School E therefore had a higher than average amount of variation in students’ NEP scale scores (average SD = 3.88). 11 students, 36.7%, had scores above 36, indicating roughly one-third of students can be considered ‘pro-environmentally orientated’.

School E can be described as a mainstream, city based, Eco-school, which had been awarded a Green flag.

Similarly to School D and C, the relatively large SD and range may indicate that the school’s ESD programme may be having a limited impact on students. Interestingly, School E had a student with the lowest score (22) and another with the highest score (45).

Notable field notes related to the students’ varied ability to take part in a discussion that followed the administering of the questionnaire, particularly their willingness to listen to others. This contrasted greatly
with the more uniform ability amongst students at School A for example, perhaps suggesting that some students lacked strong intrinsic values, or whose intrinsic values were not activated in such a situation. However, the class has just returned from a school play rehearsal, which may have excited the students, and strengthened more extrinsic values e.g. excitement, creative and enjoyment values. Therefore it could have been a difficult switch to then talk seriously about environmental issues. It is possible that the circumstances had an impact on the results obtained i.e. how the students completed the questionnaire. Crompton et al. (2010) gives examples of experiments where participants answer questions differently depending if they have been primed beforehand by engaging either extrinsic or intrinsic values.

5.2.6 Confounding variables

The above discussion focussed on the affect of school, teaching styles and roles, school climate and ESD programmes. However, the student NEP scale score results obtained are very likely to have been affected by other variables such as the socio-economic status of the students, parental influence and upbringing, cultural background, peer group, etc. (see section 2.2; Holmes et al., 2011, p. 31; Kollmuss & Agyeman, 2002). This is particularly important when students are attending non-mainstream schools, or schools of choice e.g. Schools B, F and G. For example, as stated previously (see section 5.2.2) School F is likely to attract parents with values different to those of a mainstream school. Steiner schools are also known to encourage close relationships with parents (Woods et al., 2005, p. 17) suggesting a consistency in value strengthening. Breiting et al. (2005, p. 39) consider the involvement of parents in the life of the school as essential components of ESD. There is likely to be reinforcement of similar values taking place through both school and home experiences. This of course also makes it difficult to separate the two influences without further research. When the student NEP scale scores are less varied i.e. the school has a lower SD value, although it seems logical to interpret this as the school having a stronger influence on the students than a school with a higher SD, the influence of a parent group with similar values would likely have the same affect.

In addition to more general, on-going variables, there is the issue of specific variables such as the situation or circumstances when the questionnaire was administered. As mentioned previously, the classes had taken part in various activities before completing the questionnaire (see
sections 5.2.3 and 5.2.5). School B had just come back from a walk in a national park, School D was having a self-directed study day under a different teacher and School E had just had a rehearsal for the school play. Research has consistently shown that participants can be primed (e.g. by engaging an individual’s extrinsic values) before an experiment in order to influence their subsequent attitudes and behaviour (Holmes et al., 2011; Crompton, 2010). Unfortunately, limited time and different circumstances at the schools didn’t allow for a control in this regard, though this would certainly be worth including in future research.

5.3 Class Teacher questionnaire

5.3.1 Overview

Table 8 shows significant Mann-Whitney (M-W) tests for the relationship between NEP scale score and the response received on the class teacher questionnaire. It can be seen that the relationship between the response and the NEP scale score is only significant when the class teachers of either School F or School G have answered differently from the other school class teachers. As the M-W test is based on ranking the whole set of NEP scale scores i.e. all schools’ NEP scale scores that correspond to a particular response on the class teacher questionnaire; by combining scores together, the ranking of both groups will depend on the combination of schools. Therefore to separate School F or School G, both with comparatively high NEP scale scores, and compare it to the combined scores of all other schools, with lower NEP scale scores, results in a significant result.

The intention of the questionnaire was to attempt to identify certain ESD related classroom practices (deduced by certain questions) that corresponded with higher NEP scale scores. However, as can be seen from Table 8, significant results only occurred when either School F or School G stated they carried out certain ESD practices less often than the other schools e.g. data for Question 5: ‘How often are students asked to give arguments for different positions?’ produced a significant result from the M-W test, indicating that answering ‘Occasionally’ corresponded to significantly higher NEP scale scores than when answering ‘Frequently’.
5.3.2 Possible explanations

5.3.2.1 Influence of other factors

A possible explanation for the results is that other factors at the school or in the classroom, not addressed by the class teacher questionnaire, influenced the NEP scale scores significantly. For example, placing more of a focus on holistic education or on strong student and teacher relationships, or on experience of nature is likely to strengthen intrinsic values and beliefs and therefore ‘pro-environmental orientation’ and result in a higher NEP scale score. Such practices are not accounted for in the questionnaire. This might also explain the ‘negative’ relationship with questions, in that a focus on other factors and practices may result in less focus on practices addressed in the questionnaire. Conversely, more focus on the practices addressed in the questionnaire may mean there is less focus on the kinds of activities described above that are arguably more likely to lead to the strengthening of intrinsic values.

5.3.2.2 Limitations of ESD practice assessment

The class teacher questions deal with teaching and learning strategies, some of which could be said to engage intrinsic values, or to encourage values such as empathy, equality or broadmindedness, however, the questions do not directly address the engagement of intrinsic or extrinsic values. For example, Question 6: ‘How often are students given the opportunity to clarify and discuss their own values and attempt to understand other values?’ links to Breiting et al.’s (2005, p. 27) proposal that discussion of values strengthens reflection, mutual respect and understanding of other values. However, there is no guarantee that discussion will result in respect, or that intrinsic values will be strengthened. Such activities may lead to more ‘broadmindedness’ but there is also the danger that extrinsic values may be strengthened by individuals engaging or ‘activating’ such values during discussion. This is in some ways linked to a common dilemma with ‘value education’ – the avoidance or fear of perceived ‘indoctrination’. However, Schreiner et al. (2005) whilst not advocating ‘indoctrination’ did argue that knowledge and skills, such as discussion, were not enough, and that ‘personal value orientations’ and ‘motivational patterns’ must be addressed. This of course is problematic in a culture of respecting others views and having the freedom to hold your own opinion, etc. But, as Schreiner et al. (2005) argue, some values such as equality, human rights and environmental protection should be universal. Of course, as stated previously, there’s no
such thing as a value free education (Orr, 2004, p. 12; Crompton, 2010, p. 13). A failure to foster or encourage intrinsic values, or to counter extrinsic values, is detrimental to sustainability. Also, it should be noted, that many values such as ‘bullying is unacceptable’ or more general values expressed through punishments or teacher authority are reinforced without fear of accusations of indoctrination. It is obviously a tricky area in mainstream schools however.

5.3.2.3 Adaptation of Quality Criteria

Section 3.2.2 shows the development of both the class teacher and school questionnaires, by adapting Breiting et al.’s (2005) Quality Criteria for ESD Schools. Each question is a simplified version of particular criteria, or sets of criteria. Therefore much of the explanation and depth of the original criteria has been lost during this reduction, which may affect the interpretation of the questionnaire item, and also affect the ability of the questionnaire to identify the ESD practices proposed by Breiting et al. (2005).

In addition, the criteria were not designed as an assessment tool but as guidelines to ESD-practice. The authors emphasise that the criteria are only guidelines, and comment that individual schools should develop their own appropriate criteria. By adapting the criteria into assessment questions, some of the spirit of the criteria is lost and may affect its reliability as a measure. This also relates to the school questionnaire discussed below.

5.4 School questionnaire

5.4.1 Overview

Table 10 shows significant Mann-Whitney (M-W) tests for the relationship between NEP scale score and the response received on the school questionnaire. The intention of the questionnaire was to attempt to identify certain ESD related whole-school practices that corresponded with higher NEP scale scores. However, similar to the class teacher questionnaire discussed above, each of the significant M-W tests indicate that carrying out certain ESD practices less often than other schools corresponds to a significantly higher NEP scale score, i.e. responding ‘Disagree’ to Question 13b: ‘The school clarifies and develops quality criteria for ESD according to its vision of ESD, and uses them for internal evaluation’ corresponded to significantly higher NEP scale scores than responding ‘Agree’. There is much more variation between the schools in
response to the school questionnaire than the class questionnaire e.g. the significant results do not all occur when only school F or school G are in a different response group to the other schools.

5.4.2 Possible explanations

What makes it difficult to form a clear interpretation is that there is no way to separate the school response to a particular question from the school in general i.e. an individual school’s NEP scale scores will be a result of a combination of factors, not just a result of a particular practice – this has become more apparent as this study has progressed and as data has been explored. For example, it could be argued that the significant result of question 13b: ‘The school clarifies and develops quality criteria for ESD according to its vision of ESD, and uses them for internal evaluation’ indicates that students are likely to have significantly higher NEP if the school they attend does not follow this practice. This could point towards the benefits of a less prescribed ESD programme. However, School F, which has relatively high NEP scale scores, agreed with this question, placing such an interpretation into doubt.

Another important finding worth noting, is that Schools C and D, the schools with the lowest mean NEP scale scores, and with low percentages of students scoring 36 or above, answered every school/principal questionnaire item with ‘Agree’. This could indicate that the responses on the questionnaire either have a negative relationship with students’ NEP scale score, or the questionnaire does not address the more influential factors, or at least not to sufficient depth.

It could also suggest, as mentioned in section 5.2.2.2 and more generally throughout section 5.2, that the schools that approach ESD in a more action based, instrumental way, or see ESD as a management issue, may be able to answer the majority of the school/principal questionnaire with “agree”, but that approaching ESD in that way does not result in changed attitudes or values in the students.

It has become apparent as this study has progressed, that although the questionnaires and Quality Criteria from which they were derived contain many elements of ESD (many of which can be linked to intrinsic values), there is a large quantity of information regarding the schools’ ethos, climate and educational approach which is not addressed by the questionnaire. This is interesting in itself, in that if schools use the quality criteria exclusively, or focus on the elements within it, without addressing other school practices relating to ESD e.g. access to natural environments,
or a focus on a holistic education practice; then their ESD programme may yield limited results in terms of ‘pro-environmental orientation’ and sustainability as a frame of mind or with a basis in values.
6 Conclusions

6.1 Major findings

6.1.1 Support for value theory based ESD

The results indicated that a more holistic approach to education, with a focus on values, corresponds to a higher NEP scale scores and a higher percentage of students considered ‘pro-environmentally orientated’. This is supportive of current value theory, whereby strengthening of intrinsic values, both in relation to protecting the environment and other ‘neighbouring’ intrinsic values (see section 2.2), results in more pro-environmental orientation and behaviour.

In contrast, some of the schools following the eco-schools programme, which focuses on ‘topics’ and actions rather than values, had relatively lower NEP scale scores and a lower percentage of students considered ‘pro-environmentally orientated’. However, there were notable exceptions, and the difference seemed to be whether the schools used the Eco-schools programme as a tool within their wider approach to ESD, or as its ESD programme almost in its entirety. This may point towards the limitations of a ‘stand-alone’ knowledge and action-based approach in terms of addressing pro-environmental orientation or intrinsic values.

A teacher acting as a ‘role model’ that encourages and strengthens intrinsic values, and presents sustainability as a worldview seems to have an influence on the pro-environmental orientation of students. This supports the ideas of current value theory, in that strengthening of intrinsic values leads to more pro-environmental orientation and behaviour.

The presence of conflicting values when one class of students were presented with a particular problem, such as whether to kill a wasp that was trying to sting you, emphasised the importance of reinforcement of intrinsic values in order that they are comparatively strong when value conflicts arise. This also highlighted the problems of ‘sustainability as subject’, where learning is not grounded in values – students may ‘think’ sustainably but not be compelled to ‘act’ sustainably as they do not have the value drive to do so when a conflict in interests or values occurs (see the ‘seesaw effect’ in section 2.2.1).
In addition, this finding also supports Stern’s (2000) value-belief-norm behaviour theory, and the influence of contextual factors and personal norms on behaviour.

### 6.1.2 Influence of other variables

There was not always a clear explanation for the results obtained e.g. the difference between School G and School D, or the fact there was no significant difference between School E and School F. One factor is likely the lack of data gathered on the schools in terms of ESD and the school approach in general, another is the affect of confounding variables such as parental influence, peer influence, socio-economic factors, and location. These are considered important in value strengthening (Holmes et al., 2011; Crompton 2010), and therefore are likely to influence levels of ‘pro-environmental orientation’. This study focussed on the influence of education and in particular ESD, and therefore presents only a simplified and partial picture of the real life situation. Confounding variables may explain some of the results.

It was assumed that when there was relative consistency within school NEP scale scores i.e. there was a low SD, then the school had a strong influence and confounding variables were weaker. However, this may not be the case, as stated previously, particularly in terms of ‘alternative’ schools such as School F, parental values are likely to differ from those of say School D, the choice of school by parents indicating their own values.

### 6.1.3 Limitations of class teacher and school questionnaires

The lack of explanation divulged from both the class teacher and school questionnaire in terms of corresponding student NEP scale scores suggested that the adapted questionnaires could be limited by oversimplification of Breiting et al.’s (2005) Quality Criteria from which they were derived. However, the findings could indicate that the Quality Criteria are limited in terms of a focus on values or sustainability as a worldview, and may in fact lead to a more management or instrumental form of ESD.

### 6.1.4 NEP scale for children

The NEP scale for children had a below recommended level of internal consistency. Principal Component Analysis led to the removal of Question 3. The resulting value of 0.65 for Cronbach’s co-efficient alpha was not ideal – a value of at least 0.7 would increase confidence in the
measurement. This finding was supported by some noted ambiguities in the scale and students’ difficulty in understanding/interpreting certain questions/scale items. However, after removing Question 3, the scale was considered acceptable for this study, due to the complex nature of psychological constructs often resulting in lower co-efficient alpha levels, and overall the questionnaire was understood sufficiently, enabling reasonable conclusions to be drawn from the data.

6.2 Implication of findings

The indicated influence of holistic education, in addition to current value theory, suggests ESD based on intrinsic values, that presents sustainability as a worldview, or frame of mind, would likely increase pro-environmental orientation among students. According to current value theory, all other factors being equal, this will lead to more sustainable attitudes and behaviours. Therefore, current ESD practices should be reviewed in light of this.

The importance of teachers’ influence on students’ ‘pro-environmental orientation’ indicated by this study, suggests the importance of educating teachers themselves in regards to sustainability, and in addition the importance of strengthening intrinsic values. This could be achieved through a number of methods such as initial teacher training courses, in-school training sessions, or through general school ethos and standard practice.

Knowledge and action-based programmes, such as the current Eco-schools programme, are important in terms of developing ‘action competence’ but may be limited as a ‘stand-alone’ method of ESD. The underlying values of sustainability and unsustainability also need to be addressed. The Eco-schools programme should be reviewed in light of current value theory.

This study was simplistic in relation to the complexity of current value theory (see sections 2.1, 2.2 and Kollmuss & Agyeman, 2002). Uncertainties regarding the development of environmental orientation in students, more specifically in relation to ESD practices, mean further research should be undertaken in order to clarify and expand the initial findings here.

The NEP scale for children needs to be developed further. More simplistic items with less ambiguity would likely result in less misinterpretation. This study suggests that, in particular, the development of scale items should take account of the fact that some students’
consider sustainability as a form of ‘intelligence’ (akin to ‘ecological intelligence’) or ‘cleverness’, therefore allowing for alternate interpretations of Question 3 for example.

6.3 Limitations

6.3.1 General limitations

6.3.1.1 Sample size

A small sample size (i.e. number of schools) meant that interpretation was limited. Small sample sizes can make trends difficult to identify, and conversely may make certain characteristics seem more influential than they are, simply because there may be only one instance.

In addition, class sample sizes (i.e. number of pupils per school sample) in this study were uneven, again making interpretation difficult. Clearer distinctions could have been made if sample sizes were more similar. This was in part because the research was not a controlled experiment, and the study wished to reflect the ‘actual’ or ‘whole’ situation in each class i.e. rather than a sample from within each class, producing equal numbers for each school.

6.3.1.2 Influence of educational setting

Sustainability, or at least sustainability related issues are now taught in lessons in most UK schools to some extent. The fact that such topics are taught in the classroom may mean that a questionnaire regarding sustainability could be interpreted, or seen akin to a test or exam - Do students answer what they believe or feel? Or do they answer based on what they have learnt i.e. answering how they think they should answer? In order to try to combat this potential issue, it was stressed prior to the administering of the questionnaire that the students should give their own opinion.

6.3.1.3 Confounding variables

As stated in section 5.2.6, although interpretation of the results has focused on the influence of the ESD provision at the schools, as well as the responses on the class teacher and school questionnaires, there are a number of other factors that are likely to have influenced the students’ NEP scale score results to some extent e.g. the socio-economic status of the students, parental influence and upbringing, cultural background, peer group, etc. (Holmes et al., 2011, p. 31). As this research did not collect ‘experimental’ data, it is impossible to control these factors or separate
out their influence. However, throughout the discussion above, standard deviation was used as a possible indication of consistency within schools, suggesting that the teacher/school was having a stronger or weaker influence on students’ environmental orientation.

Qualitative research, such as interviews and discussions, or casting a larger net in terms of research areas e.g. including parents’ and teachers’ environmental orientation, and exploring behaviours in the home e.g. recycling, consumer behaviour, etc., would enable a clearer view of the role of these variables, but again, was beyond the scope of this study.

Also mentioned in section 5.2.6, was the issue of pre-test circumstances, which have been shown to potentially have an affect on intrinsic values and corresponding opinions (Holmes et al., 2011; Crompton, 2010). Unfortunately limited time and differing circumstances at the schools didn’t allow for a control in this regard, though this would certainly be worth including in future research.

6.3.1.4 Complexity of value theory and behaviour

As discussed in chapter 2, psychological processes such as value formation, decision-making, behaviour and worldview, etc. are immensely complex and value theory continues to evolve. This makes for an exciting field within which to research, but also makes for some difficult analysis and interpretation. As value theory develops, linkages to other areas such as ESD are likely to become more widespread and more informative. The scope of this study was very limited in relation to the complexity of value theory.

6.3.2 NEP scale tool limitations

Ambiguities and misunderstandings regarding scale items may have had an influence on the results and therefore interpretations of the study (see section 5.1.2 above). As stated previously, such issues are much more likely with a questionnaire-based study. Ideally, the questionnaire would have been supported with qualitative data, such as interviews or discussions, which unfortunately were not within the scope of this thesis.

The low Cronbach’s alpha (0.65) indicates that the scale needs to be further developed ensuring items are set at the right level and are easily understood.
6.3.3 Teacher and school questionnaire limitations

6.3.3.1 Loose interpretation of original criteria

The class teacher and school questionnaires are an adaptation of Breiting et al.’s (2005) ‘Quality Criteria for ESD schools’. Each question is a reduction of the original criteria, therefore much of the explanation, spirit and depth of the original criteria has been lost, which may affect the ability of the questionnaire to identify the ESD practices proposed by Breiting et al. (2005).

6.3.3.2 Limited scope

As addressed in section 5.4.2, there is a large quantity of information regarding the schools’ ethos, climate and educational approach that are not addressed by the questionnaire, particularly in regards to intrinsic value strengthening. This can be seen as informative though, in that schools’ ESD programmes may yield limited results in terms of ‘pro-environmental orientation’ and sustainability as a frame of mind or with a basis in values, if they focus exclusively on the quality criteria, or the elements within it without addressing other school practices relating to ESD e.g. access to natural environments, or a focus on a holistic education practice.

6.3.3.3 Self-reporting

One of the drawbacks of questionnaires is that they are subjective. One teacher’s assessment of practice is likely to differ from another’s. Again, this could be counteracted by further research, such as observations of practice, or interviews.

6.4 Further research

There is clearly a need for a more in depth study of the influence of intrinsic values and the presentation of sustainability as a frame of mind or worldview, on the environmental-orientation of students. Considering the complexity of current value theory, and the affect of confounding variables, qualitative methods such as interviews and observations will likely inform interpretation more thoroughly than quantitative methods alone.

The influence of teachers as role models and/or strengtheners of intrinsic values and promoters of sustainability as a frame of mind should be explored. In addition, the affect of initial teacher training programmes
on teachers’ environmental orientation and subsequent ESD provision would be an invaluable addition to sustainability research.

More generally, research on the application of current value theory needs to take place, in order to strengthen and build upon the existing body of research.
References


http://www.education.gov.uk/aboutdfe/policiesandprocedures/a0070736/what-is-sustainable-development.


Appendix A

ESD schools provision questionnaire

Questionnaire development

Quality criteria regarding the quality of teaching and learning processes

1. Area of teaching-learning approaches/processes

Sustainable development requires active, creative and critical citizens that are good at overcoming problems and conflicts in co-operation, and able to combine theoretical knowledge with practical innovations and ideas. As a consequence the teaching and learning approach must have the learner at the centre and provide contexts to develop students’ own ideas, values and perspectives. Teachers must consider students as active agents in the construction of their knowledge (Breiting et al., 2005, p. 15).

• The teachers listen to and value the concerns, experiences, ideas and expectations of the students, and their plans are ‘flexible’ and open for changes.
• The teachers encourage cooperative learning and experiential learning.
• The teaching takes into account the value of practical activities by linking them to students’ concept development and theory construction.
• The teachers facilitate students’ participation and provide contexts for the development of students’ own learning, ideas and perspectives.
• The teachers search for ways to evaluate and assess students’ achievement consistent with the above mentioned criteria.

(Breiting et al., 2005, p. 15)
Derived question(s):

Q

1a How often does discussion and open student questioning occur in class?

1b How often does your teaching plan change? (i.e. How often do you allow your lesson plan to be flexible?)

1c How often does cooperative learning occur in class?

1d How often does experiential learning occur in class?

1e How often are practical activities linked to the students’ concept development and theory construction?

1g How often are students provided with the opportunity for self-learning and the development of their own ideas and perspectives?

2. Area of visible outcomes at school and in local community

The importance is not so much what issue is taken into account and/or what visible outcome is expected from the action, but whether the focus on the issue comes from student’s ideas and opinions, and whether the teachers take care of the development of complex, critical thinking, and of the clarification of values, when students investigate and try to solve the problem.

Water or energy, waste or the re-modelling of the school yard are all well used ‘examples’ of issues where participation is fundamental, where simple solutions are not given, and where there is space for uncertainty. This includes different points of view, and the exercise of democracy for sharing and taking decisions.

It is also important that teachers clarify to students the power relationships – social, institutional, economical - without giving them the false impression that they alone will be allowed to make the final decision.

The main aim is to understand how things work in reality in order to be prepared to change them in the future, if required (Breiting et al., 2005, pp. 16-17).
• Physical / technical changes in the school and in the local community, relevant for ESD, are seen as an opportunity for teaching and learning and are used for participation and democratic decision making.  
• The changes obtained and the outcomes reached at school and in the local community are nurtured and maintained.  

(Breiting et al., 2005, p. 17)

Q

2 Are physical / technical changes in the school and in the local community used as a means of teaching and learning? (e.g. development of the schools grounds?)

3. Area of perspectives for the future

Development of society is not in the mind of younger students unless they get help to focus on it and to understand the processes of societal development. ‘The future starts every second’ and ‘our future is influenced by what we and others do’, are starting points for looking on issues of development. Another is to look back in time and to find out what shaped the changes we already know and the conditions in which we live up to now.

When looking forward we should not regard ‘development’ as just one predetermined direction, but emphasize the many options for decisions and alternative solutions and ways of development (Breiting et al., 2005, pp. 18-19)

• Students work with visions and scenarios, seeking alternative ways of development and changes for the future and establishing criteria for choice.

• Students get involved in comparing short term and long term effects of decisions and alternatives.

• Students seek relations between the past, the present and the future, in order to get a historical understanding of the issue concerned.
Derived questions:

Q

3a How often do students work with scenarios/case studies/visions for the future?

3b How often are past actions linked with present or future conditions?

4. Area of a ‘culture of complexity’

Our environmental crisis has been recognized as the outcome of the application to our complex social and natural world of a way of thinking oriented to ‘simple problem-solving’ and to ‘understanding things by taking them apart’.

Education has a main role in building a culture of complexity. There are three main directions that can be applied to all disciplines and school activities in order to build complexity oriented education:

- The attention to relations, in space and in time, connecting all living beings to each other, the natural events and to the social and economic ones, the individual to the global behaviour, in order to build a ‘systemic view’ of reality and to encourage the ability to grasp the links between global effects and local actions.

- The importance of both diversity and constraints as opportunities for the future.

- The awareness of limits - to resources, to the time necessary for biological cycles, together with the awareness of the unpredictability of complex natural or social systems.

(Breiting at al., 2005, pp. 21-22)

- Students work on constructing their understanding of the problem, looking for different interests and different points of view, before trying to find a solution.
• Teaching in all subjects is based on seeking out relationships, multiple influences and interactions.

• Students have the opportunity to appreciate and confront diversity – biological, social, cultural – and to look at this as ‘opportunities’ for broadening options for change.

• Students are encouraged to listen to their emotions and to use them as a way to reach deeper understanding of problems and situations.

• Students and teachers accept uncertainty as part of the daily life and prepare themselves “to expect the unexpected and to deal with it”, being aware of the importance of the precautionary principle.

(Breiting et al., 2005, p. 23)

Derived question(s):

Q

4 How often do students explore different points of view regarding a problem, including conflicts of interest before trying to find a solution?

5. Area of critical thinking and the language of possibility

In order to become active and responsible citizens, students need to be able to think for themselves, not to take all kinds of information and argumentation as absolute truth, but instead to reflect on and go behind assumptions underlying knowledge claims, opinions and ways of looking at things (Breiting et al., 2005, pp. 24-25)

• Students work with power relations and conflicting interests e.g. in the local situation, between countries, between present and future generations.

• Students are encouraged to look at things from different perspectives and to develop empathy by identifying themselves with others
• Students are encouraged to give arguments for different positions

• Students are encouraged to look for examples of what is (or was) useful and fruitful in other situations, in order to imagine new possibilities and alternative actions.

(Breiting et al., 2005, p. 25)

5 How often are students asked to give arguments for different positions?

<table>
<thead>
<tr>
<th>Frequently</th>
<th>Occasionally</th>
<th>Rarely</th>
</tr>
</thead>
</table>

6. Area of value clarification and development

Values are an important part of the culture of complexity and of the construction of critical thinking. ESD is explicitly founded on values and rationality. Its important message is that if we share the value of having respect for the diversity of human beings, we must practice this value accepting the existence of other values (Breiting et al., 2005, pp. 26-27).

• Students work with the distinction between factual knowledge and value-based opinions, and investigate the values and interests behind them.

• Teachers focus on students’ clarification and discussion of their own values, thereby strengthening reflection, mutual respect and understanding of other values.

• Teachers accept the challenge of not imposing their own values and opinions allowing students to hold their own positions.

(Breiting et al., 2005, p. 27)
Derived question(s):

6 How often are students given the opportunity to clarify and discuss their own values and attempt to understand other values?

7. Area of action-based perspective

The action perspective means that the students decide together with their teacher to take action to solve or to counteract the sustainable development problem they are working with, and subsequently reflect on the action process.

An action is thus targeted at change: a change in the students’ personal lifestyle and/or in the students’ local and global living conditions.

Valuable learning derives from involving oneself in authentic problem-solving activities. By considering evidence, searching for relevant information, questioning the validity of sources of information, analysing assumptions, detecting biases, exploring alternatives and presenting own viewpoints and possibilities for action, students become wiser as to what mechanisms, phenomena and barriers are connected with the solving of an environmental problem (Breiting et al., 2005, pp. 28-29).

• The students’ work on issues and actions are regarded by the teacher for their educational value and not only as a way to solve real problems.

• The students participate in decisions on action to influence the problem, and they are learning from reflecting on their experiences.

• The teaching focus lies on authentic action strategies, on action possibilities and on experience from real actions.

• The students’ involvement in action is accompanied by reflections on local and global effects, comparing risks and possibilities of alternative decisions.

(Breiting et al., 2005, p. 29)
Derived question(s):

Q

7 How often are students given the opportunity to fully-participate in ‘actions’ i.e. investigate an issue before collectively developing an action.
(An example of an action could be the introduction of fair-trade products in the school canteen)

8. Area of participation

Participation is closely linked to the ideal of democracy. Participation is to take part, to share responsibility and to be involved in joint actions – all matters which help to prepare the students in the basic fabric of social life. Participation depends on students’ skills and competencies in the field, alongside conditions like: School culture, teaching climate and the specific teaching issue.

Students should be given the opportunity and space to participate genuinely, to listen and express points of views, to take responsibility and to exert influence are matters that have to be learned. Participation puts the students at the centre of the learning process and gives them ownership over it, promotes motivation to discuss, find solutions, and to act in a social context.

However, participation does not mean that the students should decide everything about the project. The important point is to make room for the students’ opportunity to choose to participate at the highest level of his or her ability but with the teacher as the person responsible for the overall quality of learning that takes place in the allocated time (Breiting et al., 2005, pp. 30-31).

- Teachers’ focus on students’ capacities needed for meaningful participation and co-operation, e.g. listening, expressing points of view, taking responsibility and showing solidarity.
- Teachers give space for students to take part in the decision making process appropriate to the students’ age and capacities.
- Students become experienced in democratic participatory processes.
Derived questions:

<table>
<thead>
<tr>
<th>Q</th>
<th>Frequently</th>
<th>Occasionally</th>
<th>Rarely</th>
</tr>
</thead>
</table>

- How often do students take part in the decision making process - appropriate to the students’ age and capacities.

9. Area of subject matter

The curriculum subjects have much to offer ESD. However, SD-related problems can seldom be addressed purely through a single subject of the curriculum. The criterion for including a given subject area is that it can contribute – together with other subjects - to responding to questions related to the problem. Natural or social sciences are, for instance, not brought into play for their own sake but models and concepts from them are used as a means to qualify the students’ understanding of the complexity of the problem at stake.

Working with problems and issues related to sustainable development involves an approach across the borders of the individual subject area. The emphasis is on strengthening the connections between different subject perspectives in a non-fragmented way.

ESD should also support learning within the traditional subjects by providing examples and perspectives for reactivating and innovating teaching and learning in traditional subjects. Seen from this perspective it is a challenge for schools to explore to what extent it is possible to use ESD as a vehicle to enhance the effect on learning of ‘traditional’ core subject matters and to strengthen the meaningfulness in the learning situation (Breiting et al., 2005, pp. 32-33).

- Teachers in ESD focus on problems and issues - the subject matter should be functional and relevant for the students’ understanding of the complexity of the issues.

- The theories and concepts from the academic disciplines are utilised to rationalise often naïve and uncritical experiential knowledge.

- Teachers look for ideas and perspectives in ESD to reactivate and innovate teaching and learning in traditional subject matters.

(Breiting et al., 2005, p. 33)
Derived questions:

9. How often is academic subject matter taught through a focus on problems and issues?

Quality criteria regarding the school policy and organisation

10. Area of school policy and planning

ESD can be a leading motive for reflection and innovation, which can help to develop the school into a dynamic ‘learning organization’. The very nature of ESD implies an atmosphere of exchange of ideas and reflections based on wishes and visions of the future. ESD can empower and engage all stakeholders at the school. At all schools the principal will have a key role to help release the many resources and energies of people at the school. In the planning process, a joint agreement on where to go is mandatory - aim, process and organization should be elaborated as a shared vision involving all stakeholders of the school.

The new experiences, reflections, innovations that ESD bring will be incorporated in the school culture and change the way people interact, discuss and do things (Breiting et al., 2005, pp. 34-35).

- The school includes a focus on ESD in its mission and annual action plan.

- The school leadership encourages teachers to use future perspectives to plan their long-term ESD work.

- The school allocates appropriate school time for the students’ work with SD, as well as for the teachers’ reflections and clarifications on ESD issues at the school.

- The school establishes a procedure to respond to teachers’ needs for further education relevant for ESD.

(Breiting et al., 2005, p. 35)
Derived questions:

10a The school includes a focus on ESD in its mission and annual action plan

10b The school allocates appropriate school time for the students’ work with SD.

10c The school allocates appropriate time for the teachers’ reflections and clarifications on ESD issues at the school.

11. Area of school climate

A school climate is a concept difficult to define but experienced by every teacher and student. The school climate is created by – and has a strong influence on – the bulk of relationships existing between students, teachers, school staff and leaderships, parents and external community.

ESD can have a positive influence on the school climate, and participation, critical thinking, value clarification, authentic action and accepting complexity can best be learnt in a school where these are developed as common characteristics of the school work.

For ESD it is also important that all the members of the school community are aware of their mission and their contribution: The staff and the cafeteria personnel are as important as the teachers or the parents to build everyday practices of respect, care for the school resources, trust in the democracy rules and enjoyment of the social and learning environment (Breiting et al., 2005, pp. 36-37).

- The school atmosphere is such that every one feels that she/he can contribute with innovative ideas and proposals without fear.

- The school leadership has a particular role in facilitating this.

- The school is seen as an arena where all the stakeholders exercise democracy and participation, and are involved, at different levels, in the decision-making processes.
• The whole school community, especially parents, are informed of the relevance of ESD for students’ general learning and are involved in the school development.

(Breiting et al., 2005, p. 37)

Derived questions:

Q

| 11a | The school leadership has a particular role in facilitating a school atmosphere in which every one feels that she/he can contribute with innovative ideas and proposals. |
| 11b | The whole school community, especially parents, are informed of the relevance of ESD for students’ general learning and are involved in the school development. |

12. Area of school management

The value of involving students in school management activities must first and foremost be seen and assessed in relation to their educational and learning value - not in relation to what extent the efforts may result in, say, saving energy or reducing the amount of waste at school.

At the typical school teaching/learning is separate from the school management. The decisions relating to the management of the school are taken outside the reach of the students. This is despite the fact that the management of the school often has huge impact on the students’ life in the school.

Instead of regarding the students as those to be managed as part of the school management, it might be more helpful to look at ways to improve the genuine ownership and participation of the management of the school in order for management activities to be learning activities.

The areas in which effort can be made are mainly related to sustainable development: From the management of natural resource (water, energy, materials, biodiversity) to minimising the use of chemicals and hazardous substances, from the care for waste disposal to the attention to ensure students’ safe transportation, from the care for eating habits to the care of the natural environment around the school and in the school yard.
The point of exemplary living is to link the lifestyle routines with respecting each other’s wishes and needs and helping everyone to be a real participant in the change. These efforts will have an indirect positive impact on the students who live a part of their life in a context explicitly engaged in sustainability issues (Breiting et al., 2005, pp. 38-39).

- The school makes a regular audit concerning the school’s needs in the direction of sustainability, involving students, teachers and staff.

- The school decides every year what are the new challenges and what actions to take for a continuous improvement of the school management.

- The school strives to be an example of careful management of resources and evidence of the result obtained are shown to the internal and external community.

(Breiting et al., 2005, p. 39)

Derived questions:

Q

12a The school makes a regular audit concerning the school’s needs in the direction of sustainability, involving students, teachers and staff.

12b The school decides every year what are the new challenges and what actions to take for a continuous improvement of the school management.

12c The school strives to be an example of careful management of resources – communicating its efforts to the internal and external community.

13. Area of reflection and evaluation of ESD initiatives at school level

Reflections on actions, self-evaluation and action research are approaches that can help school development in the direction of sustainable development. Reflection and research need time, clear research questions, collection of data, interpretation and debates, taking into account different perspectives. Documentation of the action taken and of the teaching processes is a first step.
Other steps need a definition of the quality that the school wants to achieve, and of the quality criteria that might be used for the evaluation of this achievement.

The discussion of a set of quality criteria specific for the school, open to the participation of students, parents, staff, external community, is a way to develop a common understanding of the school ESD ‘philosophy’, and a culture of participation.

Discussion should not stop with the discussion of criteria, but continue with the involvement of all the stakeholders in the interpretation of the data collected and then in the internal evaluation of the results obtained.

To shift from short term visible outcomes to medium and long term learning outcomes, concerning also values and critical thinking, and not only behaviour is not an easy process, but can be fostered by the clarification of criteria and by the reflection and evaluation of the actions taken (Breiting et al., 2005, p. 41).

- The school allocates appropriate school time for teachers’ reflections and research on their ESD issues.

- The school clarifies and develops quality criteria for ESD according to its vision of ESD, and uses them for internal evaluation.

- The school establishes procedures to make use of gains and achievements from ESD, as well as of the obstacles encountered, for the benefit of the whole school, even for teachers not involved in ESD initiatives.

(Breiting et al., 2005, p. 41)

Derived questions:

Q

<table>
<thead>
<tr>
<th>13a</th>
<th>The school allocates appropriate school time for teachers’ reflections and research on their ESD issues.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>13b</td>
<td>The school clarifies and develops quality criteria for ESD according to its vision of ESD, and uses them for internal evaluation.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quality criteria regarding the school’s external relations

14. Area of community cooperation

One of the main ideas in ESD is to be locally relevant and to construct ‘local situational knowledge’. In this way, schools are no more institutions separated from the real world, proposing abstract general knowledge, but become institutions active in the society, recognized as relevant stakeholders in the development of the community.

A first step is to use the features and problems of the community as resources for fieldwork and active learning. A further step is to propose the school as an important voice for the planning of local sustainable development, and another step is to offer the school’s facilities and competencies for community studies and action in the direction of sustainability. In this process the schools become ‘core social centres’ with open doors, sources of expertise, sharing responsibilities with others community bodies. Teachers and students gain visibility and recognition, and the latter start practising their future role as active citizens (Breiting et al., 2005, pp. 42-43).

• The school involves the community as a resource for teaching /learning in meaningful ways.

• The school uses the community as an arena for genuine action.

• The school enables the local community to address its concerns to the school and serve as a ‘community-centre’.

(Breiting et al., 2005, p. 43)

Derived questions:

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>To some extent agree/</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>14a</td>
<td>The school involves the community as a resource for teaching /learning in meaningful ways.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14b</td>
<td>The school uses the community as an arena for genuine action.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14c</td>
<td>The school enables the local community to address its concerns to the school and serve as a ‘community-centre’.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
15. Area of networking and partnerships

A key aspect of networking and partnerships is regular and systematic development and exchange of experience and information relevant for ESD.

Networking and partnership can take place on several levels: Networking between local neighbouring schools, networking between schools and NGOs or GOs active in educational development in the field of ESD (universities, centres or associations with experience in teacher-training) or networking with international partners.

At school level, students as well as teachers are active in the process of creating and maintaining networks and partnerships. Schools gain by networking in both a re-active and pro-active way, i.e. schools develop their teaching and learning by learning from experiences from other educational institutions and by initiating and promoting networks and partnerships in which they generate and pass on their experiences (Breiting et al., 2005, pp. 44-45).

- The school co-operates with other schools in order to develop, exchange and compare ideas and information relevant for ESD.

- The school is part of local, national, or international networks relevant for ESD in which they are encouraging students to take initiatives.

- The school is seeking co-operation with institutions active in educational development in the field of ESD.

(Breiting et al., 2005, p. 45)
### Derived questions:

<table>
<thead>
<tr>
<th>Q</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15a</td>
<td>The school co-operates with other schools in order to develop, exchange and compare ideas and information relevant for ESD.</td>
</tr>
<tr>
<td>15b</td>
<td>The school is part of local, national, or international networks relevant for ESD.</td>
</tr>
<tr>
<td>15c</td>
<td>The school is seeking co-operation with institutions active in educational development in the field of ESD.</td>
</tr>
</tbody>
</table>
Appendix B

Principle Component Analysis (PCA)

Preliminary tests

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = 0.664, and all KMO values for individual items were above the acceptable limit of 0.5 (Field, 2009, p. 659). Bartlett’s test for sphericity $\chi^2 (36) = 170.18$, $p = <.001$, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues over the recommended value of 1, and in combination explained 53.98% of the variance. The scree plot (Figure 5 below) was slightly ambiguous and showed inflection that would justify retaining both components 2 and 3. Given the convergence of the scree plot and that all three components had eigenvalues above 1, this is the number of components that were retained in the final analysis. The shaded points are above the inflection of the curve, and therefore indicate the factors that should be extracted (Field, 2009, p. 639).
**Figure 5** Scree plot showing the eigenvalues (Y-axis) of each extracted factor (X-axis)

**Factor Rotation**

After running the analysis using both Orthogonal (Varimax method) and Oblique (Direct Oblimin method) rotation, the Oblique rotation revealed a correlated factor structure (see Table 11), therefore independence between factors could not be assumed.

**Table 11 Component correlation matrix**

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.000</td>
<td>.260</td>
<td>-.045</td>
</tr>
<tr>
<td>2</td>
<td>.260</td>
<td>1.000</td>
<td>.007</td>
</tr>
<tr>
<td>3</td>
<td>-.045</td>
<td>.007</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.  
Rotation Method: Oblimin with Kaiser Normalization.
**Principle Component Analysis results**

**Table 12 Summary of exploratory factor analysis results - Pattern Matrix (N=152)**

<table>
<thead>
<tr>
<th>Pattern Matrix$^a$</th>
<th>Rotated Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6. Nature is strong enough to handle the bad effects of our modern lifestyle</td>
<td>.779</td>
</tr>
<tr>
<td>8. People are treating nature badly</td>
<td>.631</td>
</tr>
<tr>
<td>2. There are too many (or almost too many) people on earth</td>
<td>.622</td>
</tr>
<tr>
<td>7. People are supposed to rule over the rest of nature</td>
<td>.418</td>
</tr>
<tr>
<td>4. People must still obey the laws of nature</td>
<td>-.230</td>
</tr>
<tr>
<td>5. When people mess with nature it has bad results</td>
<td>.027</td>
</tr>
<tr>
<td>1. Plants and animals have as much right as people to live</td>
<td>.061</td>
</tr>
<tr>
<td>10. If things don’t change we will have a big disaster in the environment soon</td>
<td>.358</td>
</tr>
<tr>
<td>9. People will some day know enough about nature to be able to control it</td>
<td>.314</td>
</tr>
</tbody>
</table>

Eigenvalues: 2.47, 1.22, 1.16

% of variance: 27.48, 13.57, 12.92

Cronbach’s $\alpha$: .575, .492, .088

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
$^a$ Rotation converged in 18 iterations.

Note: Factor loadings over .40 appear in bold.
Table 13 Summary of exploratory factor analysis results - Structure Matrix (N=152)

<table>
<thead>
<tr>
<th>Rotated Factor Loadings</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Nature is strong enough to handle the bad effects of our modern lifestyle</td>
<td>.732</td>
<td>.034</td>
<td>.035</td>
</tr>
<tr>
<td>8. People are treating nature badly</td>
<td>.666</td>
<td>.363</td>
<td>.334</td>
</tr>
<tr>
<td>2. There are too many (or almost too many) people on earth</td>
<td>.619</td>
<td>.141</td>
<td>-.082</td>
</tr>
<tr>
<td>7. People are supposed to rule over the rest of nature</td>
<td>.512</td>
<td>.431</td>
<td>-.231</td>
</tr>
<tr>
<td>5. When people mess with nature it has bad results</td>
<td>.207</td>
<td>.689</td>
<td>-.053</td>
</tr>
<tr>
<td>1. Plants and animals have as much right as people to live</td>
<td>.241</td>
<td>.686</td>
<td>-.110</td>
</tr>
<tr>
<td>4. People must still obey the laws of nature</td>
<td>-.054</td>
<td>.669</td>
<td>.306</td>
</tr>
<tr>
<td>10. If things don’t change we will have a big disaster in the environment soon</td>
<td>.366</td>
<td>.263</td>
<td>.760</td>
</tr>
<tr>
<td>9. People will some day know enough about nature to be able to control it</td>
<td>.418</td>
<td>.381</td>
<td>-.578</td>
</tr>
</tbody>
</table>

Eigenvalues

| 2.47 | 1.22 | 1.16 |

% of variance

| 27.48 | 13.57 | 12.92 |

Cronbach’s α

| .581 | .518 | .088 |

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
Note Factor loadings over .40 appear in bold.
### Table 14 Unrotated factor loadings

**Component Matrix**

<table>
<thead>
<tr>
<th></th>
<th>Component (unrotated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8. People are treating nature badly</td>
<td>.696</td>
</tr>
<tr>
<td>7. People are supposed to rule over the rest of nature</td>
<td>.566</td>
</tr>
<tr>
<td>1. Plants and animals have as much right as people to live</td>
<td>.551</td>
</tr>
<tr>
<td>5. When people mess with nature it has bad results</td>
<td>.537</td>
</tr>
<tr>
<td>6. Nature is strong enough to handle the bad effects of our modern lifestyle</td>
<td>.510</td>
</tr>
<tr>
<td>2. There are too many (or almost too many) people on earth</td>
<td>.484</td>
</tr>
<tr>
<td>4. People must still obey the laws of nature</td>
<td>.396</td>
</tr>
<tr>
<td>10. If things don’t change we will have a big disaster in the environment soon</td>
<td>.490</td>
</tr>
<tr>
<td>9. People will some day know enough about nature to be able to control it</td>
<td>.432</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

a. 3 components (factors) extracted.
Appendix C

Figure 6 Box plot of students' NEP scale scores according to school