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Development of Action Competence using Education for Sustainability in a New Zealand School

**A thesis submitted in partial fulfillment
of the requirements for the degree of**

Master of Science Education

by

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Abstract

This thesis explores whether an intervention carried out with a senior secondary school Environmental Science class was able to develop action competence in Education for Sustainability (EfS) in the students. The concept of action competence was initially proposed by Danish researchers who were dissatisfied with a focus on behavioural change by other researchers in the field. I was particularly interested in using a New Zealand model of action competence in my classroom and examining the role that the culture of the student played in that model. The United Nations literature includes culture as part of Education for Sustainability but international educational research has not to date.

In designing the intervention, examined a range of learning theories and matched them with the needs of students in a city in New Zealand with a very multicultural population. Links were also made between The New Zealand Curriculum and Best Evidence Synthesis from the Ministry of Education here in New Zealand. The resulting intervention had a student centered approach and an emphasis on recognising the culture of students that was based around an action competence model developed for New Zealand. The aim was to see if this combination would enable the students in the intervention to make progress towards being action competent during an EfS unit on action –taking.

The intervention was carried out with a class of seventeen students who were undertaking an Education for Sustainability Achievement Standard involving taking an action towards becoming more sustainable. I used an action research approach whereby I taught and supported students through the process. I used their log books, reports, journals and informal conversations to provide my research data. This data was analysed using a continuum I developed that was based on the work of a New Zealand team that adapted the concept of action competence for the New Zealand situation.

The research findings indicate that the framework developed by the New Zealand team with the addition of starting from the culture of the students can lead to development of student action competence in EfS.

Dedication

To my friends and family

*“You must be the change you wish to see in the
world”*

Mahatma Gandhi

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Chapter 1 Introduction

1.1 Overview

This chapter introduces my thesis. It describes my background as a teacher and gives some information as to why I undertook this research and the context in which it was undertaken. It includes the research questions and an overview of the other chapters.

1.2 Background

Environmental Education (EE) has been a term of increasing importance over the last forty years. It started to appear internationally in 1972 at the Stockholm Conference (UNEP, 1972) and has been of concern in numerous international conferences and meetings ever since. It has had a wide range of meanings which have often resulted in people talking past each other rather than to each other. Concurrently with the talk at international level, people in the street all over the world have talked about environment issues and how to educate others about them, sometimes well before talk started at the international level. For example, in New Zealand Captain Val Sanderson established the Native Bird Protection Society after returning from World War I and finding Kapiti Island over-run by cattle goats and sheep. This Society later became the Royal Forest and Bird Protection Society and is now known simply as Forest and Bird (Forest & Bird, 2011).

Enthusiastic individuals and groups have worked with communities and schools to implement environmental changes that were seen as needed in the local situation. Unfortunately for some years there does not appear to have been a lot of communication between these local efforts and those at governmental level. When communication lines were opened real effort was required to enable both sides to understand what the other was actually talking about. This situation was complicated by the changing of terms when it was realised that what was required to protect the environment was a lot more complex than just protecting some iconic species.. Environmental issues were found to involve over exploitation of

the Earth's resources, issues of access to resources by developing countries, climate change, extinction of species, structure of the world economy, habitat destruction, human rights, fair trade and questions about who gets to make what decisions.

Consequently, internationally there is still a situation where multiple meanings exist for just about any environmental term. These meanings are further complicated by the context in which the meanings developed. When information from these contexts is added to local detail and political relationships another layer of complexity is added on top. Meanings and definitions then must always be seen within the socio-political context in which they developed.

The appearance of Education for Sustainability (EfS) in Europe from the late 1980's, then internationally from the 1992 Rio Earth Summit conference, and latterly in New Zealand from around 2003 has meant that issues under this heading need a more comprehensive and cohesive approach if they are taught in schools. This is because EfS covers social, cultural, environmental and economic aspects of sustainability. To cover it in schools all aspects have to be taught, though not necessarily in the same subject. I find this term more appropriate as well because it implies that there are multiple causes of environmental problems and also because it brings up issues of justice. The term EfS will be used throughout this thesis.

1.2.1 The New Zealand situation

New Zealand is a long thin country, made up of 3 main islands and situated in the south west Pacific. It is often called Aotearoa, which can be translated to land of the long white cloud from Te Reo Maori, the language of the indigenous people of New Zealand. Maori are thought to have lived in New Zealand for over 1000 years according to their traditions (Bishop & Glynn, 1999), although scientific evidence so far can only find their presence from around 1250AD (The Encyclopedia of New Zealand "Te Ara," 2005). In addition, European settlers

started arriving in the country over 200 years ago. These settlers signed the Treaty of Waitangi with the indigenous Maori in 1840 and this is seen by many as the founding document of our country. Our population is about 4.4 million (Statistics New Zealand, 2006), the majority of whom live in the northernmost of the 3 islands, called North Island.

New Zealand is proud of its bicultural heritage and many New Zealanders feel this is what makes us able to welcome others to our country. Being bicultural is about more than just using a few Maori words and allowing fluent speakers to speak Te Reo in court or parliament. It is about developing a way of working and living that genuinely respects and incorporates both cultures. This is an ongoing process that will not be quickly finished. Some Maori commentators appear to believe it has barely started:

Despite the promises of the Treaty of Waitangi, Maori and Pakeha relations in New Zealand since the signing of the Treaty have not been a partnership of two peoples developing a nation, but political, social and economic domination by the Pakeha majority and marginalisation of the Maori people through armed struggle, biased legislation, and educational initiatives and policies that promoted Pakeha knowledge codes at the expense of Maori (Bishop & Glynn, 1999, p. 14).

Successive New Zealand Governments ignored Maori claims for confiscated lands and other abuses of Maori rights until the Waitangi Tribunal was set up and Pakeha New Zealanders started to accept the racism of the past. This is a slow process. The current Government is demanding that all Treaty claims be settled by 2014. It is not going to be a smooth process or one without compromise on both sides. There have been some large Treaty settlements involving hundreds of millions of dollars although these are rare, however some Pakeha object to these settlements as unnecessary handouts. In the cutting of money allocated to Ministries as a result of the economic downturn Maori schools have been the first to suffer. Although seven new wharekura have been approved they will each

receive only \$50,000 base operational funding compared to the \$130,000 a similar mainstream composite school is entitled to (MoE, 2010a).

In education however very little from Maori tradition has been included in the modern day New Zealand education system and this has tended to alienate Maori from that system. This has resulted in Maori leaving school earlier and with fewer qualifications (MoE, 2010b). In recent times specific research emerged out of Waikato University (Bishop & Glynn, 1999) that led the Ministry of Education to support a programme called Te Kotahitanga to assist Maori students in mainstream schools. While not a complete solution it has had remarkable success (Bishop, Berryman, Cavanagh, & Teddy, 2007; Bishop, Berryman, Powell, & Teddy, 2007). This programme is led by Professor Russell Bishop of Waikato University. It is based on changing the approach of teachers and helping them to use appropriate pedagogy to truly identify and meet the needs of Maori students in their classes. Its approach means that all students benefit.

For many years, under pakeha rule Maori were forbidden to speak their own language (King, 2003) and many fluent speakers were lost. This is only slowly being rectified. In 1981 the Kohanga Reo movement started, this is a Maori immersion preschool based on kaupapa Maori or Maori cultural principles (Te Taura Whiri i te reo Maori-Maori Language Commission). In 1985, this was followed by Maori immersion primary schools with Te Kura Kaupapa Maori o Hoani Waititi, Henderson, West Auckland being the first. Then Whakekura or Maori secondary schools followed. In 2001 a survey entitled *Health of the Maori Language* found there are now just over 135,000 Maori speakers or about 25% of the Maori population (Te Taura Whiri i te reo Maori / Maori Language Commission), although their fluency may well be variable.

EfS recognises the importance of culture and seeks to include it. This is exemplified in New Zealand by the EnviroSchools Programme, a community-based EfS programme for schools which puts emphasis on respect for Maori tikanga (beliefs and protocol), and katiakitanga or guardianship of the

environment. As original kaitiaki (guardians) of this land, it seems that there is much to learn from Maori about how to look after the environment. Unfortunately, today many young urban Maori are disconnected from the environment and are often unaware of how their ancestors lived. Perhaps EfS might provide a way to work together to help us all create a sustainable future.

1.2.2 My Background

I am a middle aged Pakeha (European) woman and have been a teacher at my current secondary school for over twenty years. I introduced both senior Science as an integrated subject and Environmental Science into my school. Although based in the Science Faculty, I have worked cross curricula with a number of other teachers on projects. I have been the Environmental Coordinator for the last 9 years. My school became an Enviroschool in 2003. We were the first secondary school to get a silver award. To get this award we had undertaken planting of four different native gardens around the school, we had a paper recycling scheme for every classroom, for senior management and the office. We had an Envirogroup that ran an awareness week every year, trips for small groups or classes out to various places to assist DOC (Department of Conservation) and Rangers and we had some of their people into school to talk to classes. We had also introduced environmental awareness into a number of curriculum courses, for instance Social Studies and Junior Science. In addition, I have been the school contact for the Associated Schools Project of UNESCO (United Nations Educational Scientific and Cultural Organisation). I helped set up the bilingual unit at the school over 20 years ago and have taught in it ever since. My school is a large multicultural girls' school set in the centre of a large city in New Zealand. It draws students from all over the city which makes it somewhat unusual, in that it has only a small local catchment and less of a sense of local community than many schools.

As an enviroschool, the school has access to an experienced facilitator to support development of EfS in the school. The facilitator worked with me to run courses for interested staff to increase the environmental content in curriculum courses;

for example in the technology and languages faculties. She also worked with the Envirogroup over a number of years to help them develop their understanding. Until recently the school imposed structure meant the students changed each year in this group.

For a number of years I have been concerned about how to engage the interest of young Maori and Pacific Island (Pasifika) women in both science and environmental issues, as both these cultural groups are strongly represented in the school. These are areas where it is vitally important that they become involved. Their cultural groups are growing rapidly in numbers in New Zealand (see below) and yet they are not being engaged successfully in science and environmental issues. This is of concern in that it may well mean that the teaching in these areas is not meeting the needs of these groups. As the Te Kotahitanga research so rightly pointed out, it is teachers who can change the easiest and it is our job to meet the needs of our students, not theirs to fit in with us (Bishop, Berryman, Powell et al., 2007).

It was to explore some of these issues that I undertook my Masters in Environmental Education. EfS offered a possible way to incorporate a number of my interests and a possible avenue to explore how to involve young Maori and Pasifika women. Not only that but it also meshed with current educational learning theory. I was interested in the Action Competence model from Denmark (Jensen & Schnack, 1997). This was initially adapted for the New Zealand situation by the Education for Sustainability Advisors and supportive University people (Eames, Barker, Wilson-Hill, & Law, 2010b; Eames et al., 2006). A comparison of the process used by the EnviroSchools Foundation found that it too followed a process similar to the Action Competence model.

The EfS approach incorporates the four aspects of social, cultural, environmental and economic sustainability and looks at building a sustainable future for all and appears to provide a useful starting point. I was aware that the approach I had been using in Environmental Science would benefit from modification and

believed that action competence and education for sustainability offered a way forward that would allow me to combine my concern about the education of young Maori and Pasifika women as well.

1.3 Research Questions

The research questions evolved out of this background:

Can aspects of action competence be developed through delivery of a unit in Education for Sustainability in a New Zealand context?

Do the personal and cultural values/beliefs of students influence their action-taking in this unit?

1.4 Study context

New Zealand secondary schools have moved from being only for the wealthy to providing education for all over the last 100 years. The city in which the study school sits has approximately 1.2 million people and is the most multicultural city in New Zealand. It is in fact often talked about as being the largest Polynesian city in the world (see Table 1.1). This is because many Pacific Island people who immigrate to New Zealand settle here. In the study region there are 85 secondary and area schools (MoE, 2010b).

Table 1.1 Ethnic Groups in the Study Region (Statistics New Zealand, 2006)

	Total numbers	Ethnic group as a % of the total
European	698,622	56.5
Maori	137,133	11.1
Pacific	177,936	14.4
Asian	234,222	18.9
Middle Eastern/ Latin American/ African	18,555	1.5
New Zealander	99,258	8.0
Other	648	0.1

Almost one quarter of all children in the region aged under 15 years are of Pacific Island descent, 24%. 18.3% are Asian and 17.6% are Maori (Statistics New Zealand, 2006). This means that for many secondary schools in the city classes will be multicultural, with a strong representation of Maori and Pasifika students as well as Asian, in addition to their base of Pakeha (European) students.

The city is likely to increase its numbers of Pasifika people in the future as some Pacific Islands are becoming uninhabitable because of climate change and others are sustaining damage that affects their cultural traditions (Channel 4 International Ltd., 2000). This damage includes the loss of cemeteries in major storms, bubbling up of salt water at high tides, more regular flooding and salt contamination of soils (Channel 4 International Ltd., 2000). New Zealand already has an agreement with Tuvalu that would allow any of their people who wish to, to settle in New Zealand as their islands become increasingly permeated by salt water. Despite being a developed country, New Zealanders and especially this city will be facing some difficult times with respect to creating a sustainable future. The city has come together under one Council in November 2010 after being five separate cities and two local councils. It is spread out, has traffic congestion, is very diverse culturally and socio-economically and lacks an effective public transport system

There are now 84 secondary schools in the city (MoE, 2010b). The assessments for New Zealand students at the end of secondary school are called the National Certificate of Educational Achievement (NCEA). A wide range of subjects can be offered in the last three years of secondary school and one of these is called Education for Sustainability. The national qualification system in New Zealand is run by the New Zealand Qualifications Authority (NZQA). Students at each of Years 11, 12 and 13 (15-17 year olds) are able to sit a unique combination of standards each year. The combinations available are determined by the overall range offered by each school in a particular year. There is some opportunity for individualisation of courses within schools. Each NZQA subject has a suite of standards worth credits. The number of credits nominally recognises the amount of learning time for that particular standard and adds up to 24 credits across the

suite of standards for each NZQA subject. Each standard describes what a candidate can do when they can achieve the standard. This is a standards based assessment system rather than a normative based one. A school may choose to offer anywhere from one to all of the standards in a NZQA subject and offer it as a school subject, or they may combine standards from different NZQA subjects into a named school-based course. There is a nationally-based moderation system to ensure school-developed internal assessments are at the correct level and have been marked appropriately as well as a national exam system for externally assessed standards (NZQA, 2010). Before the development of specific EfS standards, schools wishing to offer this type of course would combine standards from a range of other NZQA subjects into a school-based course.

The Education for Sustainability standards were made available three years ago. Unfortunately these standards became available just as the Government changed and all support for the EfS Advisors who were providing school-based support for use of the EfS standards was cut. This has slowed the implementation of EfS in senior secondary schools as the only Ministry of Education funded support now available is a website (TKI, 2010).

The research problem that this thesis addresses is whether using a New Zealand adapted version of the Action Competence model from Denmark will enable Maori and Pasifika students in my class to engage with Education for Sustainability.

1.5 Outline of Thesis

The rest of this thesis is in four chapters. Chapter 2 is the literature review where key ideas from the literature are discussed. Next is Chapter 3 where the methodological features are put forward. The findings are in Chapter 4 and finally Chapter 5 discusses these findings and draws conclusions and implications.

Chapter 2

2.1 Introduction

In this chapter I initially examine the development of environmental education and its subsequent change towards education for sustainability. I go on to explore the development in Scandinavia of action competence which is based on an application of critical theory. I look at the testing of this theory and others in a number of countries and then look at the contributions of a number of prominent theorists to relevant learning theories. I then apply all of this to the New Zealand context to identify which are relevant for my research.

2.2 Development of Environmental Education

2.2.1 Where did Environmental Education come from?

Environmental Education (EE) was first put on the agenda of a United Nations (UN) Conference in 1972 at Stockholm, Sweden (1972). This conference arose out of the concerns of the Scandinavian countries about environmental issues (Laessoe & Ohman, 2010). For Sweden these issues included exploitation of untouched rivers for hydroelectricity, use of nuclear power and arms, and acidification [acid rain]. In Denmark the issues included visible water pollution, environmental degradation and overfishing in the North and Baltic Seas. These countries believed these environmental issues needed discussing at the world level because they had realised from *Silent Spring* (Carson, 1962) that such issues, or similar ones, were likely to be a problem elsewhere as well (Breiting & Wickenberg, 2010; Laessoe & Ohman, 2010). The environment was again discussed at international level in Belgrade and was formally described in the 1975 Belgrade Charter from the UNESCO-UNEP Conference. Education was seen to be key to addressing environmental problems, and as such EE's goal was formulated as:

To develop a world population that is aware of, and concerned about the environment and its associated problems, and which has the knowledge, skills, attitudes, motivation and commitment to work individually and collectively towards solutions of

current problems and the prevention of new ones (UNESCO, 1977, p. 118).

Prior to this a range of terms and meanings for education related to the environment had been used in local situations but no common definition had been agreed. This definition was then taken to the UNESCO Intergovernmental Conference on Environmental Education at Tbilisi the following year. Here for the first time EE was discussed at Government level and a document, the Tbilisi Declaration, produced for governments to follow. McKeown and Hopkins (2003) interviewed Hopkins, Stapp and Francis who were involved at both Belgrade and Tbilisi. These three reported that:

... the intent of the Belgrade and Tbilisi documents focused on the impact of humans on the natural environment. The overall intent of EE at the time was to preserve the natural environment and reduce human impacts. ...Concern for society and economy were means to an end, and the end was environmental protection. ...Those were the days of supersonic transport, whaling, toxic waste, and the threat of nuclear war. It was the era of Silent Spring and the first Earth Day (McKeown & Hopkins, 2003, p. 119).

The document that came out of Tbilisi states that:

The role of education in the face of environmental problems and Opportunities is therefore a crucial one. Environmental Education should be integrated into the whole system of formal education at all levels to provide the necessary knowledge, understanding, values and skills needed by the general public and many occupational groups, for their participation in devising solutions to environmental questions (UNESCO, 1977, p. 12).

It goes on to appeal “to Member States to include in their educational policies measures designed to introduce environmental concerns, activities and contents into their education system, on the basis of the above objectives and

characteristics” (UNESCO, 1977, p. 24). This was one of the easier items to implement and many countries did so. The recommendations from Tbilisi are still considered important and the *Declaration* is still referred to over 30 years later.

Three years later the key 1980 conference was the IUCN/UNEP/WWF Conference which produced the *World Conservation Strategy: Living Resource Conservation for Sustainable Development* (IUCN/UNEP/WWF, 1980). This document used the term sustainable development for the first time at the United Nations level. The key aim within this document was “to protect essential ecological processes, life-support systems and genetic diversity, as well as the sustainable utilisation of natural resources” (Tilbury, 1995, p. 197). It was this conference which changed the direction of EE towards ‘education for sustainable development’. This meant that root causes of issues needed to be considered (Tilbury, 1995). Tilbury goes on to say that:

Most significantly the Strategy explored the links between economic growth and environmental preservation. It linked poverty, development and the environment and described the dilemma of rural people in some developing countries destroying natural resources in order to free themselves from starvation and poverty (Tilbury, 1995, p. 197).

This thread was picked up by the Brundtland report *Our Common Future*, produced by the World Commission on Environment and Development in 1987. The Brundtland report was published after 900 days of collecting evidence from meetings on all continents. It made the statement:

We borrow environmental capital from future generations with no intention or prospect of repaying. They may damn us for our spend-thrift ways but they can never collect on our debt to them. We act as we do because we can get away with it. ...Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of

sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organisation on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organisation can be managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes (WCED, 1987, p. 24/25).

This quote clearly outlines the links between the economy, poverty, development and the environment. These same links are still being made today (Rosling, 2010; Stern, 2010). The first sentence is prophetic as those who were children when this statement was first made have grown up to inherit our worst environmental disaster to date, climate change.

2.2.2 EE to ESD

These hard hitting comments were repeated in 1991 with the publication of the second *World Conservation Strategy*. It states quite clearly that:

The change to living sustainably and caring for the Earth will be a major one for most people. For a start we will need to understand and accept the consequences of being part of the great community of life and to become more conscious of the effects of our decisions on other societies, future generations and other species. We will need to perfect and promote an ethic for living sustainably. ...Sustainable living must be the new pattern for all levels; individuals, communities, nations and the world. To adopt the new pattern will require a significant change in the attitudes and practises of many people. We will

need to ensure that education programmes reflect the importance of an ethic for living sustainably and that information campaigns are mounted to disseminate it (IUCN, UNEP, & WWF, 1991, p. 5).

The key idea here is about learning to live sustainably, something most people do not currently do. The last sentence reflects a priority for sustainability programmes in schools.

Five years after the Brundtland Report at the Earth Summit the term ‘Sustainable Development’ was in common usage. In 1992 the United Nations Conference on Environment and Development was held in Rio de Janeiro. This summit was attended by 100 world leaders and eventually adopted 27 Principles and the 300 page *Agenda 21*, which focused on achieving sustainable development in the 21st Century. This document has 40 chapters detailing what needed to happen to make the world sustainable. It included Chapter 36 on education (UNCED., 1992) and in fact education was mentioned in every chapter of the document. Fien and Tilbury (1996) quote from Agenda 21:

Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues It is critical for achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development and for effective public participation in decision-making (UNCED 1992, Chapter 36, p. 2) cited in (Fien & Tilbury, 1996).

Despite the detailed actions outlined above and the mood of hope that came from the Earth Summit, very little appears to have happened. Governments did not make much progress towards the goals they had agreed to in Rio. Research into environmental education continued but while a wider range of research methods were now in use (Hart & Nolan, 1999) and there were some radical proposals put forward (Capra, 1996; Sterling, 2001), most of this was not impacting on schools.

The exception was the Danish work which was first published in English in 1997 (Jensen & Schnack, 1997).

The general response within formal education systems to these calls for education for sustainable development appears to have been weak. This meant that attempts by individual teachers to implement change were often assimilated as an exception into the existing system and as a result environmental education and/or sustainable development were always going to remain on the fringes of the predominantly positivist education systems throughout the world. Education was still seen predominantly as a means of reproducing society, with an emphasis on recall of facts that have been taught in a transmissive manner, and which are tested by exams where students are rewarded when they are able to do this well (Sterling, 2001).

In 2002, the second 'Earth Summit' was held in Johannesburg. It called for the full implementation of *Agenda 21* and reaffirmed commitment to the Rio principles. This was after disappointing progress in the intervening ten years (UN, 2002). Then in 2002 at its 57th meeting the United Nations General Assembly proclaimed the UN Decade of Education for Sustainable Development, 2005 - 2014, (DESD) emphasizing that "education is an indispensable element for achieving sustainable development" (UNESCO, 2005a). It also designated the United Nations Education, Scientific and Cultural Organisation (UNESCO) as the lead agency to promote and implement the Decade. This Decade was a chance to draw together several independent initiatives of the UN and to refocus world attention on them. The UN believes education is critical to pull people out of poverty, particularly women. Therefore its emphasis on literacy, education for all and the Millennium development Goals all link in with the DESD:

ESD equally addresses all three pillars of sustainable development society, environment and economy - with culture as an essential additional and underlying dimension. By embracing these elements in a holistic and integrated manner, ESD enables all individuals to fully develop the

knowledge, perspectives, values and skills necessary to take part in decisions to improve the quality of life both locally and globally on terms which are most relevant to their daily lives. ...‘Education for Sustainable Development (ESD)’ is a concept that goes far beyond environmental education. ESD ...includes education for poverty alleviation, human rights, gender equality, cultural diversity, international understanding, peace and many more. UNESCO proposed that the vision of education for sustainable development is a world where everyone has the opportunity to benefit from quality education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation (UNESCO, 2005b).

This combining of UN initiatives provided opportunities for all countries and groups (UNESCO, 2005b) within them to see that there were obvious activities they could undertake in relation to education, whether they were from a developing nation or a developed one. The launch of the Decade in each country meant that new impetus was provided for those already doing things and opened doors for others. In New Zealand the Associated Schools Project of UNESCO continues to support schools in this area (UNESCO_NZ, 2010). This combination of UN initiatives was also the first clear indication that culture was seen to be an important part of ESD.

2.2.3 Summary of global development of EfS

What were initially seen as environmental issues gradually came to be seen as issues arising out of the way human society is structured and how we treat each other and the environment. In recent years, the focus has more clearly fallen on the interaction of environment and society, with implications for considerations of economy and culture. This means these issues are harder to remedy and perhaps explains why global agreement on their solutions has been so hard to attain. Since the Copenhagen summit on Climate Change in 2009, it has been clear that no one solution will suit all. This makes it harder to effect change, but perhaps more likely that change will happen as it needs to if we are to end up with a sustainable future.

2.3 Application of education theory to EfS approaches

In response to the developing understanding of the key role of education in environmental protection and the move towards sustainability, the literature has described two very different paradigms to implementing Education for Sustainability (EfS). They follow from two different world views or philosophies of education and were taken up by places or groups where each view resonated. Large countries, which often had a range of educational approaches, frequently ended up with a range of approaches to EfS, many of which were rooted in a behaviourist view of education, notably Germany (Bolscho & Hauenschild, 2006) and the USA (Robottom & Hart, 1995). Those countries where democratic principles were enshrined in education e.g. Scandinavia tended to follow a more critical theory of education approach (Mogensen, 1997; Schnack, 2000).

2.3.1 A behaviourist view of EfS

The behaviourist or individualist philosophy has been used in environmental education as well as in other areas of education. As described and analysed by Robottom and Hart (1995), this philosophy uses a methodology borrowed from science in that it imposes the following: structure of research, manipulation of variables (including people), and statistical analysis; believes truth is independently verifiable, uses validity and reliability, and requires the researcher to remain detached from the setting. Outcomes are generally measured against preset standards. The underlying assumptions of this type of research are that education is about changing behaviour, i.e. societies want citizens who behave in desirable ways as seen by the government of the day (Robottom & Hart, 1995). If this was applied to education it implies that students would have to learn certain knowledge and ways to behave rather than developing their skills and abilities to think. Although common aspects of education may well be seen as promoting certain behaviours, for instance learning to cross the road safely or learning to get on with others, these are used at an age when many children's reasoning may not be able to follow more involved understandings, however, it is hoped they will become able to do so as they get older.

Behaviourism can be seen as an ideology. Robottom and Hart (1995) define an ideology as a world view, paradigm or frame of reference that enables those following it to take for granted some practices as unproblematic and uncontroversial and therefore self-evidently value-free, while claiming that other alternatives are irrelevant, inconsequential and ill-informed (Robottom & Hart, 1995). The behaviourist focus on an individual's actions conveniently ignores the social, historical and political structures within which those individuals sit and which may even be controlling or at least influencing their behaviour. In New Zealand education today the Curriculum (MoE, 2007) locates students within a range of other influences including family, culture, religion and previous experiences and freely acknowledges that these exert considerable influence on students. While at times education in this country might utilise a behavioural approach, particularly around discipline or national standards testing, it is not the predominant learning approach at policy level.

Behaviourism has an inbuilt hierarchy whereby the people in power who set the standards are able to blame those that do not meet these standards as not behaving appropriately, or in other words they 'blame the victim'. This blaming often led to a deficit mentality that was used in the past to account for the lack of success of students who did not fit the norm in behaviour, attitudes or educational success. It was used extensively to account for the outcomes for students who were poor, non white, not successful or any combination thereof. Such deficit mentalities have been very destructive to many minority groups around the world (Bishop & Glynn, 1999).

Despite all this, in the USA in 2002 a behaviourist approach was still being pursued in most research into outcomes from educational programmes into environmental attitudes and behaviour. Kollmus and Agyeman (2002) reviewed a wide range of this research and reported that researchers find it difficult to pin down why people do not act environmentally, especially when they have environmental information. They report that incentives sometimes work but researchers are unable to determine reasons for differences in behaviour. The authors reviewed a number of models produced by researchers to account for their

findings, most based solely on analysing individual behaviour. They then proposed their own model for these combined results which includes both internal and external factors to account for the behaviours. The latter include infrastructure, political, social and cultural factors and economic situation but these still focus on the individual and their response, with the authors indicating they believe that old habits or behaviour patterns are very resistant to change (Kollmus & Agyeman, 2002). It would appear from this that research in the USA into environmental attitudes and behaviours at that time was still locked into a behavioural ideology, as defined by Robottom and Hart (1995).

By ignoring the societal context as behavioural educators do, they are unlikely to be able to reliably account for differences in individual behaviour. This is one reason why this approach is unsatisfactory. Secondly, in behaviourism all individuals are treated as identical and the world view they are operating under is treated as identical. This is patently not true as all cultures have different world views and these also exist within sub groups. There are no guaranteed responses. The third and largest issue is that institutions are ignored. Just as in racism and sexism the key players are not individuals but institutions, be they big corporations or governments. These are the key because they have the power to influence via marketing, or power to enforce through access to jobs or via laws. This means institutional views have more power in many situations and consequently they are able to control individual behaviour. The end result of this in education is that many responses to behavioural approaches will appear to be random because the key influences are excluded. This is why behaviourist approaches to environmental issues have failed to produce the desired outcomes. A different approach that seeks to educate to question is critical education.

2.3.2 Critical education

Critical education is education that questions what is being taught and why, and then relates it back to the structure of society. Giroux (2008) states that learning environments cannot be removed from the society they are part of. In this approach, part of the role of education is to address the deepest conflicts in

society. However, education must also be meaningful so that it can become critical and transformative. Giroux goes on to say:

For knowledge to become meaningful, it must connect with the histories, values and understandings that shape students' everyday lives. This is knowledge that not only tries to connect with what students already know, but also challenges the limits of such knowledge by questioning both the histories and context in which such knowledge is produced, appropriated and internalized. Pedagogy in this instance takes matters of context seriously, but does not limit its articulation of knowledge to the immediacy of experience; rather, experiential contexts become a starting point for moving into the larger world of knowledge, ideas, theories and social relations. This kind of education also suggests making visible the values, ideologies and practices that enable violence towards others, [and] promote an indifference to social justice. Such values and practices have to be engaged as part of a language of critique, while a discourse of educated hope has to be appropriated as part of a broader effort to reclaim ... and deepen the values and practices of a substantive democracy (Giroux, 2008, p. 1).

Huckle (1996) agrees with these points which he applied to the teaching of sustainability. He would like all teachers to be “transformative intellectuals” so they can lead such a process (Huckle, 1996, p. 106). Tilbury (1995), in describing the differences between EE and what she refers to as EE for Sustainability (EEFS), notes that what is studied must be relevant to the lives of the students, as it must encourage them to explore the links with their personal lives and prepare them for contemporary society. EEFS should look at the issue historically, including the causes and possible solutions. She goes on to include that students must understand a situation from different value systems and must ultimately be able to state and justify their own value position.

Sterling would like to see all education restructured to use the critical sustainability approach (Sterling, 2001). He believes that rather than the “quasi-

market model of education” (Sterling, 2001, p. 14) we have, the following needs to happen:

The crisis/opportunity of sustainability requires second-and where possible –third order learning responses by cultural and educational systems. There is a *double learning process* at issue here: cultural and educational systems need to engage in deep change *in order* to facilitate deep change-that is-, need to *transform in order to be transformative* (Sterling, 2001, p. 15).

This congruity between critical education and sustainability is what made it particularly attractive to the Scandinavians where this approach took a strong hold

2.3.3 Background to Scandinavian position

The Stockholm Conference in 1972 and Rachel Carson’s book *Silent Spring* are credited with igniting the Environmental debate in Sweden and Denmark (Breiting & Wickenberg, 2010). Sweden had put the issue of pollution on the agenda of the Stockholm conference and later along with other countries, such as Germany, on the agenda for Tbilisi (Bolscho & Hauenschild, 2006). In both Sweden and Denmark the initial public debate was around pollution. Denmark’s environmental awareness arose in the 1970’s when problems with pollution from industry and agriculture were seen as increasing (Laessoe & Ohman, 2010). Denmark has little land to act as a buffer between city and country and the Danes literally sit on their drinking water (Breiting & Wickenberg, 2010). When their Government did not respond to concerns about environmental pollution and instead wanted to use nuclear power, the population protested and this resulted in the Government abandoning these plans (Laessoe & Ohman, 2010).

What was important in both Sweden and Denmark was their commitment to democracy. They established parliamentary democracies in the mid 19th century and particularly since the early 20th century had an emphasis on social welfare, justice, inclusion and consensus. Schools were seen as having an important role to play in preparing students to become active citizens (Laessoe & Ohman, 2010).

All the Nordic countries perceived themselves as closely related because of their common history and culture. As a result in 1952 the Nordic Council was formed. This Council was mandated to look at any issue apart from Defence. From 1972 to 1982 the Nordic Council funded work in education on developing teaching strategies and learning materials. Then from 1983 to 1991 there was a series of events called ‘Nordic Symposiums in Environmental Education’ (Breiting, Hedegaard, Mogensen, Nielson, & Schnack, 2009). These events were called *Scanticon* and in 1984 the Danes first presented their work around a democratically founded understanding of EE as ‘problem-oriented, conflict-aware and action-oriented’. These ideas, along with the Danish Ministry of Education suggesting a greater emphasis on aesthetical instead of science approaches, helped to evolve the *Action competence, Conflicting interests and Environmental education –The MUVIN Programme* (MUVIN is an acronym for ‘Miljøundervisning i Norden’ [Environmental Education in the Nordic countries]) (Breiting et al., 2009, p. 14). The MUVIN Programme was funded by the Advisory Committee on Nordic School Co-operation and the Nordic Council of Ministers. There were three relevant international perspectives as well. The most important perspective was developments within nature conservation, and environmental protection. The second perspective was the international development of EE pedagogy and the third was the development of EE based on development work in schools (Breiting et al., 2009).

In 1992 a paper was presented to an international conference in Texas. This paper made clear the Scandinavian break with the “inherently manipulative approach of behavior-modifying education” and introduced their action competence model. The paper was called *The new generation of environmental education* (Breiting et al., 2009, p. 16). There were others around the world who sided with the Scandinavians as in conjunction with their new approach they challenged the dominance of scientific thinking in terms of research methodologies, philosophy, behaviourist psychology and sociology (Breiting et al., 2009). The others involved in this challenge included Robottom, Fien, Wals, Foros, Hart and Elliott and Posch from ENSI (Breiting et al., 2009).

2.3.4 Application of Critical Theory to EfS

In order to meet the challenge to develop “a coherent and stimulating concept of EE” that arose from the 1989 Nordic Council Symposium (Breiting & Wickenberg, 2010, p. 22) and to take their theoretical understandings into a practical application, the researchers working at the Royal Danish School of Educational Studies (RDSES) made three alterations to the then Danish model of teaching environmental education. When EE was initially introduced into Denmark, it had been used as a grab bag to cover anything non-traditional that was vaguely linked to the environment (Breiting & Wickenberg, 2010). This model had focused on ecology, nature and technical solutions to environmental problems. The RDSES changes were as follows: firstly, they refocused from human-nature interactions to human-human interactions and looked at the use of natural resources. Next they turned environmental problems into environmental issues, as these could be discussed by looking at stakeholder positions. The third step was to change from looking at conflict between economy and ecology, to conflict or dilemma between short term and long term economic concerns (Breiting et al., 2009; Breiting & Wickenberg, 2010). This approach was presented as a paradigm shift in the understanding of EE (Breiting et al., 2009). The explanation for these changes was first given by Breiting in an unavailable and untranslated paper in 1989 but subsequently quoted in Breiting & Wickenberg (2010, p. 23) as:

Human ecology should underline the special abilities of people to foresee the future and to make responsible rational decisions including making value judgements related to equality and fairness in stewarding natural resources.

The ability to foresee the future or to imagine alternatives is also called visioning. It can be seen as an aspect of critical thinking around alternatives to current situations. It came to be considered an important part of EE as if alternatives cannot be imagined they can never be reached (Mogensen, 1997).

Breiting's emphasis on human actions and responsibilities fits with the social ethos of Denmark, where similar to other Nordic countries democracy, social welfare, justice, inclusion and consensus are all highly valued as part of a participatory democracy (Laessoe & Ohman, 2010). At RDSES, as their thinking developed into the concept of action competence, they provided professional development for teachers and this became the major impetus for pedagogical change in Danish schools as part of the MUVIN project discussed below. Work at RDSES continued until 2000 when the centre was closed for political reasons (Breiting & Wickenberg, 2010) and most of the key researchers moved to Aarhus University. This work is still being pursued there.

2.3.5 Action competence

The proposal above which came to be called action competence had its roots in the work education theorists in Denmark, notably Schnack, had done on critical theory. These theorists were heavily influenced by the German concept of *Bildung*. This concept roughly translates as the formation of the personality through education or being an 'educated man' (Mogensen & Schnack, 2010). In Scandinavia this concept resonated with their understanding of critical theory and in particular the utopian dimension which has as its aim;

the fulfillment of humanity: full development of the capacities and powers of each human individual to question preconceived opinions, prejudices and 'given facts', and intentioned participation in the shaping of one's own and joint living conditions (Mogensen & Schnack, 2010, p. 61) .

One of the key researchers, Schnack, had worked in critical education since the 1970's and lectured in the area from the 1980's (Schnack, 2000). This direction had come out of the post war work on responsible citizenship that arose in both Germany and the Scandinavian countries. It combined citizenship and responsible participation in democracy as the ideal. The belief was that if people were active citizens they would be less likely to be indoctrinated and manipulated by

governments (Schnack, 2000). This concept when combined with environmental awareness became action competence. Schnack describes the links as:

Action competence is an approach within the recent school of critical education, developed within a tradition where Bildung is closely linked to democracy. Democracy without Bildung is merely an empty shell, a procedure or form of government, which at all events would never be able to survive for long. Conversely, Bildung without democracy is reduced to what the leaders of the hour have defined as highbrow culture and good manners. Thus action competence is political and democratic education (Schnack, 2000, p. 272).

The term action competence was defined by Schnack in 1996 as "...capability – based on critical thinking and incomplete knowledge – to involve yourself as a person with other persons in responsible actions and counter-actions for a more humane world" (Lundegard & Wickman, 2007, p. 15). This definition implies that knowledge and critical thinking are important and also includes action of some type. Critical thinking involves reflection on whatever has been learnt. In a later paper Schnack is adamant that building this democratic perspective together is the only way to build enough trust in each other which he sees as absolutely necessary if individuals are to take action together (Schnack, 2000). Together all these stages parallel the steps outlined earlier as the steps required for critical education, and they have been applied, by the Danish researchers, to environmental or health education.

The action competence approach was first published in English in 1997 by Jensen and Schnack in what has become a seminal paper, so much so that it was reprinted in 2006 (Jensen & Schnack, 2006). They claim to have "re-established the concept of liberal education in critical educational theory in opposition to the tendency in post-war years to reduce practice to technique" (Jensen & Schnack, 2006, p. 474) This paper reiterates that the term action competence has two components; "an analysis of the nature of environmental problems and an idea that education is more than academic schooling or behaviour modification"

(Jensen & Schnack, 2006, p. 471). They point out that their “fundamental assumption is that environmental problems are structurally anchored in society and our ways of living” and then go on to say that changes need to happen at “both the societal and the individual level” (Jensen & Schnack, 2006, p. 472). This point is crucial as otherwise action is often only considered at the individual level. There are two problems with this individual approach. It is collections of individuals who cause the problem so at the very least collections of individuals will be needed to change things. It is also powerful groups who often control the situations that cause the problems and so this is where societal change is required. This latter point is where the Danish researchers disagree with Kollmus and Agyeman (2002) and Jensen (2002) spells this out in his reply to them.

The Danes believe that action competence can help overcome the problem of students being anxious and worrying about environmental issues. They also see it as providing students with the necessary “courage, commitment and desire” (Jensen & Schnack, 2006, p. 472) so that they are “ready, willing and able” (Jensen & Schnack, 2006, p. 473) to get involved in society and work to solve environmental and other issues, so that the students become active agents rather than remain passive recipients. This is what enables them to overcome anxiety and to fully appreciate that they themselves are able to effect change.

Jensen and Schnack go on to explain exactly what they mean by the term action. They believe students must be able to consciously and intentionally choose particular targets for action and as a result be able to understand why they are taking action, and be able to explain this by giving a reasoned argument backed up by evidence. They do not, however, see schools as solving society’s problems and believe students should only be taking action if they wish to (Jensen & Schnack, 1997). They also explain what they do not include under action. They state that many teachers during the teaching of an environmental unit will include data collecting either from a stream or forest, or interviews with relevant people. While Jensen and Schnack acknowledge these as useful they do not see them as environmental actions, they are a scientific investigative action and a social investigative action respectively. For them an environmental action must work

towards solving a specific environmental problem. There may be other activities undertaken during such a unit, for instance cleaning up a beach or park. This is also not an environmental action, it is an activity. This is because it is not directed at solving the problem only at providing a short term remedy for a symptom (Jensen & Schnack, 1997). This is an important distinction for students and teachers to grasp otherwise it becomes an apparent 'easy solution', whose only value is in fact a false 'feel good' factor, as the real issues are not faced up to. Within environmental actions, Jensen and Schnack (1997) distinguish two types. These are indirect actions which are described as "dealing with 'people to people' relations" e.g. education of others, and direct actions e.g. building a compost heap for their school, which are described as "relations between people and their environment" (Jensen & Schnack, 1997, p. 170).

The position of action with respect to action competence is interesting. Action provides an experience and in the view of Jensen and Schnack experiences are very important (Jensen & Schnack, 1997). Schnack believes from earlier work he did in 1981 that the importance of experience is that it forms very deep-lying structures in terms of personality. This position is stated in their 1997 paper (Jensen & Schnack, 1997). They then relate this to Dewey in terms of the 'continuity of experience' in that one experience is the result of an action and that action was based on a previous experience and so on (Jensen & Schnack, 1997). Jensen and Schnack list four components of action competence and action experience is one of them. The other three are knowledge/insight, commitment, and vision. The knowledge they are talking about is not just factual recall. They include knowledge about an issue, its origins and causes, and possible solutions. This knowledge might have to be rethought or reorganized from an action perspective (Jensen, 2002), but it is going to be needed in a form that is relevant to the context being examined, not as a traditional block of knowledge to be swallowed whole by students. Jensen (2002, p. 329) quotes Larsen, a Danish psychologist who says it is the role of the teacher to know the knowledge needed and to be able to choreograph the educational process. This may well be possible with primary school students but at secondary level the teacher may not immediately know the information required, however they should still know

enough to be able to point students in a productive direction and later work with them to help interpret their findings. In fact, genuinely not knowing can be useful to admit in that it raises the learning process to a higher level and allows for co-construction of the knowledge required in that context.

The Danes (Breiting et al., 2009; Jensen & Schnack, 1997; Mogensen & Schnack, 2010) also include critical reflection as part of this process, and teach their students to ask questions such as:

- Where did the particular societal structures or values that underlie this problem come from?
- Do some people benefit from this even though it causes an environmental problem for others?
- Are there other ways of looking at the issue?
- What might a solution look like?
- What has to be done to implement a solution, what or who has to change?

Under commitment Jensen and Schnack say that teaching needs to support the development by students of their “motivation, commitment and drive” (Jensen & Schnack, 2006, p. 482), and that students also need the skills to be assertive. Teaching will also be needed around the type of action students choose and how it contributes to their understanding of wider issues; teaching to ensure students appreciate the differences between individual and collective actions, and that effecting large scale societal and structural change will not happen overnight. Collective actions are important in that individuals turning off light switches will not change much, however thirty families switching their lights off might start to make a difference in a small town. There is a question of scale in here that can be hard for students to grasp. Part of this might be accomplished by helping students to envision an appropriate future. How might the future look, what if oil runs out, what about a future without war? All of these futures can be examined as can all the ones students envision. The steps to achieve such futures can be examined and this can help students see that large scale change takes time but that steps

taken now can start it off. They can also see that actions taken by them as a group can help initiate wider changes in their local community. When all four components are connected together the emotions, values, knowledge and action are a powerful force for change as well as a powerful educational experience (Jensen & Schnack, 1997). These four components, used now and in the future, with responsibility being taken for actions, would contribute towards becoming action competent. Action competence then is not so much something anyone achieves but something one works towards over one's life (Jensen & Schnack, 1997).

2.3.6 Testing of Action Competence

The implementation of action competence in one situation is described by Mogensen as follows. In Denmark health and environmental education were clustered together and the aim was to introduce critical thinking into both (Mogensen, 1997). Mogensen goes on to say that the aim was to develop an approach that wasn't just moralistic; concerned with behaviour change or just recording how often students participated in recycling. Critical education was to develop students' ability to ask questions, to think for themselves and to make their own decisions. Mogensen saw this as being achieved by using a different teaching approach, listening to students carefully, treating them with respect, involving them in real world decisions, developing their curiosity, getting them to ask how something had developed, helping them work with controversial issues and, when doing so, to imagine alternatives. In order to do this teachers needed to include not only "a language of critique but also a language of possibility", otherwise students would become mired in negativity (Mogensen, 1997, p. 431) or paralysed by inaction (Jensen, 2004; Jensen & Schnack, 1997). Mogensen goes on to state that critical thinking is always embedded in a cultural/historical context, requires imagining of alternatives, is reflective and evaluative and leads to a reasoned solution. Schnack (2000) agrees with him. These conditions could be accomplished using an action competence model based on conflicts of interest (Mogensen, 1997).

The largest testing of the action competence model in environmental education was the MUVIN project. Phase 1 was from 1991 to 1994 and took place under the 'Nordic joint initiatives' of the Nordic Council (Breiting et al., 2009). In Denmark MUVIN was linked to a Government initiative to 'green' schools. Despite this there was a common approach by all 5 Nordic countries with joint co-ordination between individual countries that included teacher and student interchange. This was followed by organised experience sharing between the researchers from each country (Breiting et al., 2009). Phase 2 took place in the 1994/5 academic year. Considerable support was also provided for the second phase. This included teacher release time for regional seminars, background material provided for schools, researchers acting as advisors, study groups, newsletters and again exchange visits (Breiting et al., 2009). In Denmark there were 22 Advisors across 85 schools and 10 schools were part of a set of in depth case studies (Breiting et al., 2009).

In the project, the Scandinavians started with a conflict of interest around a resource issue (Breiting et al., 2009). They feel that by doing this, students are encouraged to identify a range of conflicting views and can then investigate what is behind each view. They also feel that this means the teacher is not pushing their view onto students and so this allows students to make up their own minds on an issue (Lundegard & Wickman, 2007). This means students are researching and acquiring knowledge about an issue and engaging in a range of activities. These activities are varied but may include: activity organised by someone other than students, going out and collecting data, or helping someone else with an action (Jensen, 2004). Teachers needed to be careful that students involved in an action were not recorded as "taking action" as the two are not the same (Breiting et al., 2009; Jensen, 2004). In an Action Competence approach 'taking action' implies the action has been designed by the students themselves, is intentional and specific and is aimed either directly or indirectly at solving the root cause of the issue (Breiting et al., 2009). This emphasis on student participation and co-influence marked the MUVIN project out from other approaches being used in Europe at the same time. Note again these steps clearly parallel the steps outlined

in critical theory but here they are applied as a process by students to an environmental issue.

This strict action competence approach to content, co-influence and defining of 'action' meant that the MUVIN project was not part of the Environment and School Initiative (ENSI) which was happening at the same time across a large part of Europe. ENSI started in 1986 (ENSI) and is an ongoing joint OECD-CERI (OECD = Organisation for Economic Co-operation and Development; CERI = Centre for Education research and Innovation) initiative which is part of the UNESCO Decade of Education for Sustainable Development (DESD) (UNESCO/ENSI, 2004). ENSI uses an action research model by teachers and focuses on supporting educational developments that promoted educational understanding and a participatory approach with individual school projects linked to curriculum and sustainable development. However they operate in more of a top down approach starting at government level and then through particular institutions so their control is at the institutional level not at the student level of co-influence, as with the action competence model (ENSI). The work they publish showcases interesting examples of this work. ENSI Programme Director Posch promoted students' understanding of complex relationships between humans and the environment and developing dynamic qualities such as exercising initiative and taking responsibility (Breiting et al., 2009). Mayer (2003) reports that as an Italian science educator working for ENSI she found it challenging to get her understandings across and to fully understand in return in a research setting that was very Anglo-Saxon. She found it very exciting working 'at the borders'. ENSI then appears to work in a complementary way to the Danish researchers. While ENSI tended to be top down, the action competence approach is bottom up. Researchers in Denmark indicate that for bottom up to work there must be some support from above, at the very least to allow time in the curriculum to follow this approach (Breiting et al., 2009).

To summarise then, action competence was an approach to both environmental education and education for sustainable development that arose out of Denmark and spread to other Nordic countries. It uses a critical education model and

emphasises what humans need to do by using conflicts of interest over resources, usually related to a school's local area, and encouraging students to develop the skills necessary to become active democratic participants in decision-making. They did this by taking part in activities, research, pursuing multiple approaches and making their own decisions through co-influence. If as a result of their work students wished to design and intentionally take action of their own to address the underlying causes of the issue, then this was encouraged. Such an approach required professional development for teachers to help them implement this approach and time in the curriculum for it to happen.

Elsewhere in Europe other forms of environmental education and education for sustainable development were designed and implemented. The ENSI project was such an approach. Both the action competence project and ENSI used a model that emphasised students changing their attitudes rather than just having their behaviour changed. This contrasts with the latter approach being employed in the USA (Robottom & Hart, 1995).

2.3.7 Action competence in other countries

In Germany, to which the Nordic countries have close historical ties, the model used was not exactly action competence but it did have more uptake. As in the Nordic countries, there was a history of environmental concern stretching back to the 1970's (Bolscho & Hauenschild, 2006). By the 1990's schools were using an environmental education model that included local environmental initiatives, interdisciplinary, activity oriented learning, and working on environmental problems. While the aim was for students to develop competence this was not defined as action competence. There was a continuum of response that varied from tweaking current approaches without changing current lifestyle to a view that was much more critical and open to more far reaching changes. This may have been due to the range of materials available to teachers, whether any urban project groups were nearby or the presence and input from some of the environmentally friendly lifestyle groups (Bolscho & Hauenschild, 2006). In 1996 sustainable development appeared in German schools. There were

nationwide groups looking at its implementation throughout the education system (Bolscho & Hauenschild, 2006).

Overall in Germany the key theme has been participation. This theme appears to have been taken up by other German speaking countries as well. Switzerland and Austria, and also, Belgium, started off with an environmental education approach that was much more ecologically based (Kyburz-Graber, Hafer, & Wolfensberger, 2006). When education for sustainable development arrived they used more of the German approach encapsulated in the term ‘gestaltungskompeteny’. This term has a broad meaning of competency to shape the future (Kyburz-Graber et al., 2006). Kyburz-Graber et al distinguish between what they see as the German approach whereby there is a direct relationship between the pedagogical approach and competence, able to be proven by empirical data; and their approach which assumes that everything is contextual (Kyburz-Graber et al., 2006). Their research was case study based and since 1992 they have explored what they describe as a socio-ecological approach that uses a critical perspective within an emancipatory philosophy. This approach has challenged schools to reorient their practice to “support young people to develop their fullest potential for being active and self responsible individuals accepting their roles as global citizens” (Kyburz-Graber et al., 2006, p. 103).

From their research around their socio-ecological approach, Kyburz-Graber et al. have identified the following as important aspects of success: use of real life situations; socio-economic contexts that involve people in naturally occurring groups; generating locally relevant knowledge; reflection on value systems; and exploring conditions of work. This is because the approach is situation and issue oriented and as such includes the perspectives of the people involved where these are socio-contextual constructions. Any findings are developed in a co-operative, interactive way (Kyburz-Graber et al., 2006). There appears to be an emphasis on students learning from these situations and then participating in civic issues and voting when they are old enough. The case study described was with older secondary students.

Kyburz-Graber et al's approach has students and teachers working together, as well as involving the researchers, at least in the case study described, which was with older students. This case study threw up the key issues of: the construction and critical use of knowledge; the interface between science, social science and humanities; the need for appropriate pedagogical settings for in depth discussions and reflection. This latter point was of particular importance in that Kyburz-Graber et al. note that society is moving towards education where visible effects and measuring standards in education are possibly supplanting the conditions required for discussion of environmental issues that need thoughtfulness and reflection.

The Danish team who developed action competence worked with some other countries to share their findings. Portuguese educators attended these training sessions and Fontes (2004) reports that while the teachers who attended the workshops and then introduced it found it worked well, other schools were reluctant to implement it. For Fontes, the key principles were as follows: concepts of action; action and narrative knowledge; real life authentic situations; concrete situations with multiple perspectives; and a social context. In fact Fontes approved of the action competence model so much she wrote that it should be used to meet the goals of education throughout Portugal, and not just in environmental education.

In a review on action competence research, Wals (2010) noted that if there is cooperation between people of diverse backgrounds, as well as extensive dialogue, then not only is the learning intensified but social learning occurs as well. This can ultimately lead to an exchange of different types of knowledge, values and the emergence of action competence that allows these individuals and groups to resolve personal and social issues. If this is done in a setting of heuristic pluralism, then instead of one set of norms being the 'benchmark' everyone is asked to examine their own position and to travel outside their comfort zone and consider other people's points of view. The more practised we become at this, the easier it is to move beyond the sticking point of different people do things differently and onto the position of understanding and innovative

meaning making that can come out of such reflections (Wals, 2010). This is important because we do not know the path or paths to sustainability yet and the process might well involve detailed sharing and understanding by a diverse range of people before any paths become apparent. Wals goes on to state: “going beyond one’s own limits might be essential in creating innovation and triggering transitions that can break with existing systems and routines” (Wals, 2010, p. 145). Wals sees action competence as an emergent property of relationships and interaction between people(s) in the context in which a particular activity is taking place. Once it has emerged, action competence then acts as a catalyst to critique its own culture so that various routines, assumptions and guiding principles do not become an unquestioned norm passed down uncritically to the next generation (Wals, 2010). He concluded that everyone must be aware of and responsible for an ongoing tension between moves for self determination now and calls for sustainable social norms via education for sustainable development in the future (Wals, 2010).

As a result of Wals analysis, the Nordic explanations of action competence and the way EE is used elsewhere, it appears that any application of the action competent principle will involve it being adapted to suit the society, and if necessary, the area to which it is being applied. In England, Uzzell criticized a lot of the so-called environmental action that was occurring in primary schools and proposed a new model linking schools and their communities using action competence to ensure that meaningful learning was taking place (Uzzell, 1999). This model had many of the same characteristics as the Nordic model but was in a form that made sense for the English situation. Additionally, it needs to be acknowledged that internationally there is little agreement on the details of EE, ESD or EfS. A seminar held at London’s King College in 2003 could only agree that EE includes social, political, economic, historical and cultural aspects as well as ecological ones (Barraza, Duque-Aristizabal, & Rebolledo, 2003). While in New Zealand we may be relatively clear about our definition of EfS, internationally a number of countries from the ‘South’ (less developed countries) believe it is yet another attempt by the ‘North’ (more developed countries) to impose a capitalistic system and a form of neo-colonialism on the South. This

view is particularly strong in Latin America (Barraza et al., 2003). As a result it reinforces the idea that each country should formulate their own initiatives grounded in their own context (Barraza et al., 2003).

This type of adaptation is relevant for New Zealand. This country has an indigenous people known as Maori, and their language, Te Reo Maori, and English are the official languages, along with Sign language. Many Maori concepts are now common in the New Zealand education system. As is common for many indigenous peoples, Maori see themselves as belonging to the land and being responsible for it in a role called kaitiaki. This along with other concepts is an integral part of one New Zealand application of action competence.

The city I work in is regarded as the biggest Polynesian city in the world. This means that, in addition to Maori interests and our responsibilities under the Treaty of Waitangi (often seen as New Zealand's founding document), students from a range of cultural backgrounds are likely to be present in my class and their learning needs must also be taken into consideration.

2.3.8 Summary on education theory and EfS

In summary, behaviourism does not provide an appropriate way to educate with respect to EfS as it completely ignores the context and focuses solely on individuals. Critical theory does provide a good approach because of its insistence on asking questions about origins. This along with the emphasis on change and action means that it fits much better with EfS. The Scandinavian application of this theory to EE to produce the action competence approach has been thoroughly tested. This approach is based on empowering students to become active citizens by encouraging them to research an issue, investigate different viewpoints, analyse and evaluate what they find and identify possible solutions. From this, they are able to take positive action to help solve the issue.

While any programme needs adaptation when being used in a different context, this approach has much to recommend it in a New Zealand setting, as this country also has a strong tradition of valuing democracy and experience. One important difference would be the need to consider the influence of culture given the cultural diversity of students in New Zealand schools, including that one third of all under 17 years olds identify as Maori or Pasifika in those schools.

2.4 Link from Education learning theory to pedagogy

Having established that action competence appears to be an important concept to develop through EE, the question turns to how this could be approached in the classroom. Pedagogy is how theory is applied in the classroom. As with knowledge theories, these practical pedagogical ideas change over time. Teachers are expected to take a topic and shape it into a unit scheme by providing relevant and interesting learning experiences using appropriate pedagogical techniques. Certain theories are often linked with particular pedagogies. I now examine some of the pedagogical techniques linked with critical theories of EE.

2.4.1 Educational Learning Theories

Educational Learning Theories are an important part of research. They focus on how students learn. This section reviews some key theoretical approaches that have links to critical education and action competence.

During the 20th century the focus on student experiences of learning environments developed prominence. Kolb traced the history of experiential learning theories by starting with Dewey in the early 20th century who believed the child should be involved in their education. He proposed hands-on learning and experiential education on the basis that if knowledge comes from interacting with natural objects, then learning cannot take place without objects (Kolb, 1984). Dewey also proposed a process that turns impulse into purpose. He believed that the impulse of experience gives ideas their moving force and ideas give direction to impulse. He saw impulse being tempered by observation and knowledge and that this led to

judgement, which led to achievement of purpose. This judgement could then provide the basis for another impulse experience and so on (Kolb, 1984). Kolb saw these ideas as providing a different direction to that of what he called implicit learning, which underlay traditional education, and as being different to behaviourism which also developed during the 20th century.

Lewin, working in the 1930's and 40's, borrowed the concept of feedback and applied it to social learning (Kolb, 1984). He used a mixture of action research coupled with laboratory work. Lewin believed that a lot of ineffectiveness was caused by lack of information and feedback, so he developed a process that provided subjects with concrete experiences that were related to abstract ideas. These subjects then discussed what researchers fed back to them in terms of observations and reflections. These led to the formation of concepts and generalizations. These generalizations were then tested in new situations (Kolb, 1984). Kolb believed that reflection was an important part of this process.

Kolb also saw Piaget's work as useful. In Piaget's terms the key to learning is a reciprocal process, one of mutual interaction (Kolb, 1984). The individual has a process of accommodation of concepts or schemas to experiences in the world in tension with a process of assimilation of events and experiences into existing concepts and schema (Kolb, 1984). Piaget, who called learning intelligent adaptation, saw imitation occurring if accommodation overcame assimilation, and play happening if assimilation overcame accommodation (Kolb, 1984). He developed four stages of cognitive growth and outlined different sorts of development for each stage.

Based on his own ideas and those from above, Kolb developed the experiential learning model (Kolb, 1984). He believed, as did Dewey, Lewin and Piaget, that learning is a process not an outcome, and as such has a different philosophical and epistemological base. He stated that implicit and behavioural learning assume that learning always remains the same, and that this approach underlies the belief that it is possible to measure how much learning someone has by testing them.

Kolb sees ideas as not fixed, that they form and reform through experience. No two thoughts are the same because there have been different experiences in between them (Kolb, 1984). If learning is a process grounded in experience, then there are implications from this for the way that education is attempted. It follows that anyone coming into an educational situation will already have some ideas about a topic based on their own experiences. This assumption underlies constructivism (Wertsch, 2007). The teacher's job is to identify students' current beliefs, provide experiences to challenge these beliefs and then assist students to integrate the newer, more developed ideas into their belief systems (Kolb, 1984). This also relates to Vygotsky's process of social constructivism and mediation as described by Wertsch (2007). Using Kolb's approach, it works better if the student can integrate the new concepts, as otherwise they might well end up with two different theories that they use in different situations.

Kolb (1984) believed that while learning is a holistic process that involves thinking, feeling perceiving and acting, he felt there were four kinds of abilities that could help the learning to be successful. These were; concrete experience, reflective observation, abstract conceptualisation and active experimentation. They are often presented as a cycle in this order. Kolb states that "when learning is conceived as a holistic adaptive process, it provides conceptual bridges across life situations such as school [and] work, portraying learning as a continuous lifelong process" (Kolb, 1984, p. 33). He goes on to say that learning is the process whereby knowledge is created through the transformation of experience (Kolb, 1984).

Schon (1985) also considered the role of experience in learning, and when he looked at the traditional concept of knowledge he replaced it with two types of knowledge. Firstly, he believed people have experiences and that this gives them a non-verbal and difficult-to-communicate understanding. Over time we accumulate a set of beliefs that are largely unconscious. He calls these our theories in action or theories in use. We may not be aware of how these theories make us act. He then argued that we have espoused theories and these are the ones we give when we are asked. If others watch our theories in action they can

tell us what they are but we may not be able to see them ourselves. If people are confronted with the differences between their theories in use and their espoused theories, then this can be a learning point (Schmidt, 2000).

Schon (1985) described our understanding of knowledge as something we pick up with our mother's milk. Again people pick up knowledge in everyday life and are often unaware they have it. It is obvious from their actions they have this knowledge that Schon called knowing-in-action. Schmidt (2000) has identified three types of this sort of knowing. They are; the feel of a skilled craftsperson for their material; the intimate knowing that people develop over time with close friends or objects; and a kind of passive /critical knowing with which people recognise things and judge the performance of others. Some are able to refine their knowing-in-action by reflecting-in-action. This may be a deliberate act of reflection at the end of session, lecture, term or it may be in the form of being taken by surprise and having to think on their feet. This latter usually evokes a sequence like surprise happening, think on feet, decide on a response, do it and see what happens (Schmidt, 2000; Schon, 1985). Schon goes on to explain that reflecting-in-action is akin to a researcher changing their model of an expert system rather than an expert whose behaviour is modeled. Schmidt (2000) comments that expert practitioners routinely reflect at the end of every session, day, unit, in other words it has become part of the way they work.

These approaches are seen as part of the constructivist approach. This is where students are assumed to have an understanding of everyday events and teaching needs to help them adjust their views in the light of additional evidence. There was considerable work done by a number of theorists on this approach. One such theorist was Vygotsky. His contribution was that he believed children needed to talk with others to completely integrate new information (Wertsch, 2007). He described a socio-cultural approach to human development (Cole & Gajdamaschko, 2007). In addition to the social contact, Vygotsky believed culture had an important role and that the interactions of the two combined could not easily be separated (Cole & Gajdamaschko, 2007). While Vygotsky did not live long enough to add depth to his theory, it resonates with many today.

Different cultures do emphasise different things in the same situation. These approaches will be absorbed by children as they learn their mother tongue (Cole & Gajdamaschko, 2007). An example would be children learning through culturally significant activities. There is evidence as well that a historical dimension may be involved. Cole and Gajdamaschko talked of a cultural-historical activity theory. These authors give the following definition “Culture is not a random array of artifacts but rather a heterogeneously, dynamically changing set of practices and resources that require constant active engagement for their continued existence” (Cole & Gajdamaschko, 2007, p. 208). While children have a culture they are born into, they may well experience other settings that have a cultural dimension, for instance in the classroom. Culture then can play an important role in how a student learns.

2.4.2 Approach identified from Efs education

The Nordic development of action competence was an implementation of critical theory in a particular situation. This implies certain pedagogies as part of the process of what should happen in class. The action competence approach involves firstly a student, rather than teacher, centered approach. This means the students are to be the focus, and they drive the process, not the teacher at the board. This requires that the teacher set the scene and develop the series of activities to help the students initiate the process. Teachers are likely to have to provide resources such as computer access and trips to the library. Student centered learning is usually done in groups to enable support and discussion to take place. It may require the teaching of certain skills before a unit aimed at developing action competence is started. Students will require skills not only to find information but also to select relevant material and to know when they have sufficient. This material has to be processed and then discussed. Reflection techniques are necessary to promote understanding. At some point a discussion on possible action must occur as must any form of report back that is required, whether that be to the class, their parents or the whole community.

The role of the teacher then is as facilitator and enabler (Fien & Tilbury, 1996; Jensen, 2008; Jensen & Schnack, 1997; Mogensen, 1997). The teacher needs to be skilled enough to set the unit up so the students are able to succeed. If at some point during the unit the students identify a need, the teacher will then have to provide a way to meet that need, be it skill based or information related. All of this requires a highly skilled and confident teacher who has a thorough knowledge of their students.

For a student to be declared on the way to action competence, they must be able to carry out the whole process, so are likely to need to use it several times to develop the skills as well as to make the links required to become an active citizen. Schnack actually refers to action competence as a ideal that is not necessarily reachable (Mogensen & Schnack, 2010; Schnack, 2000). Mogensen and Schnack (2010) go on to say that the type of competence they are talking about is not the type that can be checked off on a list and that it should also not be used as summative assessment, as it is about the development of the person.

2.4.3 Summary

There is considerable agreement between the pedagogy that comes out of the critical theory approach to EfS that generated action competence and the learning theories discussed above. Both imply a student centered approach whereby students are creating their own knowledge when they construct their own understanding of an issue. The experiential learning cycle matches this as well. As noted by Vygotsky, and also alluded to by Barraza et al. and Uzzell (Barraza et al., 2003; Uzzell, 1999) different cultural settings imply different factors need to be taken into account.

2.5 EfS in New Zealand

2.5.1 NZ Education System

New Zealand has a population of around 4.4 million people (Statistics New Zealand) The education system is made up of primary, intermediate and

secondary schools. The usual primary school is from Year 1 to Year 6 (5-10 years). Intermediates are for Years 7 and 8 (11-12 years). Secondary includes Year 9 to 13 (13 -17 years). Schooling is compulsory from the age of six to 16 years and is free in the state system. Most children start school aged five years. As of July 1st 2009 there were 2,581 schools with 760,859 children attending (MoE, 2010b). The majority of schools are government funded with both co-educational and single sex schools available although the latter are predominantly at secondary level. All public schools in New Zealand are secular, although there are some schools with religious affiliations that have become integrated into the state system (MoE, 2010b). There are also Maori medium and Pasifika medium schools which allow students from these cultures to learn the curriculum in their respective language and cultural settings. In total for 2009 there were 2,463 children in Pasifika medium education, with the largest sub group being Samoan with 1,596 children. In contrast there were 28,171 children in Maori medium education (MoE, 2010b).

New Zealand has an increasing number of children in Early Childhood Education (ECE) with around 58.7% of children under five years being in licensed ECE at any one time. Just prior to turning five, around 95% of children attend ECE (MoE, 2010b). At the other end of the scale more than half of New Zealanders aged 15 to 29 hold a tertiary qualification, although this percentage decreases with age. In New Zealand, tertiary education includes Universities, Polytechnics, Wananga (Maori tertiary institutions) and private training establishments. 40% of Maori and Pasifika students complete a Bachelors degree within five years of full time study (MoE, 2010b).

Success in New Zealand secondary schools can be measured in a number of ways. The National Certificate of Educational Achievement or NCEA is the current way success for secondary students is measured in New Zealand. NCEA is the National Certificate of Educational Achievement and is a standards based assessment system (NZQA, 2010). Further to the discussion in Chapter 1 (p14/15) about the structure of NCEA some statistics are included. 43.6% of school leavers in 2008 successfully completed schooling by attaining at least NCEA level 3

and/or gaining university entrance. Students sit their NCEA level 3 in Year 13, level 2 in Year 12 and level 1 in Year 11. In 2006 15 year old (Year 11 or NCEA level 1) New Zealand students achieved at the top proficiency levels in reading in PISA, with 40% achieving at least PISA level 4 and 16% achieving PISA level 5 or above. This compares with the OECD averages of 29% and 9% respectively (MoE, 2010b). If the statistics for NCEA level 1 numeracy and literacy are examined, only 61.1% of Maori students achieved this, while for non Maori the figure was 77.3% (MoE, 2010b). This level of literacy and numeracy must be passed before NCEA level 1 is awarded. Overall Maori and Pasifika students do not achieve as well as non Maori/Pasifika students as can be seen in Figure 2.1 below:

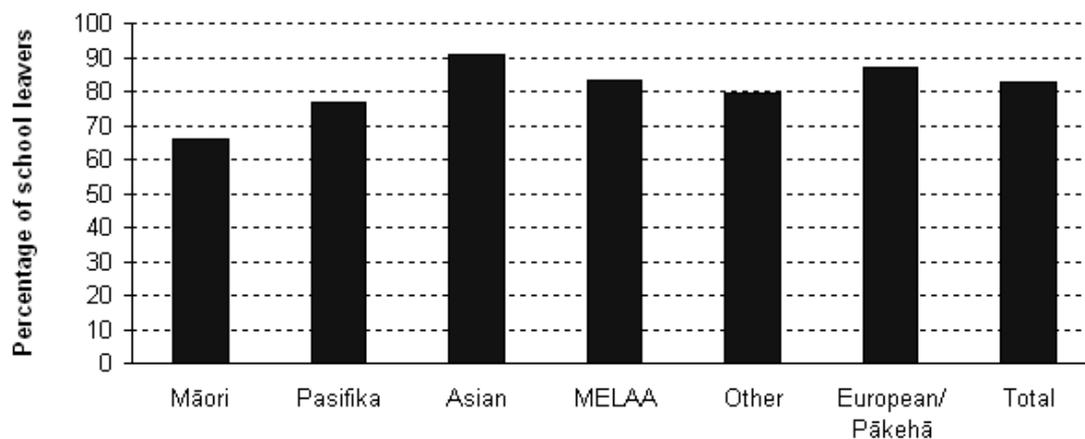


Figure 2.1 Percentage of school leavers with NCEA level 1 or above by ethnic group 2009 (MoE, 2010b)

As Figure 2.1 shows, in 2009 the percentage of school leavers with level 1 or above were as follows; Asian students had the highest proportion with 90.9%, European/Pakeha 87.1%, Pasifika 76.6% and Maori had the lowest at 65.9% (MoE, 2010b). When compared to their place in the overall population these figures are of concern as Maori make up 24% of the 0-17 age group and Pasifika make up 12%. This means that a third, 36%, of this total age group are in the underperforming groups.

Maori are also under-represented in science studies at tertiary level. Of the nearly 84,000 Maori enrolled in tertiary studies in 2007, only 1.7 per cent (1412) were taking science courses (Cumming, 2009).

Just 120 Maori graduated in natural or physical sciences in 2007, 5.5 per cent of all science graduates, which is less than their proportion of the population..

Former secondary school science teacher Liz McKinley, of Auckland University's education faculty, says Maori students tend to view science as "hard, boring and alienating" (Cumming, 2009). She goes to say "We can't do much about the hardness but we can do a lot about the boredom and the alienation". McKinley agrees that making science real is the key - "science which meets the needs of the Maori community and gets kids and schools involved. That needs to happen to help our kids get over the alienation" (Cumming, 2009).

2.5.2 Why the change from EE to EfS in New Zealand?

EE began at the grassroots in New Zealand with passionate and interested teachers delivering programs in their classes (Eames, Cowie, & Bolstad, 2008). Throughout the 1990's and early 2000's there was some opportunity for interested schools to develop their EE programmes (Eames et al., 2008). As elsewhere in the world there was considerable variation in what was covered and whether any action for the environment was included (Eames et al., 2008). The development of the new curriculum and the UN DESD along with the growth of the Enviroschools movement have seen EE become EfS in New Zealand schools (Eames et al., 2008).

As suggested in the New Zealand (NZ) Parliamentary Commissioner for the Environment (PCE) report *See Change* (PCE, 2004), the change in emphasis from EE to EfS was for a number of reasons. The term sustainability had crept into usage over a period of around twenty or more years. At the 2002 *World Summit on Sustainable Development* there was a push for governments to use the term EfS as it was seen as critical "to integrate sustainable development into education systems at all levels of education in order to promote education as a key agent for change" (PCE, 2004, p. 37). It had another benefit in that Environmental Education (EE) was sometimes seen as being a negative stance towards

environmental problems e.g. pollution, killing species. In contrast, “...sustainable development takes a more proactive approach towards positive outcomes” (Davis, 2001, p. 2), and was therefore seen as an easier aim to motivate people towards. (I have seen this among staff at my own school, where some cannot get beyond environmentalism being about picking up rubbish or anti-whaling). The PCE report also records that some sectors of society react negatively towards anything with the word environment in it (PCE, 2004). This report goes on to say “Education for sustainability [EfS] is therefore forward-looking. It aims to do things differently in the first place, instead of just cleaning up the symptoms of underlying problems” (PCE, 2004, p. 38). As noted by others, the emphasis moved from being solely on the environment to involving humans and their relationships both with each other and with the environment (Surendra, 2004; Tilbury, 1995)

2.5.3 EfS in New Zealand

In New Zealand Education for Sustainability is visible in at least three very different situations. They are the Enviroschools Programme, the introduction of the *Guidelines for Environmental Education in New Zealand Schools* and thirdly the EfS Standards. First was the Enviroschools Programme developed initially by the Hamilton City Council and the Community Environmental Programme and piloted in three Hamilton primary schools. In 2001 the Programme went national and in 2003 The Enviroschools Foundation was established, and by then both primary and secondary schools were involved although the former still predominate. The Enviroschools Programme has five guiding principles which are as follows; empowering students; learning for sustainability; having a Maori perspective; respecting diversity of people and cultures; and sustainable communities (Enviroschools, 2011) Their programme works by getting classes and teachers to identify the needs of a school through a visioning process and then together developing a plan of action to address those needs. It identifies not only obvious environmental goals but also some in curriculum, school management and local school environment as well. The students drive the process and many ultimately involve their community as well, for instance parents, businesses, media etc. This process has been extraordinarily successful with an increasing number of schools taking part despite the cutting of funding by the government in

2009. In fact the concept is being shared with Chile and Argentina (Enviroschools, 2011). The aims of the Enviroschools Programme are similar to the action competence model from Denmark, although with its own New Zealand flavour.

The second situation was the development and introduction of the *Guidelines for Environmental Education in New Zealand Schools* (MoE, 1999). These were published and issued to schools in 1999 although implementation was optional. Over the course of the next ten years these Guidelines were used by an increasing number of schools. A National Advisory Team was set up in conjunction with local Universities. A member of this advisory team, who was an Enviroschools Facilitator, worked with people from my school to extend our EfS into other areas within the school over the last few years and offered support during this study.

2.5.4 The EfS standards

During this decade the Parliamentary Commissioner for the Environment published several reports on sustainability and then the UN Decade on Education for Sustainable Development started. As a result EE has increasingly become EfS. This title was felt to be much more appropriate than ESD which has overtones associated with economic development and business. As New Zealand is a developed country, it was felt ESD as a term was too misleading and would cause too much confusion (Glasgow, 2010).

The University of Waikato played a lead role in coordinating research into the action competence model and its use by a group of Enviroschools to evaluate the effectiveness of a New Zealand model of action competence that had been developed by a partnership of University Researchers, National EfS Advisors and a number of Enviroschools under the auspices of two Teaching and Learning Research Initiative (TLRI) funded projects (Eames, Barker, Wilson-Hill, & Law, 2010a; Eames et al., 2008; Eames et al., 2006). In the Scandinavian work, the aspects of action competence that were described were knowledge, reflection,

vision, action/experience and commitment (Jensen & Schnack, 1997). The model produced by the New Zealand team developed these ideas further and slightly differently. In their model of action competence there are six aspects (Eames et al., 2010b). These are: Knowledge; Experience; Vision; Action; Reflection and Connectedness. This model looks very useful and so I have included a table of part of their model below. It appears to relate better to the New Zealand context and the New Zealand Curriculum.

Table 2.1 Aspects of Action Competence from New Zealand study (adapted from Eames et al.(Eames et al., 2010a)

Aspect of Action Competence	Explanation
<p>Experience</p> <p>Experience refers to a state, condition (feelings) or an event that has happened. The interpretation of this experience may be personal and/or collective.</p>	<p>To be action competent, a learner should have a range of experiences to develop their understanding, commitment and engagement with sustainability issues. This includes learning in the environment and about the environment to connect the learner to the environment that the issue is situated in and engage their motivation and passion as in the motto ‘head, hearts and hands’ or ‘think, feel, act’. This component develops the ‘heart/feel’ aspect</p>
<p>Reflection</p> <p>Reflection is the ability to enquire into your experiences through a process of critical thinking.</p>	<p>To be action competent, a learner should know how, when and why to reflect. Learners will reflect in and on action, be critically reflective of themselves their actions, and also what they read and hear. Learners will also reflect on their own learning. Reflection is essential to make the connections between thinking, feeling and acting.</p>
<p>Knowledge</p> <p>Knowledge relates to both conceptual and practical understanding of sustainability and the</p>	<p>To be action competent, a learner should develop knowledge and understanding of sustainability issues as they are found in everyday life, and the impact they have on all living things. Therefore, knowledge should be developed in an integrated</p>

<p>processes through which knowledge is gained and used.</p>	<p>approach. It should include finding and analysing factual/scientific information, social, cultural and historical views and exploring multiple ways of knowing. It includes the learner knowing themselves and others. Learners should be developing their ability to use such information and findings to inform decisions and actions that lead to a more sustainable future.</p>
<p>Vision for a sustainable future</p> <p>Future visions for sustainability consider how we might like our future to be and what changes need to be made now for that future</p>	<p>To be action competent, a learner should develop a vision for a sustainable future. This involves understanding sustainability and exploring alternatives for change</p>
<p>Action-taking for sustainability</p> <p>Action is the intentional act of doing something. It is carefully-considered behaviour that promotes sustainability.</p>	<p>To be action competent, a learner should develop an ability to plan and a willingness take effective action for sustainability. The action could be direct or indirect and should be aimed at addressing the cause of a sustainability issue.</p>
<p>Connectedness</p> <p>It is the interconnectedness between people and all aspects of the environment: this includes making connections between thinking, feeling and acting (head, hearts, hands).</p>	<p>To be action competent, a learner should understand that they are connected to other people and their environment. This connection should be evident in their attitudes and values, which in turn are linked to their behaviour. It includes understanding the interdependence of environment and societal aspects such as culture and social needs. It is the connectedness that leads to relevance, enthusiasm and interest because learning is participative.</p>

The original model was designed to help teachers do three things:

- Clarify what is meant by the term “action competence in EfS”
- Help teachers and their EfS facilitators to develop student competence in EfS
- Identify evidence by which teachers could assess development of student action competence in EfS. (Eames et al., 2010a)

The New Zealand researchers proposed that the aspects of their model are intertwined. I think the analogy of a rainbow might work well. Each aspect (colour) can be separated out but needs to be included with the others to get the full impact.

These explanations resonated with the New Zealand context and covered the aspects of action competence that educators believed to be appropriate for that context (Eames et al., 2010b). This model had been tested by the research team but no trial of its use in a classroom had yet appeared in the literature. It was of interest therefore in this study to adopt this model as the framework for examining development of action competence in New Zealand students.

The New Zealand model does not make it clear where the culture of the students fits in the aspects. It is assumed that culture underlies all aspects and is perhaps implicit in the Connectedness aspect. The impact of culture in teaching and learning in environment and sustainability is further discussed below.

2.6 NZ Curriculum

In 2007 a new Curriculum (MoE, 2007) was introduced to New Zealand schools for full implementation in 2010. This was presented as one document instead of several individual subject specific curricula as in the past. The first half of *The New Zealand Curriculum (NZC)* refers to a Vision, Principles, Values and Key competencies that are meant to underpin all school education in New Zealand. These parts of the Curriculum make several mentions about aspects of EfS. A summary of those aspects is given below in Table 2.2.

Table 2.2 Summary of EfS related aspects in the first part of the NZC

Vision	Principles	Values	Key competencies
Confident	High expectations	Excellence	Thinking
Connected	Treaty of Waitangi	Innovation, inquiry, & curiosity	Relating to others
Actively Involved	Cultural diversity	Diversity	Using language symbols & text
Lifelong Learners	Inclusion	Equity	Managing self
	Learning to learn	Community participation	Participating & Contributing
	Community engagement	Ecological sustainability	
	Coherence	Integrity	
	Future focus	Respect	

While EfS is not explicitly mentioned in the NZC, the term ecological sustainability is within the values section. There are also a large number of other terms in the NZC that are often used in conjunction with terms like ESD and EfS. This then provides a backdrop against which each school is expected to write their own version of the Curriculum adapted for their school. The latter part of the work on action competence conducted by the New Zealand research group discussed above was also aligned with this curriculum document and in particular the key competencies.

The NZC also discusses appropriate pedagogies to be used in all school education. These are described as teacher actions that promote student learning and are listed below:

- create a supportive learning environment
- encourage reflective thought and action

- enhance the relevance of new learning
- facilitate shared learning
- make connections to prior learning and experience
- provide sufficient opportunities to learn
- inquire into the teaching-learning relationship (MoE, 2007, pp. 34-35)

It can be seen that these pedagogies are consistent with the pedagogies discussed earlier. They fit well with a social constructivist approach in that they promote a supportive learning environment, provide opportunities to learn, make connections to prior learning and encourage reflection, which are all essential aspects of this process. The experiential learning cycle of Kolb with its four stages of concrete experience, reflective observation, abstract conceptualisation and active experimentation fits neatly with this list as well. The inquiry into the teaching learning relationship fits with the role of student centered, teacher as facilitator format from the action competence model out of Denmark.

Before the release of the new Curriculum the Ministry of Education had commissioned a series of what became known as the ‘Best Evidence’ reports. The first was aimed at teachers and teaching. All of the pedagogies above fit with the ten characteristics that Alton-Lee found in her *Quality Teaching for Diverse Students in Schooling: Best evidence synthesis* (Alton-Lee, 2003). These characteristics are as follows:

1. Quality teaching is focused on student achievement (including social outcomes) and facilitates high standards of student outcomes for heterogeneous groups of students.
2. Pedagogical practices enable classes and other learning groups to work as caring, inclusive, and cohesive learning communities.
3. Effective links are created between school and other cultural contexts in which students are socialized, to facilitate learning.
4. Quality teaching is responsive to student learning processes.
5. Opportunity to learn is effective and sufficient.

6. Multiple task contexts support learning cycles.
7. Curriculum goals, resources including ICT usage, task design, teaching and school practices are effectively aligned.
8. Pedagogy scaffolds and provides appropriate feedback on students' task engagement.
9. Pedagogy promotes learning orientations, student self-regulation, metacognitive strategies and thoughtful student discourse.
10. Teachers and students engage constructively in goal-oriented assessment.

Adapted from the Executive summary (Alton-Lee, 2003).

EfS in the New Zealand Curriculum can be described as using many of the approaches listed above. It usually has the teacher in more of a facilitation role, often employs a problem solving approach, encourages thinking skills, may well use an action reflection cycle derived from Kolb's experiential learning cycle, and looks at real issues relevant to the students. In addition it looks at a range of Principles and Values from the NZC such as the Treaty of Waitangi, cultural diversity, community engagement, equity, integrity, respect and environmental sustainability. Coupled with a dynamic teacher - student interaction then EfS is an ideal model to use in the classroom and one that is responsive to needs. Some of the research detail of EfS and pedagogies used in New Zealand are included below.

2.6.1 NZ Pedagogies in use in EfS

Research on pedagogies being used in NZ to teach EE and EfS has been going on for almost ten years. In the late 1990's and very early 2000's it was found that there was little emphasis on 'for' the environment in schools (Eames et al., 2008). This then started to receive more attention from the early to mid-nineties onwards. The pedagogical approach and support received from the Enviroschools Programme encouraged more schools to take part in their programme. This programme is predominantly found in primary schools, although over time more secondary schools have taken part. Some of its benefits are that it provides

support for schools starting out, it has a set of resources of possible activities, the pedagogical approach is clearly spelt out and alongside the training this means teachers feel much more confident about undertaking the programme (Eames et al., 2008; EnviroSchools, 2003). To recap their pedagogical approach involves being student centered and driven, working with adults and often wider community, an emphasis on all of heads, hearts and minds, inclusion of Maori beliefs with respect to the land, taking action, focus is on school sustainability, communicating with others. The scheme also has an awards process and there are now a significant number of schools that have gained awards recognizing their progress towards sustainability. This means the whole school is involved and well on the way to becoming truly sustainable (EnviroSchools, 2003).

Recently further research has been completed specifically looking at teachers' pedagogical approaches that promote action competence (Eames et al., 2006). This report was careful to use a clear definition of action competence that mirrored that of the Danish research. This included actions to be consciously targeted by students, these actions could be direct or indirect, and took place after students had identified environmental problems, determined solutions and the action was directed at the cause of the problem (Eames et al., 2006). This research identified the following approaches from the literature as being relevant for EE or EfS: a social constructivist approach, working on real issues, and student centered instruction with a teacher as facilitator and perhaps modeler of some skills, group interaction, and authentic assessment. In the group interaction there should be discussion of values, perceptions and opinions, with students being able to supply their reasoning. Also reflection must be included throughout. Students need to identify problems, conduct investigations, collate data, suggest solutions, and develop and implement action plans. These ideas come from a mixture of constructivist and socially critical paradigms (Eames et al., 2006). The research team identified five components of action competence they wanted to look for. Knowledge and understanding for decision making, planning and taking action, participation, emotional responses and critical thinking and reflection. This led them to believe they needed to look for programmes that were using a transformative mode rather than the more traditional transmissive teaching

style, often called 'chalk and talk'. There were six pedagogies that they identified with a transformative style and these are: experiential learning, enquiry learning, co-operative learning, reflective practice, student centered learning and affective-aware teaching (Eames et al., 2006). Their findings indicate the importance for the teacher of planning i.e. what pedagogy to use where, the matching of the programme to the needs of the students in the class, and the ability of the teacher to accept a change of relationship with their class when moving to a more facilitative type role. From the student point of view they need to be emotionally engaged, be able to participate at this more intense level, able to make decisions and to work in different subgroups as required. They also need to be able to choose an achievable action to carry out. If it is too taxing then the failure to complete it might well act to discourage them (Eames et al., 2006). Jensen had also noted this point (Jensen, 2004)

2.6.2 Maori Pedagogy

As discussed earlier, some of the students in my class self-identify as Maori. Maori educational researchers have proposed a pedagogy they believe will remedy:

... the continued marginalization of Maori cultural aspirations, preferences and practices in the education system and the continuance of Maori 'underachievement' in a system that was in fact designed to promote such underachievement. It is a continuing irony to Maori people that it is the proponents of the very system that perpetuates marginalisation and underachievement who insist they have the answers for these problems. (Bishop & Glynn, 1999, p. 13)

How could such a situation arise? It arises when one culture takes over a country with an indigenous population that have very different beliefs and values. This cultural mismatch happened in New Zealand and leads us to consider the importance of culture in learning.

2.6.3 The importance of culture

Culture is a major factor in our lives. If we are part of a dominant culture then we grow up believing everyone thinks like we do and that our way of looking at the world is the norm. If we are part of a minority culture then we grow up knowing that we have to struggle to maintain our culture against the pervasive influence of the dominant culture. We know there are multiple ways of looking at the world but others may not have this experience. They are free in their leisure time to relax whereas minority group members may spend a lot of their leisure time ensuring their culture, customs and language survives. For instance when Maori moved to cities for work they became isolated from their whanau:

... many Maori people turned to various groups for support and fellowship. New associations were formed, where Maori could meet and share activities, concerns and interests. Most of these voluntary groups were not kin-based but had a common purpose of perpetuating Maori identity, values and culture, and helping people with the demands of city life. These groups included Maori clubs, councils, welfare committees and wardens, Maori Women's Welfare League branches, youth and church groups ("Te Ara," 2005)

Once a system like this has been set up it does not take active discrimination to maintain it. The continued ignorance (lack of knowledge) of the majority of those in the dominant group will maintain the inequity. Unfortunately New Zealand is in this position with the dominant Pakeha group often totally unaware of the effect their culture has on those of other groups. Culture is a complete way of viewing the world, not just what is seen but what is valued (Aikenhead & Jegede, 1999). It includes the language with the history of that people embedded in it along with their past values and current priorities. It includes all the stories and beliefs that little children are told, the roles of the people you live with, even who you actually live with. It includes how you face the world each day and the values behind the decisions you make such as what to wear, what to eat, what you talk about and possibly even where you work.

Culture then determines the key aspects of our lives and our interactions with each other and our environment. If a culture believes the Earth is Mother as in Papatuanuku then that determines the set of values important in relating to her. A culture that thinks of the Earth as Mother would seem less likely to consider it appropriate or acceptable to misuse resources, destroy ecosystems or pollute the environment. Such cultures may also have ways of reducing pressures on the environment although these may not all be common custom, some may be tied up with spiritual beliefs. An example from Maori culture is the rahui. This is a prohibition on taking food from certain places and could be imposed because of shortage in the resource or because of deaths of people in the sea. So kaimoana or seafood, particularly shellfish, could not be taken if the resource was considered too small or if, for example, someone had drowned in that area. Only the elders could impose and lift a rahui. A similar concept was found in the Pacific and used for similar purposes. Rahui are still used in New Zealand including when a toxic bloom affects shellfish or as part of a more comprehensive management strategy (Marsden & Adkins, 2009).

As culture is based on different values, beliefs, norms and expectations, it is important to consider it in our education system. To understand the effects living in a different culture can have on a people, we need to listen to those affected. In New Zealand those most affected are Maori. They went from being a sovereign people to being a minority in their own land by 1881 (King, 2003). The effects of that change can be seen today in the education statistics quoted in Section 2.5.1 p50 and are spelt out by Bishop and Glynn who state:

The history of international relations in this country, the pattern of dominance and subordination that has been developed, and the unsuccessful attempts that have been made to mediate this relationship, illustrate the impact of the ideology of cultural superiority on the indigenous population of New Zealand and provide a striking example of the outcomes of subtractive bilingualism and hegemonic domination within a modern nation state. This pattern and its necrotic outcomes affects other

community language groups as well. Therefore, in terms of their potential for addressing cultural diversity in NZ, current mainstream models leave much to be desired (Bishop & Glynn, 1999, p. 12).

Culture then is not only important but can fundamentally influence how students from non-European backgrounds, particularly those from indigenous groups, do in school. Culture can be defined in lots of ways. Aikenhead and Jegede (1999) provide two. One from Geertz (1993, p. 5) which states that culture is a “an ordered system of meanings and symbols in terms of which social interaction takes place” and one from Phelan et al. (1991, p. 228) which states that culture can “be conceptualised as the ‘norms, values, beliefs, expectations and conventional actions’ of a group”. Using these definitions Western science is a culture or at least a sub-culture in its own right. This science culture can have devastating effects on indigenous students as it can force them to choose between their birth culture and science (Aikenhead & Jegede, 1999). Science and its values and beliefs are used everywhere in Western culture and it is not uncommon to find people who believe science is ‘the only way’ to look at the world, often promoting it with a fervour not dissimilar to religious persuasion. Many students from indigenous groups find that in order to retain their own culture they need to reject science (Aikenhead & Jegede, 1999). This is unfortunate and Aikenhead and Jegede describe an approach that Aikenhead developed and Jegede successfully tested. They call this ‘cultural border crossing’ and it involves the teacher and students in cultural negotiations (Aikenhead, 2001). In this approach, the teacher needs to acknowledge the background of Western science and how it might have been used in the past. They also need to clearly value indigenous understandings and to validate indigenous knowledge. Teachers can identify to their class whose values they are referring to at any point in time so that students are aware. They also need to allow plenty of teacher /student dialogue in various forms but also student/student dialogue. If multiple groupings are present in a classroom, then these groups should be allowed to discuss as well. If conflict arises then it needs to be dealt with openly and with respect. This cultural

brokering provides an effective 'border crossing' and helps indigenous students to retain a positive cultural identity and self esteem.

New Zealand indigenous authors promote similar approaches to those described by Aikenhead. Bishop and Glynn describe a whakawhanaungatanga approach (1999). This term is best translated as developing relationships, where a relationship has the dimension of reciprocal obligations. It involves the teacher in establishing relationships where responsibilities are spelt out on either side with benefits and accountability specified. It involves the teacher being connected ethically, spiritually, morally and methodologically to the students, and through the students to their families. It assumes that learning will be reciprocal /two way for which the word is ako. Collaborative storying is used as a way of sharing and checking understandings (Bishop & Glynn, 1999).

In a classroom where students from a range of cultures are going to look at environmental issues and sustainability, a similar approach to those described above is required. Many groups may feel alienated from such discussions in so-called 'normal' classrooms because it is predominantly Western countries that have created many of the problems to date and they are unsure of the truth or relevance to them or their families of yet another western issue. If these discussions are held within an explicitly different framework, then they may be happier to participate. Many environmental issues today, for instance sea level rising, ocean acidification, extreme weather impacts, weather and habitat change to name a few have links back to climate change. When students realise these connections, my experience is that they find it unfair that the west created the problem but it is small indigenous nations in the Pacific and Indian Oceans who will feel the effects first. The acknowledgement and sensitivity shown by the teacher in terms of the content of lessons and the structure of the classroom interactions could help determine how productive such discussions will be. This then has a major effect on the pedagogy used in the classroom.

2.6.4 Summary of EfS in New Zealand Education

New Zealand has a culturally mixed population with one third of all under 17yr olds being of Maori or Pasifika origins. These groups under-perform in the New Zealand education system. While the new NZC encourages the use of culturally relevant pedagogies, it has so far been up to individual teachers to ensure they do so. One programme that is helping teachers is Te Kotahitanga which is a school wide programme developed by Russell Bishop and others. The city in which this study is located is the largest Maori and Pasifika city in the world and the number of Maori and Pasifika students are therefore much higher. This is reflected in the student population in the study school.

EfS in NZ has followed three lines in recent years. Firstly, the Enviroschools programme which is based on an action learning cycle that evolved from Kolb's work. This programme has been incredibly successful and is being implemented in one quarter of all New Zealand schools. Secondly, the publication of the *Guidelines for Environmental Education in New Zealand schools* and the subsequent availability of school advisory services to implement these. Thirdly, in the secondary sector EfS standards are available as part of the NCEA at levels 2 and 3. An increasing number of secondary schools are using these standards to assess with.

2.7 Chapter Summary

Over thirty years ago environmental education started being talked about at international levels in response to issues of pollution, overfishing, species going extinct, over use of fertilizers, access to fresh water and so on. Initially the discussion was around the environment but it was soon realised that these issues needed to be put into the wider context of development, human interactions, justice, supply and demand, population growth etc,. The discussion then became about sustainability either in terms of development or for the future. The emphasis was different in different places. It is recognised that the changes to our current unsustainable living practices that are required are not trivial and that considerable effort and commitment will be needed. Sustainable

development/futures identifies and examines social, cultural, environmental and economic factors in any situation and then looks at what is happening now, what could be done and hopefully at some solutions.

The UN pursued the goal of getting an international binding agreement in a series of international conferences with mixed success over the next thirty years. Meanwhile research was being carried out in a number of countries according to the dominant research paradigms in those countries. The application of this research to education produced mixed results. Where behaviourism was used there was little progress partly because this system did not include all the contributing factors. In Scandinavia an approach that arose from critical education theory was tried and had much greater success. This approach is called action competence and comes out of a background of critical education. Critical education is emancipatory in that it wants students to keep asking why things are the way they are. Are there better ways of doing things? If so why not use them? It is about encouraging critical thinking and developing active citizens.

Danish researchers developed their programme of action competence using the following approach. A relevant conflict over resources, preferably local, is identified. Students then research this issue in the fullest possible way. They discover its scale, history, causes, and range of opinions concerning it. They interview, debate, collate data (both experimental and other), consider values and when all this is done decide on solutions. These must be aimed at the causes not the symptoms of the issue. If so moved, the students might then take action based on all they have learnt. This student-led action is targeted and addressed to solve the problem either directly or indirectly.

The hope is that students become aware not only of the process but of their own ability to effect change. This is important as change on a large scale is unlikely to occur unless active citizens push governments and business in the direction of sustainability. Along the way it is hoped that students will have learnt about finding out different types of knowledge and analysing and reflecting on them,

developed an appreciation of the different points of view, identified several possible solutions, and arrived at an action that could be taken. The ability to arrive at solutions for particular instances is enhanced by students developing their own versions of what a sustainable future might look like. The concept of taking action with others is tied up with experience and both are felt to be important for students to really become aware of what is possible. These factors all contribute to action competence which is seen as an ideal that people can move towards but probably never fully achieve.

Learning theories such as those developed by Kolb and later Schon follow a cyclical process of concrete experience, reflective observation, abstract conceptualisation and active experimentation. While these processes are listed in one particular order that order is not the only way of using them. It can be seen that the process of working towards action competence covers all these steps and this gives these theories a connection to this concept. It should be noted that with different countries having different histories, a programme developed in one place is unlikely to work if just uplifted and placed, unchanged in a new context. It will need adapting to fit the new context. This has recently happened with work in New Zealand adapting the Danish model of action competence to suit local conditions. However, this adapted model has not been tested and moreover, has not been subjected to testing in a classroom environment where culture plays a significant role in learning.

To successfully develop a programme that helps students move towards action competence requires certain pedagogies to be used in the classroom. These involve the students having the skills and confidence to be able to attempt such a programme.

New Zealand has developed its own versions of this approach. The most common is the EnviroSchools approach. The other is where individual teachers are implementing their personal version of this approach in their own classroom. This is the approach that I took in this study.

From this literature review, it is clear that the following principles would need to be considered in designing an intervention to develop student action competence: the use of an experiential learning cycle that starts with who my students are; implementation of a learning culture within the classroom that allows encourages students to be themselves, a consideration of values and culture to help them clarify who they are, students being encouraged to take an action for sustainability; and provided with enough support to help them plan, carry out and report on this action. This action can be directed by an EfS achievement standard, which would be assessed for credit.

The students would be introduced to the concept of action by an intervention that included learning about the aspects of EfS, analysing our class experiences earlier in the year, looking at our personal and cultural identities, identifying what sort of future we want for us and our children and why, learning to research required information and to reflect on new knowledge and on our understandings gained from starting to act, thinking about the connections we can make, identifying who we wish to take action with and why.

The next chapter describes the development of the intervention built around these principles and its evaluation.

Chapter 3 Methodology

3.1 Overview

This chapter will look at the methodology I used in my intervention. I evaluate several different approaches and then outline my choice. I identify data collection methods that fit with my approach. I outline my intervention and how that will give me the data I am interested in. I then discuss how that data will be handled. Finally I discuss how I will handle validity and reliability in my context and then discuss ethics.

3.2 Research Questions

The following research questions guided this study:

- Can aspects of action competence be developed through delivery of a unit in Education for Sustainability in a New Zealand context?
- Do the personal and cultural values/beliefs of students influence their action-taking in this unit?

3.3 Research Methodology

There are many methodological approaches used in education research. I briefly review three for their potential suitability to this study, namely positivism, interpretivism and critical. Cohen, Manion, and Morrison (2007) describe the first two approaches as essentially looking at the same thing but through different lenses. The other one uses a very different approach. Critical theory comes out of Habermas's work from the mid 1980's.

3.3.1 Positivism

In the words of Cohen, Manion, & Morrison (2007, p. 26) "positivism strives for objectivity, measurability, predictability, controllability, patterning, the construction of laws and rules of behaviour, and the ascription of causality. In

this theory phenomena are important”. It is the application of a strict scientific approach to social science. It has as an underlying assumption that “knowledge is hard, objective and tangible” (Cohen et al., 2007, p. 7). This view has the additional assumption that by applying scientific theory to the social sciences that any laws surrounding human and social behaviour will become apparent (Cohen et al., 2007). While scientific theory works well in the inanimate world its direct application to people and social situations suffers from the problem of regarding people as machines with respect to their behaviour and interactions. This is problematic because it does away with the idea of choice, free will, individuality, moral responsibility and the ability to have an inner life (Cohen et al., 2007). If positivist theory is applied to education it is often called behaviourism.

3.3.2 Interpretivism

Cohen et al (2007, p. 26) describe this as the “interpretive paradigms strive to understand and interpret the world in terms of its actors. ... [In this theory] meanings and interpretations are paramount”. This view assumes that people’s actions are deliberate, that people construct their own view of the world, that situations are fluid and changing and that multiple interpretations are likely, and that it is the view of the participant of their experiences that is important (Cohen et al., 2007). In these ways interpretivism differs significantly from positivism and has a key focus on a subjective rather than an objective view of the world. A criticism of interpretive approaches to educational research is they are so centered on the individuals and negotiated meanings that they can ignore the power relationships within which the context is set. This can result in there being artificial boundaries being set and a concentration on micro-sociological perspectives (Cohen et al., 2007).

3.3.3 Critical theory

Cohen et al. (2007) describe critical educational research as being heavily influenced by Habermas’s work from the 1980’s. This approach now has the expressed intention of social change, although Habermas’s original work did not comment on this (Cohen et al., 2007). Critical theory as it is now espoused is

political and emancipatory with the aim of building an egalitarian society. Critical theory wants to understand and then change society, i.e. it is transformative and seeks to build social democracy (Cohen et al., 2007). It works by using a process that has several steps as outlined below:

Step 1: Identification of an ideology that is problematic. Then a critique is done to expose the vested interests at work and how they may be disempowering others. These interests and powers may not be immediately obvious as they are usually hidden to protect them.

Step 2: The detailed historical reasons that allowed the present situation to arise and an evaluation of the interests and values behind them and how legitimate they actually are. It is hoped that those doing this analysis will be able to see that they have been involved in perpetuating a set of conditions or social order that works against their democratic freedoms and supports those in power. In other words they will be able to identify that their rights, culture have been suppressed and that they were complicit in this.

Step 3: They are able to develop a process to change this situation and then implement it.

Step 4: An evaluation of the change process and what it has achieved is undertaken.

(Adapted from Cohen et al (2007)).

This brief review of methodological approaches in education research has highlighted strengths and weaknesses in each approach in relation to this study. Positivism states that people's behaviour can be studied in simple ways using a scientific approach. It treats individuals as separate from their context and looks to change one thing at a time. As such this approach was deemed unsuitable for this study because it assumes simple factors will control behaviour and does not recognise context as relevant. This means it is unlikely to be able to reliably account for people's behaviour. Secondly is that in behaviourism all individuals are treated as identical and the world view they are operating under is treated as identical. This is patently not true in either case as everyone is unique, but there are things that are held in common, for instance, all cultures have different world views and these also exist within cultures. The third and largest issue is that institutions are ignored. Just as in racism and sexism, the key players in

environmental issues are not individuals but institutions, be they big corporations or governments. These are the key because they have the power to influence via marketing or enforce through jobs and laws. This means their views have more power in many situations and consequently they are able to control individual behaviour.

Critical theory has been criticised as being too prescriptive in its approach but it has had a lot of success in certain areas, notably that of curriculum review, and then went on to influence developments within UNESCO in the mid 1990's (Cohen et al., 2007). While critical theory has been adopted as the preferred theory by many authors in the social justice area because of its emancipatory approach, it has been adapted by each author to fit their own perceived situation and has recently undergone rapid proliferation (McKenzie, 2008). This multiplicity of views has resulted in appeals to postmodernism with its 'everything is relative' stance for justification but no overall understanding of how this might arise or why some views are so disparate. The assumption is then made that either people are being difficult in not compromising or that ongoing quests for one view in, say environmental education or climate change, is yet another attempt at neo-colonialism (Barraza et al., 2003; Clark, 1997; McKenzie, 2008).

3.3.4 Choice of methodology for this study

The fragmentation has meant that it is difficult to develop a coherent picture of the interaction of various factors. While this approach works well in defined situations, it is not suitable for this piece of research.

Cohen et al's (2007) definition of interpretivism as given in Section 3.3.2 above is closer to the approach required for this study, as research (Creswell, 2007) indicates that learning theories based on a constructive approach are best suited to interventions such as the one planned here. I wanted to provide an intervention that would allow my students to take part in a process that might allow them to progress towards action competence. As I wished to work in a constructivist mode, I used an interpretivist framework.

Schon (1985) and Kolb (1984) both refer to learning as a process not an outcome. This process is continuous and grounded in experience and gives learning a different philosophical and epistemological basis (Kolb, 1984). Kolb claims that Lewin, Dewey and Piaget all saw learning as a process too. This is in direct opposition to a traditional definition of learning where once something is learnt it stays the same. This is the key change Kolb sees in experiential learning and cites Bruner as saying that the purpose of education is to stimulate inquiry not to memorise knowledge “Knowing is a process, not a product” (Bruner cited in Kolb (1984, p. 27). This makes learning active, requiring energy and involving interactions with others and/or with the learner’s environment. An interaction is defined as a reciprocal action or influence (Oxford, 1993). Kolb preferred the term transaction as he felt that the term interaction was too mechanical (Kolb, 1984). The term interaction then will be used in a holistic manner to cover both learner/learner interactions as well as learner/environment interactions. Kolb believed that learning was a holistic process of adaptation to the world that “involve[d] the integrated functioning of the total organism—thinking, feeling, perceiving, and behaving” (Kolb, 1984, p. 31)

Learning as a process not a product means that learners come to situations with preformed ideas. The teacher’s job is to help learners identify their views and to provide experiences that enable learners to modify their views by integrating new ideas into their belief system (Kolb, 1984). This is the basis of social constructivism that underpinned the intervention used in this study.

3.3.5 Methodological issues

There has been some concern in recent years in the environmental education literature and elsewhere about researchers not paying sufficient attention to their methodologies and that these are not the same as methods and do include the following; ontology, epistemology and axiology (Dillon & Wals, 2006). These authors go on to explain that ontology is what is being dealt with, for example, the nature of reality, people’s knowledge, number of words. Epistemology refers to how we make that knowledge for example; give tests, look for patterns, infer thoughts. Axiology relates to ethical considerations and our own philosophical

viewpoints, so it is more of why use a particular stance (Dillon & Wals, 2006). These authors then state that methods are about how data is collected and processed. They cite Hart and others who agree with them that all researchers should state their ontology, epistemology and axiology as it helps readers to understand the context of the researcher (Dillon & Wals, 2006). Creswell (2007) agrees with this position, and adds the following conditions for qualitative research:

Ontology is about the nature of reality and in qualitative research that means it is subjective and multiple as seen by the participants in the study. This implies the researcher should use the words of the participants and give evidence of different perspectives.

Epistemology is about the relationship between the researcher and those researched. It requires the researcher to try and lessen the distance between themselves and the participants, in other words to be involved with them.

Axiological is looking at the role of values and requires the researcher to acknowledge that research is value laden and that there will be biases present. The researcher will need to include their interpretations along with those of the participants (Creswell, 2007).

These are important conditions and below I state how I will approach them.

My Ontology is that everyone will have their own reality. There will be similarities but as everyone has their own unique life history everyone will develop their own unique understandings. By sharing, researching, reflecting, listening carefully, taking action and making connections we can come to some common understandings.

My Epistemology is to work as a facilitator where I stand alongside my students as they try and take action. I will offer support and encouragement to them. They will be able to negotiate some of the timeframes and content.

My Axiological position is that I am a middle-aged middle class Pakeha woman who is working to empower my students by using appropriate pedagogy. I am aware that I am likely to still 'get it wrong' if I just rely on my observations so I

will be looking for what my students are saying about how they see things and what they understand.

The combination of these conditions means that the most appropriate methodology to use is action research as it allows an interpretivist approach.

3.4 Action Research

Action Research has a variety of meanings. What is agreed is that it is conducted by practitioners to improve education. It is often carried out by a group but may be done by individuals. Cohen et al (2007) have a number of lists from different authors on what they see action research as. The following are some extracts from these lists: (Selected from Hult and Lennung 1980 and McKernan 1991 in Cohen et al 2007 p229)

- Enhances the competencies of the participants
- Is undertaken directly in situ
- Seeks to understand particular complex social situations
- Seeks to understand the processes of change within social systems
- Is participatory
- Is methodologically eclectic
- Has a critical perspective in some forms
- Strives to be emancipatory
- Is formative in that the definition of the problem, the aims and methodology may alter during the process of action research

Action research has elements of a practitioner reflecting on their own practice as well as comparing their theory-in-action with their espoused theory (Schon, 1985). Even on its own this would be valuable knowledge. If, however, what the practitioner is trying is likely to improve the political awareness and understanding of the members of a particular social system or classroom, then there are emancipatory elements present as well. This means that aspects of critical theory are present and this interpretive stance could be applied to the end result rather than used as a data collecting technique. No matter what style of interpretation and analysis is going to be used, there needs to be data recorded.

This data can take a variety of forms including interviews, questionnaires, observations, conversations, records of class discussions, and written work of a variety of formats i.e. journal entries, research material and reports.

There has been considerable discussion in the literature about the rigour of some qualitative research. Creswell (2007) described what characterised this rigour which included the following summarised points:

Multiple forms of data collection, perhaps in table form, adequately summarised

- The study is framed within qualitative research and includes fundamental characteristics like evolving design, presentation of multiple realities, researcher as an instrument of data collection, and focus on participant's views.
- Researcher uses a recognised approach, clearly identified.
- Study begins with a single focus
- Study includes detailed methods, rigorous approach to data collection including triangulation of data, and data analysis and writing.
- Data is analysed using multiple methods of abstraction
- Researcher writes persuasively, so reader experiences "being there" and findings become believable
- Study reflects the history, culture and personal experiences of the researcher.
- Research is ethical and goes beyond the permission of the ethics committee.

Creswell (2007, pp. 45-47)

Action research often results in case studies. Some researchers have examined case studies which often tell a story and concluded that it is a good format for examining practice and should be told in such a way that it has transformative value (Corcoran, Walker, & Wals, 2004). These authors examined material from 54 journal articles and concluded that case studies needed to contain a clear

purpose or issue, a critical analysis of the case, and how the case might contribute to developments in the area (Corcoran et al., 2004). Vignettes are much smaller than case studies but are similar in that they are used to give more detail to particular sections of data or to serve as an exemplar. It would seem that they should follow some of the same criteria such as having a clear purpose, look at a particular aspect in some detail so that a story from behind the data can be seen.

In reporting on case studies in action research, the more detail that is reported the easier readers are able to assess the rigour, validity and reliability of the research and what it reveals. I will be including some case stories that tell the stories of five students that result from my intervention. The researcher may also include their own reflections about how the research had influenced them (Creswell, 2007; Grant, 2007).

3.5 Data methods

The data collection methods used in this study were questionnaire, personal observation / conversations, student journals, student research logs and student final reports.

3.5.1 Questionnaire

A questionnaire was given to all participating students at the start and the finish of the unit. It had two sections, with the first being 20 questions using a Likert scale. The second section was a series of open ended questions with space to write and at the end an opportunity for students to add any comments. Another teacher got students to complete the questionnaire at the start and I was to get them to complete it again at the end.

A Likert scale provided a range of responses to a given statement. Respondents could indicate the nature and intensity of their response by the answer they chose to each statement. This type of question had a degree of subtlety built into it with the range provided. The disadvantage of this question style is that what one

person feels is a 'strongly agree' might be someone else's 'agree'. They are however easy to complete and to get numerical data from (Cohen et al., 2007).

The open-ended questions allow respondents to give honest personal comments. These might well elicit a rich response that Cohen et al (2007) see as so distinctive about qualitative data. The disadvantage of open ended questions is how to handle the answers. It is not possible to count numbers of comments as they are unlikely to be the same. Shortness of time and ability to express oneself do limit the writing (Cohen et al., 2007) It might well be possible to group some of the answers under themes.

The unit end time was stretched out at student request. This resulted in the end of the unit and the handing in of their assessment, coinciding with the students going on exam leave at the end of the academic year. Therefore while six of them completed the questionnaire a second time most did not. When faced with the choice of students completing work for an assessment or completing my questionnaire I opted for them to complete their assessment.

3.5.2 Personal observations /conversations

During the unit I noted personal observations and any important conversations I had with students. Not every conversation was noted as the unit took place over some weeks. Observation during teaching had to be participant observation as it comes secondary to what is required for the lesson. The students were aware that I was observing them but I did not expect this to concern them, as it was going on over such a time period that I assumed they would get used to it. It was also a normal part of teacher behavior in their classroom. Notes were made at the end of each lesson while things were still fresh in my mind unless it was a particularly significant observation, which was then recorded as soon as possible after the event. Participant observations tend to be 'strong on reality' (Cohen et al., 2007, p. 405). When the class combined their responses from small group work into one class response, then that response was recorded as well.

3.5.3 Student journals

Student journals are a way to get students to record their feelings, their thinking and hopefully their reflections. A place for them to do this was set up on the school intranet site. The challenge in using this method was actually getting them to record something often enough to be able to see a change in their thinking. Journal writing had proved to be useful when used by a colleague (J. Andrews, personal communication February 2009).

3.5.4 Student log books

Student log books serve several purposes. They are a way for less able students to record and then process information. I requested that students use large scrap books. This means that students could highlight the glued in pages and then beside this, comment on the relevance of the information, what research question it might answer, and how valid the source of information was. This meant the students were able to process easily while they were still collecting their information and made it easier for them to see if they had enough material. This was a form of scaffolding that enabled students to complete all the steps of research in the unit while they were still learning the process. The log books also guarantee authenticity without this becoming a major issue. Log books do not have to be neat and tidy so long as the student can find everything. I have used log books like this for over ten years and have found them a good way to assist students with the research process.

3.5.5 Student Reports

Student reports in this study were their final write-up for their assessment. In this they had to record what action they took and justify it with respect to climate change, the large context for the unit, and whatever local issue they were dealing with for example carbon footprint. They needed to summarise their action plan, note how it was implemented and then to evaluate its implementation. It is also where they reported on any change in their thinking over the time of the action and if so why. While most of this information might also be in the log book, this was their chance to pull everything together into a coherent whole.

3.6 Intervention

In order to answer the research questions, I designed an intervention to be carried out in my classroom with a class I taught in 2009. In Chapter 2 I outlined a conception of action competence, the development of which could be examined using an interpretivist study. This theory implies that an action research approach be used in a classroom-based study of a unit of work.

3.6.1 Context

The school in which the study was undertaken is a large inner city girls' school of around 1400 students. It is a Decile 5¹ school and at August 2009 had the following ethnic composition (ERO, 2009).

Table 3.1 Ethnic composition of the study school

Ethnic Group	Percentage %
NZ European/Pakeha	19
Maori	22
Samoan	19
Tongan	10
Indian	7
Cook Island Maori	4
Niuean	4
Fijian	2
Chinese	3
South East Asian	3
Other Pacific	1
Other Asian	3
Other	2

This represents a high proportion of Maori and Pacific Island students compared to many New Zealand high schools, and a very culturally diverse student population. There are over 60 ethnic groups represented in the school and almost

¹ A school's Decile indicates the extent to which it draws its students from low socio-economic communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities. Decile 10 schools are the 10% of schools with the lowest proportion of these students. (MoE, 2011)

as many languages. The majority of students are not from the local community, but travel in from other parts of the city and come from areas of the city that have middle to lower incomes. The school has a strong emphasis on sport as well as academic skills and also enters a high number of teams in the annual Maori and Pacific Island Cultural Festival. The school is over 100 years old and is situated on the side of a hill next to a sloping public park. As one of the first secondary schools in the country and an all-girls school, it has no sports grounds of its own, as young ladies did not do sport when it was set up. While it does have facilities for indoor sport and a swimming pool, it has to use the one level area in the neighbouring park for outdoor sports practises. The sports teams requiring fields have all their games as away games. The school is situated in one of the oldest suburbs of the city and can no longer expand out, so now has to expand up. The school has been involved in environmental issues since the late 1990's when a green team was set up, and was the first secondary school in the country to be awarded a silver Enviroschools Award. It has been offering senior environmental courses in both Social Science and Science Faculties for 5 years. In the junior school most of the eight faculties have some inclusion of environmental or sustainability issues. The school has native gardens and a vegetable garden. The site has a number of large, very old trees, some of which are native, and that are all protected because of their size. The cultural and religious diversity of the school is seen as one of its strengths and many students in their last year comment that this aspect was important to them in their time at the school. The school now has a global citizenship umbrella group jointly run by staff and students. Under this umbrella there is an environmental sustainability group, fair trade group, and human rights group.

3.6.2 Class Structure /Rationale

The class used in this study was my senior Environmental Science class which was a mixed level Year 12² and Year 13 doing Environmental Science (see Table 3.1). The class was very mixed ability with a bias towards lower achieving students. It was very mixed ethnically as well. The class was chosen for the

² Year 12 indicates students are in their 12th year of schooling. Year 13 indicates 13th year of schooling and the last before University or other tertiary education.

study for two reasons. Firstly, I believed they could benefit from the intervention, and secondly, because their course involved doing an EfS Achievement Standard that involved taking an action for sustainability. This standard fitted in nicely with my intervention and because of its length was one I considered the students might need extra support with. As well, the course was considered to be non-mainstream and this meant the programme had fewer assessments, as the majority of these students were considered to be at risk of dropping out of school. There were a range of reasons why they were at risk and these included being recent immigrants with poor English language skills, failure in the previous year and poor attendance. Some of the students had actively chosen the class out of interest and some were put into the class, as it had few pre-requisites. The class was provided with a more inclusive style of teaching and a slower pace of learning to accommodate its students.

While some of the students appeared to have an understanding of their cultural identity, others did not appear to be so sure. While all but two of the class spoke good English, for most of the class their written English was below standard for their year. Both of the students for whom speaking English was more difficult were recent immigrants, one from Brazil two years previously and the other from China earlier in 2009.

Regular attendance at class was a key issue for at least half the class. As the year progressed four students became extremely irregular in their attendance, attending school approximately one day per fortnight, and these students did not participate in the intervention or its assessment. These students are indicated in the Table 3.2 below with an asterisk. Another student ended up not submitting her final assessment for the intervention after doing most of the work, when her father had a car accident and destroyed his car along with everything in it which included her worm farm and the rest of her work. This student is indicated with #. As can be seen from the above description, this class and its participants faced a number of challenges that needed to be considered during this study. Table 3.3 provides a list of the members of the class (names are pseudonyms to protect the students' identities), with their ethnicity and Year Level at school.

Table 3.2 Members of the class

Student	Ethnic Group	Year level
Rangi	Maori	12
Hine #		12
Reka		13
Aroha	Maori/Pacific Islander	13
Ilisapesi	Tongan	12
Lesieli		12
Salesi		12
Vika*		13
Mekala	Samoan	12
Telisa		12
Sina		12
Alofa*		12
Mandy	European	12
Hannah*		12
Tere	Cook Island Maori	12
Farrah	Iraqi	12
Han	Chinese	12
Mereoni	Fijian	12
Sovaia	Fijian/European	12
Yara*	Brazilian	13

As the Table indicates, 15 students took an active part in the intervention. The intervention is described below.

3.6.3 Unit Overview

A unit overview is provided here to allow the reader to develop an understanding of what was carried out. The results chapter includes some detail and the more detailed plan of the intervention is included in Appendix 2.

Table 3.4: Overview of Unit

Link to EfS	Lesson content / Learning Technique	Effective Pedagogy	Desired Outcomes
SCEE Concepts	Use of prior learning Posters students made earlier in year	Making links with prior learning	Links to students prior learning Valuing of student input
Values Personal identity & values Culture & values	Making and dressing of peg dolls as someone from their culture Learning to infer values from decision made Learning to use SCEE compass diagrams to identify values Use of origin stories, Native American & Maori to identify indigenous cultures link to planet	Class able to chat and build bonds while making individual peg dolls to create supportive working environment Small self chosen groups Students record outcomes on small whiteboards Collating of class ideas as large group with summaries available for future lessons Facilitating sharing	Students feel comfortable with each other & sharing in small & large groups Students feel indigenous cultures & their cultures respected Students able to identify differences between Western culture & indigenous cultures/ their cultures Students recognise & accept that others can come from very different backgrounds Students can recognise & discuss their own cultural identity & apply personal & cultural values to situations

<p>Visioning</p>	<p>Imagining/Visioning of future you want to live in</p> <p>Collation of ideas & class sharing</p>	<p>Imagining future you want to live in</p> <p>Class able to negotiate length of activities if extra time needed</p>	<p>Students able to imagine some sort of future that is different to now</p>
<p>Reflection</p> <p>Analysing</p> <p>Action/ activity distinction</p> <p>Critical evaluation</p>	<p>Class activity around how decision making can change when situation changes or new info is given</p> <p>Analysing students' prior experiences as class (these included videos, environment activity, speakers</p> <p>Learning reflection techniques</p> <p>Learning critical evaluation skills</p>	<p>Small self chosen groups</p> <p>Students record outcomes on small whiteboards</p> <p>Collating of class ideas as large group with summaries available for future lessons</p> <p>Use of analogies</p> <p>Use of templates to provide scaffolded learning</p> <p>Linking of what students felt with what they did & thought</p>	<p>Students able to draw on prior class work earlier in year to facilitate their understanding</p> <p>Students recognise they do know how to access knowledge</p> <p>Students able to record their reflections</p> <p>Students able to evaluate</p> <p>Integration of head, hearts & hands</p>
<p>Introduction to student assessment task</p>	<p>Reading of Achievement Standard & task with class</p> <p>Introduction of weekly feedback sessions</p> <p>Use of motivational/ inspirational stories</p> <p>Small group & whole class discussions over questions arising</p> <p>Teacher offering ongoing emotional support for students</p>	<p>Class able to ask Q of clarification</p> <p>Copies of task handed out & available up on School intranet</p> <p>Class able to negotiate extra time if needed</p> <p>In class time booked on computers to overcome lack of home internet</p> <p>Students practise writing answers using different setting</p> <p>Teacher insistence on students completing work</p>	<p>Students can check out meanings & query wording</p> <p>Students feel confident to complete assessment</p> <p>Students actually do complete task & hand in</p>

This intervention was delivered to the class over a period of 12 weeks, at the end of which the students submitted the assessment task. Throughout the intervention, data was collected as below.

3.6.4 Data collection and analysis

Questionnaires

On the first day of the unit, the participating students were asked to complete a questionnaire (see Appendix 3) that explored their initial responses to questions about their environmental attitudes. Four students who were absent on the first day completed the questionnaire at the start of the second day.

The questionnaires were analysed by quantitative or qualitative means according to the data type. Section 1 with the Likert scale data was analysed by recording the responses on a frequency table by question and response. Descriptive statistics were calculated and after the findings from the pre-intervention and post-intervention questionnaires were compared.

The open-ended responses to the questionnaires were read and the comments grouped under themes informed by the action competence model of Eames et al. (2010b).

Personal observations and conversations

Personal observations were recorded after key lessons or key conversations. These observations and conversations all occurred in class time. No actual conversations were recorded as most lessons involved both large and small group activities. My aim was to make brief notes of at least one conversation and one observation with each student. There were a total of at least three entries for each student and more for most. These were particular points that were personal to them as opposed to general conversations about the lesson or explaining a particular point. These points often appeared in a written format in their log books. Where the class agreed on a diagram or drew conclusions these were copied by hand and put up electronically. Twelve of these were copied.

Student developed summaries of values and other class work were recorded by me as well and typed up so students would have access later in the unit if they wished.

The information contained in the personal observations and conversations was analysed against the aspects of the action competence model and for themes that emerged from the data to see how it might contribute to an understanding of each student's responses.

3.6.5 Student journals, log books and reports

All students were required to have a log book and they were encouraged to use a large scrap book. Most students ended up recording their reflections in their log books using a dated entry. The number of entries was up to the individual student and they could put entries into their log books whenever they wished, but were supposed to have one per week. Many had found the school intranet hard to access from home or did not have home access. They were not necessarily ready to write during class times when computers were booked and access was sometimes a problem even at school. Students log books were to record their plan, timeline, ideas, and downloaded material was to be stuck in and preferably highlighted. Many wrote their draft reports by hand in their log books as well. Students were given planning templates, consequence wheels, and an inspirational story and these could be included as well.

Students knew that their log with its information and journal entries was part of their assessment and so required considerable detail. This detail was then used to write their reports. Both log books and reports had to be submitted. Students had to show me they had journal entries completed when they handed their work in.

The data from the log book, report and journal were read, and then analysed and information recorded on a spreadsheet for each student. This spreadsheet recorded the data against the aspects of action competence for New Zealand. To assist in analysis I have designed a set of descriptors along a continuum of progression towards action competence for each aspect (see Appendix 6). These descriptors allowed me to record information from the student work so that I

could develop a more coherent picture of changes apparent in each student and their work over the course of my intervention. Information recorded from my observations and conversations was also added to these spreadsheets.

3.7 Validity

Validity for naturalistic, interpretivist research settings is not the same as that for positivist. Cohen et al (2007) refer to the honesty, depth, richness and scope of the data collected rather than to the methodology and data accuracy as positivist research might.

I endeavored to be as honest as possible with the material I have included so that it includes evidence of the depth and the breadth from each student. Where there is a short comment or a rich story to tell that is included as well.

To ensure credibility authors state that data should be triangulated where possible from methods, sources and theories as available (Cohen et al., 2007; Creswell, 2007). I triangulated data from students' log books, report, and journal as well as any observations I took during the intervention.

To achieve the requisite detail for data listed above, Cohen et al (2007) note that thick descriptions are needed. Creswell (2007, p. 194) cites Denzin's (1989) description for this term as "presents detail, context, emotion and the web of social relationships...[and] wakes emotionality and self feelings. ...The voices, feelings, actions and meanings of interacting individuals are heard". I was careful to choose extracts that could convey feelings, to give students a voice, to convey their actions and let them say what things meant to them.

Cohen et al (2007) also discuss cultural validity and describe this as relevant where it is the intention to shape research so that it is appropriate to the culture of the researched, and where the researcher and the researched are from different cultures. Cultural validity is defined by Joy (cited in Cohen et al (2007, p. 139) as the "degree to which a study is appropriate to the cultural setting where research is carried out". Cohen et al note that this applies at all stages of the research. They

go on to state that it involves a degree of sensitivity to the participants, cultures and circumstances being studied.

I was particularly careful about this aspect as my class was very multicultural. I checked all relevant documents with them for understanding before use. This included consent forms, worksheets, and student assessment tasks. As well, I answered any questions concerning understanding of any texts throughout the intervention and had dictionaries on hand as well. I ensured that there was a clear consideration of cultural dimensions with my intervention as this is something that I believe is very important and was extremely relevant to my research. It was clear from class discussion that some things were done very differently in different cultures and this was an important learning for the students during the intervention. I also emphasized that different was OK. If understanding was in doubt then I had a one to one conversation with the student concerned and in the case of the Chinese student, supplied her with a dictionary and ensured she sat with another student who would help her.

3.8 Reliability

When using a more naturalistic approach reliability has a different meaning. In positivist research it is about getting concurrent results, results that agree, whereas in interpretivist research it is about collecting a range of data to ensure there is sufficient for rich descriptors as described above. Presumably this would also identify any changes in what was understood to have occurred. This could then be dealt with during the intervention.

According to Creswell (2007) reliability is also about consistency of coding. My study was not large enough to require more than one person to code. To ensure that errors had not been made I went over the coding a number of times to ensure that data had been assigned correctly.

3.9 Ethics

The principle of informed consent is important for research. It arises out of participants' rights as members of a democracy and covers their right to freedom

and self determination. Informed consent can also be seen as informed refusal as participants can withdraw once research has begun. It is important that participants understand what is required of them before they give their approval. In a definition of informed consent quoted in Cohen et al (2007), they name four aspects; competence, voluntarism, full information and comprehension. If all of these aspects are present, then it can be assumed that the participants' rights have been given protected and that they have given informed consent.

Ethical procedures are required to prevent either party, that is researcher or participants, from being harmed during the research or any resulting publication. By obtaining consent beforehand both groups can be assured that the other fully understands their rights and their obligations and that all precautions have taken.

As part of my thesis I was required to obtain ethics approval from the Waikato University Human Research Ethics Committee. This committee granted me approval, as did my Principal at the study school. In order that participants are not affected in an adverse way by my research pseudonyms are used instead of names in this thesis.

Although my students were old enough to sign their own consent forms, a letter was sent to their parents as well explaining the process to alleviate any fears they might have particularly given the situation explained below. There were a number of ethical issues that arose with my research. Firstly, students were participants in my research and were also completing an internal Achievement Standard in Education for Sustainability. To avoid any concerns about the validity of the task and assessment schedule I had it pre-checked by a colleague who was an EFS Advisor. While I was the only teacher competent to mark the student assessments, I also had the Advisor check the marking straight after the intervention finished. She approved all my grades as correct. Since then the task, schedule and marked work has been moderated nationally by the New Zealand Qualifications Authority as part of their ongoing quality control. Again the work was passed as correct. These procedures were to ensure that my students were not unfairly treated by my research or that I did not misrepresent anything to further my research. I wanted to ensure that all possible precautions had been taken to

ensure none of my students were disadvantaged by participating in my research and that they were able to be satisfied of this.

3.10 Summary

I designed and delivered an intervention that was based on starting where my students were. We analysed our experiences from earlier in the year and then looked at our individual cultures and values. From this students moved on to plan, carry out, evaluate and report on an action for a sustainable future. I used a facilitative teaching approach and an experiential learning pedagogy.

Chapter 4: Findings

4.1 Introduction

This chapter presents the findings of my research with a class of students involved in an action project in an Education for Sustainability context. I examine the progress they made as they moved towards becoming action competent. At the start of each section is a table indicating the aspect of action competence being referred to and a description of what students might be able to do at each of a series of designated stages on the path to developing that aspect for action competence. I included this progression to help me identify some possible stages so that I could acknowledge where my students sat on this continuum. I include numbers of students who demonstrated each description. I refer to experiences students had both within or external to my classroom setting. I begin with a description of some deviation from the planned intervention.

4.1.1 Teaching of the Unit

The unit was originally going to be three weeks of teaching and then a weekly meeting for a class discussion, with the rest of the time spent with students working independently. This did not happen. The students were still not confident taking initiative after three weeks, so there was considerably more time spent going back over concepts and discussing in class what certain things meant. Concepts were discussed using situations that were similar but not the same as those being used by the students for assessment. Part of this reticence on the part of the students came from their apparent lack of confidence and part from lack of experience in taking initiative. Many of these students are used to being passive in class and take time to change this approach. Students were provided with the emotional support required to make this change and provided with extra time to practise some of the writing tasks. That this was important was indicated by a comment Salesi put on her post-intervention Questionnaire "One thing I also liked was group/class discussion even though I didn't contribute but people coming up with their ideas and thoughts helped me in my work".

4.2 Aspect of Action Competence: Experience

This section presents findings about experiences that students in this study had had related to environment/sustainability. Experience in this context is defined as of environmental/sustainability-related events. It should be noted that this definition is not identical to that put forward by Jensen and Schnack. They see experience as being part of the action experience action experience cycle (Jensen & Schnack, 1997). For students who are just starting this is not appropriate. In New Zealand, to accommodate students who were totally new to the concept of action, experiences were provided for students as a class so they would all have had some in common and were not dependent on their prior experiences which were very diverse. The common experience is also something that the Danish researchers regard as valuable (Schnack, 2000).

The environment can be thought of as natural or man-made, and a sustainability-related event was considered to be any event that sought to address environmental and/or social sustainability. These experiences may have been organised by others or by the student themselves. Research (Greenall-Gough, 1999) shows that relevant experiences can help young people to think and feel something to do with the environment/sustainability issue they are in. Youth under 30 respond best to others in a similar age group, which was shown by the observation that the students preferred the younger of the two Rangers who worked with us on class experiences outside the classroom and invited him into school to discuss aspects of the history of the area (Greenall-Gough, 1999).

Table 4.1 below illustrates that experiences of students in this class varied from little or none to extensive, and from involvement in those experiences organised by others to self-initiated experiences. The table also shows a progression from left to right in apparent motivation to participate, and apparent understanding of the rationale behind participation. Data used in the table come from analysis of student report, journals, log books and/or conversations during class.

4.2.1 Level of student experience through class work

This class had had mixed previous environmental/sustainability-related experiences. While some had a lot, others had very little. Due to prior experiences being a component of action competence, the course the participants were in was designed to provide some experiences for them to draw upon when planning their action taking. Early on in the year the course provided speakers to help prepare students for trips into the Waitakere Ranges, a forest reserve near the school. These trips provided a set of experiences whereby students could experience a problem identified by concerned stakeholders of Ark in the Park, a restoration project in the reserve, then help carry out a solution, and later identify what could be learnt from it. The students reported enjoying the experience, for example, Salesi said in her post questionnaire "Setting out traps in the Waitakere Ranges, I enjoyed it because I got the experience of being responsible without a teacher and [we] got heaps of rats on our tracks". Talesi in her post unit questionnaire response said [At] "ark n park got out with group & trap pests that destroy our native plants & animals" and then went on to say about another trip "Ark in the Park. I enjoyed it because we got to see a protected area of bush; it was very healthy and green".

To help the students unpack this experience in the reserve a template was provided. These experiences were revisited and processed at the start of the action unit to enable students to use the learning from them to enrich their proposed actions. It was hoped that students would realise that they were capable of a wide range of actions after this experience. Apart from providing experience, the Ark in the Park trips can be described as activities rather than actions using descriptions from the Scandinavian experience (Breiting et al., 2009; Jensen, 2004). It also served to give students an 'in the bush' experience and in the true spirit of environmental education helped them push their boundaries and extend their idea of what they were capable of. These are considered to be important in both the Environmental Education Guidelines (MoE, 1999) and a Research group comprised of Education for Sustainability Advisors, Waikato University people and teachers in schools (Eames et al., 2010b)

The teaching prior to the students taking action was also designed to show students that who they were and what they valued were valid aspects of experience. This experience of self is further discussed under Section 4.4 on reflection.

4.2.2 Level of student experience out of class

Out of school environmental/sustainability-related experiences for members of the class varied from two students who had had a considerable range of experiences to those who had had very little. Experience on its own did not seem to be the deciding factor in whether students were able to complete an action, although in some circumstances it definitely contributed. Reka and Mandy, despite considerable prior experiences, did not complete their chosen actions and reports. In both cases the students were prefects. Mandy had chosen an action that was too big to complete easily and rather than refocus it; she opted not to complete it. Mandy had wanted to reform the recycling scheme for our school along with Sovaia. Reka had completed most of an action but only wrote part of it up before her other commitments took precedence for her. She had researched, planned and created a vegetable garden but only completed the research and planning for a worm farm for her family. On the other hand, Han and her family had emigrated from China where the government strongly promotes recycling and so had a very different experience background. Han understood from this that recycling was good; however she was unable to see how this experience could be built on given her current living arrangements in a high rise apartment block.

Farrah had cultural experience and nuclear family stories of an extended family planting fruit and vegetables back in Iraq. Her father's occupation is still linked to this area. On the other hand Sovaia's family already had a garden at home. When Mother went away on a trip she left her 2 older teenagers with enough money to buy some food but they had to eat out of the garden as well. Sovaia recalled this experience with pride.

Table 4.1 Aspect of Action Competence: Experience

Aspect	Absent	Awareness	Emerging	Developing	Action competent
Experience: Participation in organized environmental/sustainability-related events. Engages "hands" and includes education "in" the environment.	Has had little or no experiences that they connect to environment/sustainability issues. Resists participating in anything related to the environment/sustainability. Usual activities/actions centered around self.	Has had a few experiences that they connect to environment/sustainability issues. Understands that participation in environmental/sustainability-related events is a good thing but does not understand why it is good. Is not proactive in choosing such experiences	Has had some experiences that they connect to environment/sustainability issues. Willingly participates in environmental/sustainability-related events organised by someone else. Sees such participation as a good thing and understands that there are good reasons for doing it but unable to share reasons with anyone else	Has had regular, self or other initiated experiences that they connect to environmental/sustainability issues. Enjoys participating and understands the issues behind the experience. Tries to involve others to share the experience.	Actively looks for new experiences that they connect to environmental/sustainability issues. Understands the issues related to these and actively shares this knowledge and experience with others.
Level of experience in my class		Class of 15 listened to speaker from Ark in Park organised by teacher and invited and listened to Ranger in his early 30's	Class of 15 attended trips to Sharps Bush and Cascade Kauri and participated in a planting day when asked to by teacher.	1 is a member of school Kapa Haka team.	
Level of experience outside of my class		5 students had had some experiences outside of school during this unit but while these made an impact on them it was not significant enough to overcome other barriers the student experienced such as language, self esteem or family circumstances. Another student was able to use her out of school experiences to develop further	7 students who had little previous experience were able to make a significant connection and then use this to create understandings that helped them to make progress during their action.	2 students had a wide range of out of school experiences to draw upon. While there was evidence they used these to take action elsewhere these experiences only benefited them in the Knowledge aspect of Action Competence. Another student with less experience was able to use it to make significant progress	

4.2.3 Participation - student motivation and understanding

As expected, all students had had some positive environmental/sustainability-related experiences prior to entering this course, as those who were negatively disposed to the environment were unlikely to have chosen the course. Those with very limited experiences tended to make less progress as evidenced by Tere’s lack of awareness of what was going on at home. When she discovered her mother was already recycling, she was surprised but pleased. In comparison Farrah and Sovaia had had positive prior experiences with their families and this was an important factor in their successful completion of their personal action. Those with more experiences often came from families that already supported issues around a sustainable future. Unfortunately this prior experience did not always translate into greater success in completing an action for sustainability.

Table 4.2 Analysis of students’ experiences led to the following estimation of students’ development of this aspect of action competence:

Aspect	Absent	Awareness	Emerging	Developing	Action competent
Experience: Participation in organized environmental/sustainability-related events. Engages "hands" and includes education “in” the environment.		7 students were placed here as they had not had much prior experience.	The 6 students who were placed here had had more experiences but again this did not mean they could not complete their action....	The 2 students who were placed here had had a number of diverse experiences both in class and out of class.	

4.2.4 Summary of experience as an aspect of action competence

Relevant experience either by people recognised as significant by youth (Greenall-Gough, 1999) or their own direct experience is believed to empower young people to take action. The course the class was taking included a range of actions and experiences designed to give them something to reflect on and possibly kick start their own action, taken as part of the unit being taught. For this group of young people their families were important as well. The desire to

improve life for their families certainly seemed to act as an initial motivation for some students. The Maori word for family is whanau and refers to an extended family, not a nuclear one. For Maori and Pasifika students whanau is the centre of their existence. This may be true for other cultures as well but for these students they approach the rest of the world from their whanau and so being able to start giving back to their whanau was an important step for them. More development of action competence was seen in those students whose attitude to taking action on a particular environmental/sustainability-related issue was positive, rather than being related to the amount of environmental/sustainability-related experiences on other issues they had had.

4.3 Aspect of Action Competence: Knowledge

This section presents findings about the knowledge that students in this study had or were able to find that related to environment/sustainability. As in previous tables the movement from left to right on the table indicates improving skills in accessing and using knowledge.

Knowledge may be about a particular issue, its origins and solutions, its relevance to individual students and to a global sustainability issue. The need to access a range of types of knowledge is discussed in Jensen (2004) where he states that if students access a range of types of knowledge as well as aspects of sustainability then they are more likely to develop an effective understanding of an issue. This in turn will be more likely to lead them to take action themselves. The aspects of sustainability social, cultural, environmental and economic were remembered using the mnemonic SCEE. This abbreviation is used from this point in the thesis. Students were encouraged to build on skills of accessing knowledge already developed in other units earlier in the year.

4.3.1 Student knowledge development in class

Finding information is a standard skill for students and many were comfortable doing this. By the time the action unit started most students had sufficient skills to find and identify relevant information on a given topic. Researching in previous

topics had honed these skills. From these results it was clear that there was a difference in their skill in looking for a sufficiently wide range of information and their decision as to what was reliable information. Mekala made a number of links in her report:

There are a number of reasons why we recycle because lowering the amount of natural resources we have to consume by reusing the old ones we have already used, it gives us an opportunity to clean up our country and secure our life for future generations. It also reduces the amount of the Earth's resources that we use; this will greatly impact on the reduction of our emissions too.

4.3.2 Student knowledge development outside of class

Student practise of researching in other subjects was an advantage here as all students had had this in addition to skill gained in my class. One area they only seemed to improve on with extra practise was choosing really relevant and reliable sources. Ilisapesi and Mereoni chose good information as did Lesieli and Sovaia. For instance, both Ilisapesi and Lesieli were able to find and access information put out by their local councils. Lesieli then contacted the Council directly and got someone to come and talk to her family.

4.3.3 Participation

Students who completed their report had researched appropriate information. Despite reminders as to the breadth of information and the reliability of sources required these areas remained an issue. Some students had some relevant information but not enough to enable them to make all the required links. Farrah had information on growing vegetables but nothing on why this might be useful other than as food for her family, whereas Aroha had found information on how roof top gardens could positively improve Londoners' lifestyles. While students were able to work on their log books in class some would forget to bring them. Students were encouraged to check they had the information needed and that they understood it and could make links. Students would say they did understand, and Salesi did say this, but her log showed she did not understand what was actually required. Students had practised linking ideas and information to the different aspects of sustainability in previous units of work and were provided with

Table 4.3 Aspect of Action Competence: Knowledge.

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Knowledge: Knowledge leading to understanding/ explaining of environmental/sustainability issues, then leading onto understanding of links with impacts. Skill in finding & identifying relevant information on an issue & its impact Skill in linking and analysing social, cultural and historical dimensions to the aspects, such as social, cultural, environmental and economic (SCEE), for an issue & its impact. Skill in using knowledge to inform action</p>	<p>Has little or no background knowledge on any environmental/ sustainability issues or impacts Is unable to identify relevant information on an issue Is unable to link information between any dimension or aspect of an issue.</p>	<p>Has some basic knowledge of a specified environmental/sustainability issue or impact. Has skill to find and identify some relevant information on an issue or its impact Has skill to identify simple links between dimensions and/or aspects of an issue.</p>	<p>Has reasonable knowledge and understanding of an issue & its impact. Has skill to find and identify relevant information on an issue & its impact. Has skill to identify links between dimensions and aspects of an issue. Can explain some of these links. Has skill to adapt an action found by researching.</p>	<p>Has good knowledge and understanding of an issue & its impact. Has skill to find, identify & select relevant information on an issue & its impact. Has skill to identify and analyse links between dimensions and/or aspects of an issue. Is able to explain most links. Is able to use their knowledge to develop an action of their own.</p>	<p>Has detailed knowledge and understanding of an issue & its impact. Has skill to identify missing information and know where to find it. Has skill to analyse and evaluate links between dimensions and aspects of an issue. Can transfer these skills to other issues. Able to use knowledge to plan a wide range of actions.</p>
<p>Knowledge development through classwork</p>		<p>Class of 15 taught by Librarian to search school library catalogue, use INNZ (Index NZ), search Gale databases and conduct and refine online searches. Class taught in class how to recognise simple links between dimensions & aspects of an issue</p>	<p>Class of 15 provided with time during this unit and earlier in year to conduct their own searches for relevant information on an issue. Class provided with opportunity in class to practise writing links between dimensions &/or aspects of an issue</p>		

additional opportunities in this unit when it became apparent that more practise was required. This was an area where Tere improved with practise. She was able to produce a coherent understanding of global warming and how it works and could link it to effects on people, including loss of grave sites from erosion caused by sea level rise, to changes in infectious disease patterns, to changes in crop productivity. For this reason, she was placed under Developing as her rating for development of knowledge.

The skill in linking different types of information to aspects of SCEE was easier for students than the next step, which involved being able to link aspects of sustainability and information on the issue to the actual action the student was going to undertake. While most students found the first linking relatively straightforward, the second linking back to the action was much harder for many. Pasifika students in particular found it easy to make some of the links because the Pacific Islands have been some of the first places to experience sea level rise and because they are finding the islands are more vulnerable to extreme weather events. Two of the Tongan students, Lesieli and Ilisapesi, had spoken to relatives about what was happening in Tonga and reported back verbally about storm damage during a class discussion.

4.3.4 Summary

Identifying the information they need and then finding it are skills that are improved both with practise and a clear understanding of the purpose the information will be used for. When students did not attempt or complete work then their skills did not improve. The skill appears to come from trying different search terms until you find ones that answer the questions you have. It seems to be a 'hands on' skill. The two Year 13 students' extra experience showed in this area. This experience was as a result of having completed Year 12 with more research assignments. The best students were able to supply a chain of links to go from their action to international bigger picture which in this case was climate change or to international groups with similar concerns. Good research skills helped students find relevant information they could use to talk with whoever they were working with, to find solutions or actions and to help them write up their reports.

4.4 Aspect of Action Competence: Reflection

4.4.1 Student reflection in class

This section presents findings about the reflection skills of students. Self reflection is an important skill. It is often what makes the difference between proceeding as per usual and making changes. It is not a skill that all students have, even at this level. In the intervention, students were asked to use an online reflective journal. After some abortive attempts at working like this online, they asked if they could use their log books instead and this was agreed.

The reflection process in the intervention was broken into three parts. The first part was 'who the students were' so it was reflection on self. This was very important as it acknowledged the students for who they were and did not assume they would have the same values and identity as the majority of New Zealanders. Secondly, there was reflection on the quality of the links to be made between different pieces of information and the action they had chosen and how it linked to a global issue. This was to see if their reflection made them reconsider any action or to give them any unexpected insights. Thirdly, was the idea of critical thinking about the meaning and implications to come out of their action.

In class I started with who the students were and what their values were. To start this off we made peg dolls that were to represent the student or someone very like them. This was a very popular activity. The non European students in general went to considerable effort to make their peg dolls very clearly connected to the cultural group they identified with. Tongan peg dolls had tapa¹, skirts and feathers in their hair. Maori peg dolls had kapa haka outfits with tipare or headbands and cloaks. The Muslim peg doll wore a hijab or head scarf. The peg doll was to represent the student or someone very like them. This was to help students identify their feelings or the feelings and /or reactions of someone very like them.

¹ Tapa cloth is made by beating the inner layer of bark from the mulberry tree and then dyeing it. It is used to make mats and wrap round ceremonial skirts.

Table 4.4 Analysis of students' knowledge led to the following estimation of students' development of this aspect of action competence

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Knowledge: Knowledge leading to understanding/ explaining of environmental/sustainability issues, then leading onto understanding of links with impacts. Skill in finding & identifying relevant information on an issue & its impact Skill in linking and analysing social, cultural and historical dimensions to the aspects, such as social, cultural, environmental and economic (SCEE), for an issue & its impact. Skill in using knowledge to inform action.</p>	<p>The 1 student who ended up under Absent did not complete her action or hand in any material.</p>	<p>There were 2 students who ended up under Awareness. 1 did not complete and the other did not find relevant information, she had huge gaps and barely useful material.</p>	<p>The 4 under Emerging were able to find relevant information and to make links within it and between their action and their research. Aroha had a particularly good section on growing vegetables in cities and how this linked quite clearly with aspects of SCEE; her growing of a vegetable garden, the global issue of climate change and growing local food. Mekala had this to say "There are a number of reasons why we recycle because lowering the amount of natural resources we have to consume by reusing the old ones we have already used... It also reduces the amount of the Earth's resources that we use; this will greatly impact on the reduction of our emissions too."</p>	<p>The students who were under Developing were able to: ... for example, Mereoni was able to find and access info on carbon footprints and how to reduce them and apply to her family's situation. She could explain how her actions related to SCEE. As well she had specific information on Carbon footprints and also accessed data on businesses that had reduced their Carbon footprints. She was able to identify saving money as good side effect of helping planet</p>	<p>The 2 students who were placed in the Action Competent column. For example, Sovaia made links between pollution prevention, recycling, landfill and waste. She had found the NZ Waste Strategy Plan and linked her findings for Auckland to this. She then linked this to the rise of consumerism in our society and had UN information to back up her claim. It was this that she based her action on.</p>

Students identified themselves by their cultural group and after class discussion on values were able to choose their most important individual values. In further discussion it came out that their values were not identical to those of their parents. There were some interesting points made in class discussion when it was realised how different life in Iraq was from life in NZ. In particular when Farrah revealed that honour killings still occur in Iraq, the class was quite shocked. Those students who did not attend church regularly were surprised by how big a role church played in the lives of those who did attend. Both Muslim and Christian students discovered they prayed daily and read from their respective scriptures often.

Some students had not been as straightforward about what they knew as others; Ilisapesi admitted in her post questionnaire [I] "Didn't really know about pests & how it is harming native birds. I use to just pretend I did but now I really do" with respect to Ark in the Park. Tere in her questionnaire responses also reflected on her Ark in the Park trips:

Trip to Waitakeres, skeptical bout going into bush, enjoyed it
...Its one thing to read articles or go onto [internet to] find out about environment but to be in the heart of the Waitakere Ranges is another story. It's another world. Birds singing freely, trees are skyscrapers or high rise buildings of the forest.

Sina had this to say in her questionnaire response: "This changed my thinking as in experience by actually realising what the actions we take do make a difference on our environment. So therefore the more people we get involved the bigger changes in order to make our environment [better]". Mekala had this to say in her report about people just dumping rubbish everywhere:

I have learnt a lot of different things from recycling. Now I'm actually really quite aware of how much recycling can save energy. Importantly this taught me about the different values that are involved in saving our planet. I respect these values even more now that I take global warming seriously. Learning about my values was vital to me because it taught me the different principles that were once important to our ancestors

who lived long before us e.g. cultural values; cleanliness, many cultures believed in keeping environments clean.

4.4.2 Student reflection outside of school/classwork

Students may be asked to reflect in other subjects, but if so, then it did not seem readily transferable, as there was no clear evidence of reflection skills being transferred into my class from other classes. They certainly treated the reflection process as if it was a new experience. This may be because they are unused to reflecting on matters concerning their world views.

4.4.3 Participation

Students used their reflections on their culture and values in their interpretations of the information they had gathered and to comment on their reaction to some of the experiences they had had. Sovaia was researching recycling and reusing resources and how this could help the natural environment. She comes from a mixed heritage family with a European mother and a Fijian father. She made this comment in her log after talking about how valuable the environment was;

My dad's side of the family is Fijian and still live in villages in rural Fiji where they are highly dependent on the land and its resources for survival. I want to ensure that they can continue to live their lives this way as it has a minimalist effect on the environment and is an awesome thing to witness by anyone.

Once they started to do their action, this gave students something to write about but also to reflect on. They were able to compare how they behaved with what they had found out in their research. Some were better able to do this than others. For instance Reka wrote in her log book:

Culturally for me as a Maori student coming from a Maori oriented family, having a direct connection with Papatuanuku (Mother Earth) has always been important to me. By taking time to understand how when and why fruits/berries/vegetables grow best I deepen my understanding of the value of earth and develop greater respect for the environment which sustains me.

Table 4.4 Aspect of Action Competence: Reflection

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
Reflection: How, when and why to reflect. Reflect on own identity, thinking and actions. Is essential to make links between thinking, feeling and acting; i.e. able to link attitudes and values to SCEE and to actions.	Has little skill in reflecting on who they are, what they do or why they do it.	Has some ability to identify who they are. Has some ability to identify own thoughts on an issue. Has some skill in reflecting on own actions but unlikely to do it spontaneously.	Has some ability to make links between who they are and their values and thinking. Has skill of reflecting on own behaviour, thinking and learning. Has skill to make links between thinking, attitudes and actions/behaviours of others.	Has skill to use reflection to help self understand current responses, and predict own future responses to situations. Has skill to give feedback to others on perceived links in situations.	Has skill of continually reflect on own actions, values and responses. Has skill to perceive when inconsistencies exist in own actions, values and responses. Has skill to give and receive feedback on actions, responses and understandings.
Level of reflection in school/classwork		Class of 15 was asked to reflect on a range of activities during the year and throughout the unit.	Class did work on identifying their own culture and values. Class used decisions of public figures to identify links between thinking and actions.	Class aware that their personal cultural identity will influence how they respond to certain situations. This came through in their work.	

Table 4.5 Analysis of students’ reflection led to the following estimation of students’ development of this aspect of action competence:

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Reflection: How, when and why to reflect. Reflect on own identity, thinking and actions. Is essential to make links between thinking, feeling and acting; i.e. able to link attitudes and values to SCEE and to actions.</p>	<p>0</p>	<p>The 3 students who ended up under Awareness were those who could make only an occasional link but really did not see the connection</p>	<p>7 students were placed under Emerging. Students could make some links for instance Mekala wrote “I have learnt a lot of different things from recycling. Now I'm actually really quite aware of how much recycling can save energy. Importantly this taught me about the different values that are involved in saving our planet”. Telisa wrote about wanting to do something to help Samoa where she has family. “Samoa is suffering some impacts from global warming”. She stated that her personal view has changed and she now recycles thoroughly all the time, has made it a habit. She also involved six households of her extended family in recycling including one cousin who had been taught all about this by his grandmother before she died and he now took on involving a number of younger relatives in this issue.</p>	<p>4 students were placed here. Reka who was placed under developing saw making a vegetable garden and worm farm as linking back to her Maori roots</p>	<p>Lesieli was placed under action competent because when her grandfather died during her action of reducing her family’s electricity bill she did not give up her personal steps even though the rest of the family did. She also took the opportunity to sit her extended visiting family down and tell them all about what they could and why they should it. I thought this showed initiative and commitment.</p>

This reinstalls the values I grew up with about how wrong it is to rape and pillage the earth which in Maori mythology is a sacred mother to us all as humans and that these actions are not without consequences.

4.4.4 Summary

Despite reflection appearing to be a new skill, or new in this area of study, students showed evidence of some good reflections by the end of the unit, however, these were not always to be found in their journals. Some were in the questionnaire responses. More practise with a range of situations and in small groups, would probably help students gain the experience they need to put more depth into their responses. Deeper analysis skills relating to particular situations, possibly from class discussions might also enable them to see that one response will not fit all situations. The students who improved were those who did carry out a detailed action so had more to reflect on. Lesieli was able to reflect enough to grasp an opportunity that arose even when it involved her taking a risk and showing initiative. At the start students had not necessarily made links that seemed obvious once they realised them for instance Mekala realising her people did care for the environment and Sovaia and wanting her father's people to be able to live their traditional life.

4.5 Aspect of Action Competence: Vision of a Sustainable Future

Visioning is a difficult skill. People from different backgrounds will have different visions depending on what is important to them. If your culture is different to that of the dominant group in society, your first step in visioning may well be to imagine that your culture is given equal status. That as of right you will be able to access your land, language, world view, arts, dance and a place to call your cultural home. The latter is turangawaewae (home region) in Maori and would be the marae (home) of your whanau (extended family), whereas for Pacific Island students it would be the island and village where they or their family originate from. It is less clear what that place is for other immigrant

groups. For students of European or Pakeha ancestry visioning would need to involve the recognition that other cultures have different ways of looking at the world and that the Pakeha view is one among many rather than being pre-eminent.

Two of the Maori students in the group were members of the Maori unit Nga Tumanako o Kahurangi. This is the bilingual group that has been a part of the school for the last twenty years. Its aims are to teach tikanga, Te Reo, kapa haka while offering the benefits of being part of a large secondary school. Part of the kaupapa (philosophy) of this group is to encourage young Maori women to stand tall and to be proud of who they are and where they come from. The Pacific Island students identified strongly with their island of origin, even if they were born in NZ.

4.5.1 Students' visioning in class

In class earlier in year students had watched a number of videos on climate change and its consequences. They had followed this up with research to verify what they had seen. As a result the Pacific Island students were very moved by what they had seen. For both Maori and Pacific Island people land is vitally important. People are seen as guardians or kaitiaki of the land. They do not own it but are responsible for its safe keeping from generation to generation.

When we first discussed their visions of a sustainable future in class, students tended to produce short answers such "more green", "less cars" "not polluted, dirty etc" but later they were able to come up with visions that much more detailed. These varied from Salesi's short "less fossil powers [electricity] & more solar panels. More people would take public transport & take part in an action that would help the environment" which shows she has begun to add detail to her vision and is moving towards what I would call an emerging category of visioning, as described in Table 4.6. Mekala had a lot more to say in her report and her post questionnaire responses:

My opinion towards this issue is that I personally think that we should get the government to oblige new eco-friendly laws that state they are going to limit the amount of energy people use.

This should be acted upon each and every nation. With the government laying stricter laws and promoting eco friendly living styles people will be easily influenced into saving energy

She did not explicitly make connection between her family making changes and this spreading to other families, but she did show some developing awareness, as the following quote from Mekala's log book shows:

...Less native destructions, less extinction of species, more land, healthier environment, more permeable surfaces, less cars more buses (carpooling). ...Social, communities helping & taking part in actions e.g. trees for survival to grow more native things for the ecosphere.

Her responses are at an emerging level but are full of detail that she thought would work.

4.5.2 Students' visioning out of school/classwork

There was little evidence to support whether or not this was occurring. None of the data indicated that visioning was happening outside the class, and this may be an aspect that is not being developed in other classes or in the home environment.

Table 4.6 Aspect of Action Competence: Vision of Sustainable Future

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Vision of sustainable future: Can visualise a sustainable future and identify why it is better. Can identify aspects of SCEE in it. Can see own role in making it happen.</p>	<p>Has little skill in thinking of future as anything different to present.</p>	<p>Has skill of imagining future as different to present but likely to think of it as an extreme i.e. all good or all bad, without much detail. May well be paralysed by this.</p>	<p>Has skill of imagining future as more sustainable than now and sees this as better. Has skill to identify some of the changes that are required. Has skill to see how some actions under SCEE contribute to this future and to take some of these actions</p>	<p>Has skill of visualising a detailed sustainable future. Has ability to explain why it is better. Has skill to see how actions under SCEE contribute to this future. Has skill to explain how changes they have made contribute to a sustainable future.</p>	<p>Has visualised own personal view of a sustainable future. Has skill to realise that own vision will need merging with others. Has commitment to work with others to bring about a shared vision of a sustainable future. Has skill to participate in society in range of groups to bring about changes.</p>
<p>Level of visioning in school/classwork</p>		<p>Class of 15 asked to imagine future but found task difficult.</p>	<p>Some of these skills developed as class completed their actions</p>		

Table 4.7 Analysis of students' visions led to the following estimation of students' development of this aspect of action competence:

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Vision of sustainable future: Can visualise a sustainable future and identify why it is better. Can identify aspects of SCEE in it. Can see own role in making it happen</p>	<p>1 Han was put in the absent group because she showed no sign of being able to describe the future as being anything different.</p>	<p>3 The three in the awareness group did not write a lot about the future. Sina was worried about the future as in conversation she seemed convinced it was going to be bad. Her father had lost a cousin in the Samoan tsunami and there had obviously been considerable discussion at home.</p>	<p>7 Talesi did not record her vision for a sustainable future, however she did note in her report that in choosing her six households for her recycling project she had chosen a range of ages and different personalities. She then talked about setting an example for the younger children in the family and showing them why recycling was so important to her and her family. She linked it to continuing the family values of respecting the land.</p>	<p>4 Reka decided short term to buy a commercial worm farm as she was going to leave home at the end of the year. Later on when asked about a sustainable society she wrote "A society which has moved away from the consumerism and wastefulness which has become acceptable".</p>	<p>0</p>

4.5.3 Summary

Students' visions of a sustainable future developed during the unit, but they were often not expressed as such. It is not clear whether this is a skill that students have not yet developed, whether it was taught badly or whether this is the wrong question to be asking these students. Students' ability to plan and carry out a good action is a form of visioning. To improve visioning more practise would be useful. This could be achieved by suggesting more 'what if' situations during the topic and possibly linking to other situations where there has been dramatic change for instance where there have been disasters or other consequences from major events, including positive ones. Another way could be to get students to think about time frames for instance in six months time, two years time, five years time and so on.

4.6 Aspect of Action Competence: Connectedness

Connectedness is about links between people, between aspects of sustainability and between people and aspects of sustainability at all scales.

In terms of relationships between people, especially whanau, or extended family, Maori talk about whanaungatanga (reciprocal relationships involving obligations). This concept resonates with Pacific Island students as well to whom family is equally important. For some Pakeha families this closeness may be familiar as well. These links may be culturally embedded as in creation stories. In the intervention, Maori stories of creation were shared with the class, as was one from the indigenous people of North America. Many students felt a strong connection with the land or the planet even if they were not able to write this down. Rangi wrote a long passage in her log book outlining her beliefs from her Maori culture:

Also in Maori culture our perspective of the land and the environment is a sustainable one. We see people being a part of the land, not the other way around. Everything we do is to benefit the land and environment, not disadvantage it. The land is our Mother, Papaptuanuku, and the sky is our Sky Father, Ranginui. Everything between them are their living children.

For example, the forest and trees is Tanemahuta [God of the forest] and Te Waonui-a-Tane [the forest], and the sea is Tangaroa, the God of the Sea. We also believe that we people originate from the land, therefore having more reason to look after and have respect for the environment, and eventually everything is returned to the land. For example, when you pass away your body is returned to the land in some form and buried. This is like a cycle.

This shows Rangi's connections with the land as embedded in the myth. This value is obviously important to her and implies a certain respect and responsibility. She talks about the cycle of life coming from the land and being returned to it at the end. She implies the notion of kaitiakitanga or guardianship.

4.6.1 Students' connectedness in class

In class an inspirational story was examined about a young woman Julia Butterfly Hill who lived in a 1000 year old redwood named Luna for 738 days to stop the felling of these ancient trees in California. Mereoni mentioned in her log how inspiring she found this story. In addition earlier in the year the class had watched a number of videos showing how global warming was likely to affect the Pacific Ocean nations and facts and figures about it might affect NZ. The Pasifika students were very moved by these stories, particularly when they showed that cemeteries were being damaged by severe storms. Ilisapesi recorded in her log book, (p5):

Other sad incidents are the graveyards which have been destroyed due to the rising sea levels. Graveyards are one of the most important things in one's life as it is a place for people for people to feel a connection and pay respect to 'lost' loved ones.

The other story that made an impact on them was that in the islands of Kiribati in the Pacific Ocean, one island called Bikerman had already been submerged under the sea. The video clip about this story starts by showing two men rowing in the middle of nowhere out in the ocean (Channel 4 International Limited 2000). Then they stop and one man hops over the side and stands in knee deep water. This is the island of Bikerman he says. He goes on to say that groups used to meet on this island with the chiefs to talk but no longer, as sea level rise had taken the island away. This made a very clear visual connection between climate change, loss of land and the fact that the Pacific is suffering already. Mereoni noted in her log that:

...sea levels rising is an effect of global warming. This affects the Pacific Islands the most. When the Pacific Islands get affected by erosion of the land, the environment isn't the only thing that gets affected. Culturally tradition and values start to lose also because most cultures revolve around the earth/land. If this is lost due to climate change and global warming, culture will also be lost.

Later in her log, Mereoni had copied this quote from Aldo Leopold in *A Sand County Almanac*: (Leopold, 1949)

We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.

We did not use this quote in class so she must have included it because it meant something to her. I suspect because it talks about people belonging to the land rather than thinking they own the land. This was a concept discussed in class. Another type of connection was made by Sovaia. She researched landfills in the world, then found information for New Zealand on our waste strategy which she then connected to the City Council's roadside recycling scheme. She developed a short slideshow presentation on recycling around school which she presented to a senior assembly. She had already put some visual aids up telling students where bins were and how close they were (cold, warm, hot), in other words to indicate closeness to the nearest bin. She had before and after photos of the use of the bins

with dated photos. This showed she had made a series of connections between information sources, finding increasingly relevant ones and finally linking them to our school and her action. There were sources highlighted to indicate where information came from, comments in her log, copies of her slideshow, graphic organisers to evaluate her action, her process outlined in her report all to show the sequence of connections she had made.

4.6.2 Students' connectedness out of class

Students who come from cultures with strong links to the land may well already have a connection with the land especially if they were raised in traditional ways. The students in my class had mostly been raised in the city but were beginning to make connections with where their families came from. This was evidenced by stories written in their log books, for instance, Sovaia wrote about her father's village in Fiji. The Tongan and Samoan students spoke about the connections they felt after watching some of the videos. They were then able to link these back to class work.

4.6.3 Participation

Most students could express some type of connection verbally by the end of the unit but, at least initially, found it hard to put it down on paper. I suspect this is because it means identifying values and attitudes that are usually unspoken. While students are familiar enough with values to be able to name important ones and even identify some behaviour that implies certain values are held, they are much less certain about their own behaviour and values. This is quite a personal area and may need pedagogical approaches to scaffold student work.

Table 4.8 Aspect of Action Competence: Connectedness

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Connectedness: Able to make connections between people and all aspects of environment. Able to identify relevant attitudes and values. Able to link these to their actions. Able to see that need solutions at different scales e.g. local, regional/national and global.</p>	<p>Unable or unwilling to make connections between self and others. Attitudes and values are egocentric.</p>	<p>Does not see connections between own or others attitudes and values and what happens to planet. Does perceive some sort of connection between people and planet but unable to clearly articulate it.</p>	<p>Is able to make connections between their actions and the planet. May lack appreciation of scale of changes needed. Can relate these connections to attitudes and values. May not see need for "snowball effect" to make big changes.</p>	<p>Is able to link their attitudes and values to the way they treat the planet. Is able to apply SCEE in a range of situations. Sees importance of action at a range of scales i.e. local, regional/national and global i.e. need for "snowball effect".</p>	<p>Able to connect people and planet at all levels and for all issues. Able to apply an analysis to these connections. Able to appreciate scale of problem appropriately</p>
<p>Level of connectedness in class work</p>		<p>During class discussion students were encouraged to make connections</p>	<p>Students practised writing connections between ideas in class</p>		

4.6.4 Commitment

Commitment can show through in the students' work where they include evidence that allows triangulation of results. For instance, Mereoni included in her log research about household energy consumption with data on cost saving from energy efficient light bulbs highlighted. She then had the information on composting highlighted as well. Later in her log she had a receipt from a hardware store for energy efficient light bulbs and pictures of them in place in her house. There were comments in her log that her family replaced 24 of the 30 light bulbs in her house, outside doors and garage with these new energy efficient light bulbs and made a calculation of energy saved. In terms of composting, she admits she did not understand anything about it and then researched and also asked around her extended family to locate expertise. The family then bought a compost bin and a picture is shown of it set up. She used this approach throughout her action to reduce the family's carbon footprint. This systematic approach demonstrates commitment and the connectedness inherent in this process is further discussed in Section 4.8.

4.6.5 Summary

For some of these students it appeared that the skill of making and feeling connections had improved during the unit. I am aware that Rangi had heard the stories about the land before but this is the first time I was aware of her really understanding the relevance of that knowledge outside of her Maori language class. For some of the Pasifika students it seemed to take time for them to realise they were able to make this type of connection as well.

Commitment can be shown by the systematic method a student uses to go through a set of actions. When this is done not only commitment but also a different set of connections is demonstrated with students providing multiple sources of evidence for their action.

Connectedness is a big aspect with lots of different types of connections possible. Students who are more insightful could demonstrate more than one of these ways

Table 4.9 Analysis of students’ connectedness led to the following estimation of students’ development of this aspect of action competence:

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Connectedness : Able to make connections between people and all aspects of environment. Able to identify relevant attitudes and values. Able to link these to their actions. Able to see that need solutions at different scales e.g. local, regional/national and global.</p>		<p>4 When Salesi completed her post unit questionnaire she was just beginning to make some connections as she made this comment “cultural values: encouraging your people to become more aware of the environment and the effects we will have in the future”. This had not happened earlier which is why she was in the Awareness group.</p>	<p>4 Farrah was in the emerging group and made some small links like if we grow food we don't need to import it and plants remove carbon dioxide from air. For her growing vegetables is something that happened in villages back in Iraq so she felt closer to her heritage when doing this</p>	<p>6 Reka was included in the developing group because in her log she clearly outlined how her setting up a vegetable garden and worm farm related to all four aspects of SCEE. The cultural aspect has been quoted earlier but here are her other aspects. Socially: Socially setting up a vege garden would be sustainable because it is something I can share with others. I can tell my friends about it and I can include my family in it. A proven ideal activity of bringing families closer together is working together to achieve a common goal. By sharing a vegetable garden with my family we can work together to reap the rewards we can all benefit from. Environmentally my household’s vege garden will be beneficial because we will be growing it all organically without adding pesticides or any other chemicals and by not buying non organic vegetables we won’t be supporting farms that use pesticides. Economically the vege garden will be beneficial as I will no longer be paying [for] vegetables I’m growing myself, saving me and my family about 10 dollars a week and we will be saving on the money we would have spent on petrol by not having to drive to the supermarket.</p>	<p>1 Sovaia was put in the action competent group because of her consistent skill in making connections. Here are two examples from her log: I personally think that my action was and is extremely effective because instead of just sorting the recycling myself I have educated hundreds of students on how they can take action and take a part to conserving the natural environment whilst creating social sustainability as communities will also learn the values of recycling because [our school] has such a widespread population across [our city]. It has also made me notice rubbish much more. I’ve started to notice the littlest pieces of rubbish on the ground and I have gained huge respect for the man I see on [a main road] whose job it is to pick up the rubbish that has been littered by us. I feel that I now have a better understanding about rubbish in my city , where it goes, how we can help, why we should and our social responsibility as a resident in [this city] and a user of its resources</p>

quite clearly. Other students found making connections much harder and possibly needed more support or more experience or both.

4.7 Aspect of Action Competence: Action taking

As part of the unit that was taught students were required to choose, plan, carry out and evaluate an action to support a sustainable future. This was an assessment for Achievement Standard 90810 for Year 12 and AS90828 for Year 13. These standards may be found in Appendix 3. The tasks set for the students based on the standards are in Appendix 4 and the Assessment Schedules in Appendix 5. Students had free choice as to the action chosen and to whether they worked individually or with a group. Most, but not all, chose to work with their families. Two students chose mostly an indirect action with education being the key focus. The others who were aiming for more direct action with their families often included an education aspect. For example, when Lesieli did this she invited a Council Advisor to come in and talk to her family.

The ability to take action together is a way to build commitment. This is something mentioned explicitly by the Danish researchers Jensen and Schnack (1997). Jensen and Schnack achieved this partly by having the group work together on an action. This was not desirable in my situation. The range of student ability meant that the whole class might end up waiting for a student who was absent a lot. This did not seem fair. I also feel that students would be likely to relate more strongly with their families than with their peers. Partly this is a cultural issue, but it does overcome the issue of commitment that is so important in the Danish work.

4.7.1 Student action-taking out of school

Two students had taken action for the environment before, namely Mandy and Reka. These two students spoke of being too busy when asked about their work and that they were picking and choosing which assessments they finished to enable them to complete their work before they went on exam leave.

The students who completed their actions wrote them up. The ones who did not hand anything in were the ones who did not complete their actions or in some cases even start them. Sometimes this was due to factors beyond their control, for example Hine losing her worm farm in her father's car when the car was in an accident. For other students the action was something they could not even begin to undertake, for example, Alofa and Hannah, whose attendance was erratic. Vika had stopped attending school early on in the unit. While Han attended school her poor English meant she felt unable to tackle the action. Yara had negotiated to complete an earlier assessment as she could not cope with all of the assignments she needed to complete before the end of the year.

4.7.2 Participation

Not all students participated fully in the action. Some seemed to find the concept too hard for instance Alofa, or got part way into it and then found it too hard. Sina is an example of this. She got her Minister to help her call a meeting of the houses in her area to talk about keeping the area safe but as far as I am aware got no further. She did not hand in anything at all. Han was another one who wanted to do something with recycling but could not imagine anything that would improve on what was happening in her building so she decided not to do anything.

Table 4.10 Aspect of Action Competence: Action taking

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Action taking: Carries out carefully considered acts/ behaviours that support a sustainable future. Can make a relevant decision and carry it out. Can carry out an action over a period of time. Can carry out direct and indirect action.</p>	<p>Has little or no motivation to do anything for others. Only action might be to protect own lifestyle.</p>	<p>Most likely to participate in actions organised by others. Might encourage others to participate, particularly if time frame required for action is short.</p>	<p>Able to see their own actions as important and making a difference. May not have appropriate understanding of perspective of own action. Carries out an action for a short period of time but may not be committed to a long term action.</p>	<p>Has made or is prepared to make multiple long term lifestyle changes when understands reasons for change. Is able to explain these changes to self and others. Prepared to talk to others about action taking.</p>	<p>Has embedded some changes in their lifestyle and has plans to continue making other changes. Acts with others to ensure actions required for a sustainable future happen e.g. social justice issues and at regional/national and global levels. Is proactive about encouraging others to take action.</p>
<p>Level of action-taking outside of school/class</p>	<p>Some students did not attempt an action</p>	<p>2 students already participate in family organised actions for a sustainable future.</p>	<p>10 students who got involved in actions developed more in this area.</p>		

Table 4.11 Analysis of students' actions led to the following estimation of students' development of this aspect of action competence

Aspect	Absent	Awareness	Emerging	Developing	Action Competent
<p>Action taking: Carries out carefully considered acts/ behaviours that support a sustainable future. Can make a relevant decision and carry it out. Can carry out an action over a period of time. Can carry out direct and indirect action.</p> <p>Level of action-taking in school/class</p>		<p>5 The students in the Awareness group were those who did not complete an action or whose action was extremely limited and whose understanding was of it was limited</p>	<p>0</p>	<p>8 The Developing group contains all the students who carried out a successful action and were prepared to continue it. Farrah grew vegetables with her Mum at home. Aware of her position as a young Muslim woman she eventually summoned the courage to speak to her younger brothers about why this was important for the family. Later she spoke to her whole family about the link between climate change and how plants can remove carbon dioxide from the air. They had not realised this link and were going to come up with another action to take for the planet. Telisa had organised 6 households to begin serious recycling. These households were all going to continue and a teacher who lived in one of them was getting her school to recycle. Telisa reported that she now makes her friends recycle when they are out.</p>	<p>2 Lesieli and Ilisapesi were both put into the action competent group as their actions were detailed and both households made a commitment to continue with the action long term. Both students had taken advantages of opportunities that came up to spread their message to others.</p>

4.7.3 Summary

The students who completed actions all grew in confidence and understanding as a result. Their log books and journal entries show this development. Whether they made large or small leaps in understanding they were able to describe what they did, what it meant to them and what they thought it meant for the planet. A number spoke of being closer to their family as a result of this action. For some the added maturity they had gained was apparent in their eyes. Aroha's new found confidence for coping with her sister, and Ilisapesi's pleasure at saving her mother some money and helping the planet at the same time were evident in their animated conversation, the look in their eyes and the pleasure they got from telling their story to me.

Others were able to establish criteria for evaluating their actions beforehand and then use them to make a determination on the success of their action. Sovaia did this in her log book, using her before and after photos, and then wrote about it in her report. Other students were so enthusiastic about their action that they declared they were going to continue with it as a lifestyle choice. Telisa was hopeful that the six households of her extended family would continue to recycle. Both Lesieli and Ilisapesi declared that their households were making their changes a lifestyle choice. In fact almost a year later Ilisapesi told me her household were still carrying out their actions.

At the start of the unit only two students had taken action. Neither of them completed their action because of other commitments as prefects. None of the other students had considered planning and carrying out an action of their own. The number of students who completed an action that had a profound effect on them and their family shows that the unit did produce some change in some of the students.

4.8 Case stories

To illustrate more deeply the changes that some students went through, a short series of case stories are now presented. These stories focus on particular aspects

of action competence development. Data is drawn from a variety of sources for these stories and where not attributed, it is from the student's log book, journal or final report.

4.8.1 Ilisapesi

Ilisapesi lives with her Mother and slightly older male cousin in a State House (Ilisapesi, log book, p. 7). She is a quiet, thoughtful 17 year old student of Tongan descent. She would like to work in the field of health. In her own words;

My chosen sustainability issue is on the decrease of 'carbon footprint'. The need to take action and reduce my carbon footprint is of great importance as I do daily activities which increase this issue. Therefore, there has been a feeling of guilt but through the lessons, knowledge and learning habits I have gained ... I am determined to contribute to a sustainable future and adhere to my personal values; ecological awareness, nature, personal development, responsibility and economic security (Ilisapesi, log book p4).

As Ilisapesi researched she found out more about how global warming was causing climate change and made a connection to video material; *Rising Waters: Global warming and the fate of the Pacific Islands*; she had seen in class earlier in the year (Channel 4 International Ltd., 2000). This appeared to lead her to deeper meaning about what was happening and she reacted emotionally:

The increase of carbon dioxide emissions due to human activity such as the burning of fossil fuels (i.e. coal, oil, gas) for energy is harmful and causes damage to the environment (i.e. therefore affecting and disrupting ecosystems). This is because CO₂ is a greenhouse gas and contributes to the greenhouse effect where the greenhouse gases trap solar radiation therefore warming the earth which causes global warming and climate change. This saddens me as I know that my daily actions are causing this and other

ecosystems suffer the consequences as well (Ilisapesi, log book p 4).

Having made that connection between her actions and the consequences, Ilisapesi felt compelled to act:

This is a wake up call for me [to] be a responsible person. Also the sustainable changes I would strive towards in relation to this issue would help benefit my family especially in terms of economic aspects. By aiming to reduce my carbon footprint through actions such as limiting time spent showering, electrical appliances and even shopping less etc this can reduce electrical and water bills, therefore saving money and putting less pressure on my mother (a single Mum) (Ilisapesi, log book, p 4,).

For her log and final report Ilisapesi accessed reliable information from New Zealand sources e.g. the Crown Research Institute National Institute of Water and Air (NIWA), and the Ministry for the Environment. She also used overseas sources such as Woods Hole Oceanographic Institute, the Environmental Protection Agency in the United States and Griffiths University in Australia (Ilisapesi, log book, p 12-21).

She was able to make connections between her understanding of global warming and to locate herself and feel some responsibility as a Pacific Islander living in NZ:

As a Pacific Islander it is heartbreaking to see all the disasters that are occurring due to global warming and climate change in the Pacific Islands, such as Kiribati are now facing rising sea levels which have destroyed sea walls, where people now have to move to higher grounds; they have lost their homes ... along with their personal belongings. Other sad incidents are the graveyards which have been destroyed due to the rising sea levels. Also if sea levels continue to rise, Kiribati may eventually flood and disappear so its people would lose their

‘land’ which is a huge part of their culture (Ilisapesi, log book p 5).

Ilisapesi reported that she involved both her mother and her cousin in her efforts to reduce the household’s carbon footprint (Ilisapesi, journal entry 25th August 2009). She developed a comprehensive action plan that had nine out of twenty steps involving reduced use of electricity in some way (Ilisapesi, log book p23). The steps covered using energy efficient light bulbs (pictures of these in place, Ilisapesi, log book, p. 25/26), turning appliances off when not in use (pictures of appliances turned off, Ilisapesi, log book, p. 29), using appliances more effectively or for less time, using less hot water and heating. With this approach Ilisapesi’s family managed to drop their power bill from \$185 per month to \$148 by the end of the two month action, a difference of \$37, as evidenced by the power bills included in Ilisapesa’s log book (p 27, and p30). In addition, Ilisapesa encouraged the eating of less processed, fresher food, and more exercise, for instance walking to Church, and over the two months of the initial action her Mother lost 7 kg in weight.

Ilisapesa noted that the household members reminded each other to keep to the agreement they had made regarding her plan and while this required constant reminders initially, by the end it seemed to become more habitual. Some of these changes involved a lot of commitment as Ilisapesa, for instance, stated that she hated using public transport but reported resolutely using it now whenever she can. She included her bus tickets in her log book (Ilisapesi, p. 33.). Ilisapesa also noted that the household found it hard to give up long (15-30 minutes) hot showers, often several a day, but did so. She reports in her journal (Ilisapesi, Sunday 6th September p. 28) that the shower now has a ‘water saving showerhead’. In her journal, Ilisapesi also notes that spare clothing was put in a recycling bin by herself and her Aunt (Ilisapesi, Monday 14th September). From the 27th of August her journal records that her male cousin had even been persuaded to heat up his pizza in the microwave rather than the oven (Ilisapesi, p. 27).

In her journal (Ilisapesi, Tuesday 22nd September p. 30) Ilisapesi notes that her Mum's sister Emeline has decided to follow their lead and had started by obtaining a compost bin the previous Saturday. Ilisapesi reflects in this same journal entry that the household's shopping is very different now as they don't buy a lot of processed food any more and that previously her Mum and cousin had eaten a lot of processed food. She also records that they always take their reusable shopping bags with them. In her October 23rd journal entry Ilisapesi records that she and her cousin have been running (Ilisapesi, p. 32) and earlier she noted they had played basketball outside rather than watch TV or listen to music (Ilisapesi, journal entry Friday 11th September p. 28). Her 16th October journal entry (Ilisapesi, p. 31) records that while at Church the teenage boys in the congregation were littering the garden. Ilisapesi told them off and they picked it up, although she did get called 'ecofreak'. On the 25th October she notes in her journal with pleasure that there is hardly any littering at Church now (Ilisapesi, p. 32).

On the 20th October Ilisapesi records in her journal that her thinking has changed over the last few weeks and she now knows a lot more about sustainability (Ilisapesi, log book, p. 31). The following Monday in her journal she writes:

Although this is the ending date for my action plan ...it is really just the beginning –it has become a lifestyle choice (Ilisapesi, journal Monday 26th October p. 32).

In her report she wrote:

With having more knowledge on sustainability and the experiences of performing my action, my household and I have decided to carry on with these actions and perhaps add on more eco-friendly actions. It has become a lifestyle choice. ... I am now determined to live a greener lifestyle and I now more often think about the consequences before I act (Ilisapesi report p. 13).

When I spoke to her in the corridor six months later the household is still maintaining their action. Ilisapesi was in the developing or action competent groups for all but the experience aspect. Throughout her action she clearly demonstrated the other aspects.

This record (Ilisapesi, log book, journal) shows the day to day steps taken by an ordinary household as they change their lifestyle to one that is more sustainable. They make this change for two reasons. Firstly, to help the household save money and secondly, because reducing their carbon footprint is a small step to stopping their beloved Pacific Islands being affected by rising sea levels.

4.8.2 Sovaia

Sovaia is of Fijian and European descent. She is aware of environmental issues and shows an increasing passion in this area. In her report she writes:

I initially planned to complete this with a classmate as she had come up with the idea to revamp the bin system at [our school]. We knew from the beginning it was a huge task to take on. ...It proved to be too big and unachievable for us to complete in the time we had. ..I slightly changed the idea from revamping the whole bin system, to just encouraging the ...girls to start using the system we already have (Sovaia, report p. 1).

She found information on landfills and linked this to pollution prevention, waste and recycling. She made the point that recycling means less use of new resources. She then found how much rubbish went to landfill from Auckland (Sovaia, log book p12-16, p18), and linked this to the NZ Waste Strategy Plan she had also accessed (Sovaia, log book p 42-44). She went on to make links to United Nations material in her report and in her log book (Sovaia, report p2). She then went back to the local level with the regional *Waste Wise* programme (Sovaia, log book p 40/41) and linked it directly to our school environment and what we currently do with our waste (Sovaia, log book p29) to help her develop her presentation to the assembly (Sovaia, log book p45). She linked the increased use of landfills with the consumerist throwaway society we live in (Sovaia, report p2). In her planning and analysis she had completed a consequence wheel (Sovaia, log book p31), an action /consequence table (Sovaia, log book p21), a Gantt chart (actions, dates, comments) (Sovaia, log book p23), a set of criteria she would use

to evaluate her action (Sovaia, log book p26) and did a SWOT (strengths/weaknesses/opportunities/threats) analysis (Sovaia, log book p26/27).

Sovaia demonstrated that she has excellent research skills, that she can link information from a national to a regional and then local scale and then make links to western society. She was able to give a very clear set of connections that had been compiled from a number of different sources.

Sovaia was motivated to complete her action and her report for two reasons. The action assessment had been offered in two classes and Sovaia was in both. She had missed completing an action in the first class because of her time management skills. She was determined to complete an action the second time. Secondly, she has developed a passion for the environment. She demonstrated how important the environment is to her by making this comment:

My dad's side of the family is Fijian and still live in villages in rural Fiji where they are highly dependent on the land and its resources for survival. I want to ensure that they can continue to live their lives this way as it has a minimalist effect on the environment and is an awesome thing to witness by anyone (Sovaia, log book p10).

Secondly, by being part of the school's Envirogroup, and helping out with the Travel Wise programme at school. Her ability to reflect and to develop a vision for the future were linked:

The reason I chose to do this was that rather than just educate my family about recycling, I realized that I can educate a whole school (or half a school) [our school can only meet a half at a time as our hall is too small] to recycle at school and they can pass this knowledge on to their families. By doing this I can get my message out to more people, and rather than myself sorting through the recyclables, because that would have no real impact on the environment (Sovaia, report p1). ...Because I targeted a large group that all have separate families from all different areas around my city, my message can hopefully reach to many

different communities and create social awareness (Sovaia, report p3).

She wanted to work on litter in the school context. She put out labeled bins with posters to encourage use and took photos. At an assembly she then showed a power point on rubbish and landfill that she had developed. She followed this with another week of bins and posters again with photos taken at the end. She was able to show an improvement in the use of the bins over this time. She developed this action based on her experience as a senior student and using her considerable artistic skills.

I planned to go about this by creating visual aids to get through to students because I know that students usually do not respond well to speakers that just talk and tell them what they're doing wrong. I tried to take a more positive approach by not telling what they're doing wrong but how we can help to prevent any further damage than we already have. The most effective way I know to do this, I believe, was with visual aids. After I had decided this I created posters to promote recycling (Sovaia, log book p24/25). ...The slideshow I created was kept simple and direct so that the students did not have much to read as I explained each point a bit more in depth but not so much I lost their attention (Sovaia, log p25). I also used picture[s] in every slide to help students absorb the information because I think that it is easier for them to have a mental image to associate words with. ...The next action I took was to create signs and post them around and on recycling bins to remind students to put the right things in the right bins and to point out which are the right bins and how close they were [student made coloured signs orange/warm, red/hot, and green/5 metres with recycling logo]. (Sovaia, log book p 45).

These signs were clearly visible around the school in the week of 3-10 November 2009 (sighted by me). Sovaia's conclusion on her action was that while she had achieved a small short term increase in recycling, something much bigger would

be needed to effect the much larger change she was after. Sovaia identified during her evaluation that:

I have no way to really show the students what kinds of impacts their actions on recycling had on our environment or even our school. I would have liked to find statistics on how much waste our school produces per week and compare it to after my action, so that I could show the students how they have helped just by putting a piece of rubbish in the right bin (Sovaia, report p3).

What comes through with Sovaia is how entwined her action is with her connectedness and with her ability to reflect. This enabled her to be aware of possible future directions. Sovaia is aware of her Fijian connections but is able to think of the bigger picture as well. Apart from the Experience, aspect Sovaia was placed in either the Developing or the Action Competent group for all other aspects. This passion and commitment should hopefully follow through to Sovaia taking action on other projects. I think that Sovaia is better able to see that information alone is not enough now and that this needs to be taken into consideration in her future actions. From my personal experience Sovaia is a student that has had to learn a number of lessons by direct experience and this one about information is one of them.

4.8.3 Aroha

Aroha was one of only four Year 13 students in this mixed class. She was of mixed Maori and Pacific Island descent. She was a quiet, shy student who attended the class irregularly. She lacked self confidence and did not initially handle challenges posed in the class well, but she did attend the planting field trip and enjoyed it (Aroha, post unit questionnaire). For her action during the intervention, she decided to build a vegetable garden at home as a way of reducing her family's carbon footprint. She carried out a survey with each family member to get their written responses (Aroha, log book p3-8), which were positive to her idea. She believed it would reduce the family's carbon footprint by reducing the number of trips to the supermarket and reducing the distance that some of their

food had travelled. She had read about how London is trying to encourage people to put in gardens everywhere so they could have 2012 gardens by 2012 to help supply Londoners with fresh food during the Olympics. This research suggested using rooftops, canal banks, and old railway lines and she was inspired (article in log p. 25 and commented on in report p. 2). Her parents felt it was a great idea and fitted in well with traditional values from both Maori and Pacific sides of the family. Her Mum pointed out that it would be healthier as well (Mum's survey response, Aroha, log book p.7).

Aroha knew what she “wanted done and how I wanted it to happen” (Aroha, report p. 2). She chose a corner of the home section that got a lot of sunlight and one weekend the family got stuck in and put up a small barrier and dug some ground and added what Aroha described as “fertile compost soil” and provided photos showing dark fertile soil inside low brick wall, (Aroha, log book p 32/33). Deciding what vegetables to plant was easy as the family ate a lot of salads, so they chose tomatoes, lettuce, carrots and spring onions. Her father told her how to protect them using a 2L coke bottle with the bottom cut out. This sheltered the plants and acted as a small greenhouse, he told her (Aroha, log book, p. 32/33). Dad had done most of the digging and Mum helped with planting. Aroha took lots of photos of the different stages to provide proof of her action (Aroha, plan records intention to take photos log book, p11).

Aroha felt that her action held a lot of importance for her family culturally as Mum is part Maori and Dad is Polynesian (Aroha, report p. 31, also commented to me in class 18th September 2009). The family enjoyed being outside together and her Mum explained how by doing this they were getting closer to Papatuanuku (Earth Mother) and said “by planting seeds we are putting life into the ground and replenishing it with compost which was once alive, we are making new life, and becoming part of the cycle and keeping the cycle alive itself...” (Aroha, conversation with parents, written into log book p31). Her Dad believed doing this helped us get in contact with our roots “because growing up in today's world is so different from when I grew up, I think that making this garden together has helped us remember our roots and ancestry” (Aroha, conversation with parents written into log book p31).

Aroha related (Aroha, report p5) that her boyfriend was so impressed that he told his mother and she then decided to plan and put a garden in. Aroha hoped her boyfriend's Mum would tell her friends and that they might also try gardening at home (Aroha, report p5).

When it came time to print the photos that Aroha had taken of the gardening, she discovered that her younger sister had wiped them when she had taken the camera to a friend's place. Aroha was very upset. In a conversation that I had with her subsequently in class (Aroha, informal discussion, 6th November 2009), it became apparent that the younger sister was much more outgoing and got away with a lot at home and Aroha was reluctant to challenge her over anything. I suggested that she talk to her parents about the situation rather than give up. She did so and was elated the next school day to say that the situation had been dealt with at home in a way she had never thought possible. More photos, taken by flashlight and accompanied by a letter from her father were handed in with her report and in her log.

This story illustrates how a student who had a positive attitude, but not a lot of confidence, followed through the process from class and was able to complete an action. Initially she attended the class planting trip and enjoyed it. This helped her to develop a positive attitude. Aroha did not document the work on culture from class but did include in her log book views from her parents, one of whom is Maori and the other Pasifika. She had good research skills and found the article that inspired her which was on Londoners preparing to supply themselves with fresh food during the Olympics, and another article on how Michelle Obama was going to grow vegetables for the White House. U.S. President Obama had just been elected and the class was very interested in the move to the White House. This came up in class as something they were following in their own time. Aroha then found detailed information on making a garden and growing vegetables and was later able to reflect on the links between growing vegetables on local and city scales and how this helped the environment. This demonstrated she could find appropriate knowledge of a range of types and analyse it, use it and reflect on it. While working on the garden she and her parents talked about how this linked in with how they were brought up and how what they were doing linked to specific

cultural values. This is actually a very cultural approach, discussing the values and importance of something while actually doing it. These discussions enabled Aroha to make connections and helped her to finish her action. While Aroha did not write much about her vision of sustainability, she did write specifically on how this was helping her family and so could be seen as a small local vision. The other important step for Aroha was being prepared to talk with her parents about the missing photos. The positive outcome not only enabled her to finish her assignment on her action and so gain credits, but also helped in her family relationships (personal communication to me, 18th November 2009).

The overall outcome for this student is she developed certain skills and become more aware of who she is and what she can do. She has moved towards becoming more action competent in sustainability in her life.

4.8.4 Lesieli

Lesieli is of Tongan descent and lives with her family in the west of the city. For her action during the intervention, she decided to work with her family to reduce electricity bills and to try out a few other activities as well. Lesieli related (Lesieli, report p4) that she started by contacting the local council who had Advisors who visit households and talk to them about becoming more sustainable. The Advisor visited the family three times and all 14 household members attended each session (report p 4, First session 11th September 2009). At the end of this time they agreed they had never realised that such simple actions could save so much money and save the Earth, so they set some group targets and decided to carry them out for forty days (Lesieli, report p4).

At home a large hand-printed plan was made and stuck to the fridge. In the plan (log book p11-13), it was decided that the children would all take homemade lunches to school instead of buying them from the shop (picture of sandwich making, Lesieli, report, p. 5) They changed as many incandescent light bulbs to energy-saving lights as they could afford to (Lesieli, picture in report p5). They

made a rule that for the next forty days they would not turn lights on if it could be avoided and when they did have a light on, all those reading in the evening shared the room as no TV was now allowed after 5pm. Others played board games or did homework. Along with the no TV rule there was a no stereo rule in evenings and all appliances were turned off at the wall to avoid standby power usage (Lesieli, journal 13th September – 18th October).

In the plan (Lesieli, log book p11-13, commented on in Journal p 19/20), in the kitchen the lunch making (Lesieli, report p6) was joined by 'all dishes to be washed by hand' so the dish washer was turned off at the wall and Lesieli and her Mum washed them by hand (Lesieli, Journal 13th October). This was not enough though and so the dryer was turned off as well and all the wet clothes were put on the outside clothes line. In addition, Lesieli made a huge sacrifice and surrendered her hair straightener, so her beautiful long hair was full of curls (Lesieli, Journal 25th September -18th October). Later, for a week, she surrendered her phone and asked her Mum to hide it (Lesieli, Journal 7-10th October). In addition, hairsprays and perfumes were put away as well, as it was felt they might contain CFCs (Lesieli, Journal 27th September to 18th October).

In the plan, there were activities planned for weekends as well. The car and van were moved onto the front lawn for their 6 monthly wash to avoid any detergent going into the storm water drains on the road (Lesieli, Journal 19th September, report p6). These vehicles were getting less use as her brothers were walking the little children to school each day and collecting them and walking them home as well. Lesieli was trying to use public transport but in the middle of this time a bus strike happened, so she jumped in the van with her cousins and got dropped off with them in town and walked to school (Lesieli, Journal 9-11th October 2009).

Lesieli reported (Lesieli, Journal 15th September -18th October) that the family was making excellent progress, even in the area of hot showers. There was now a timer on the wall and if you went over five minutes you lost half your dinner and if you were in there as long as ten minutes you missed dinner altogether, and everyone was working together on this. Mum and Dad even took the rather long walk to the weekend market and back. Spot checks on appliances showed they

were all turned off at the wall. Lesieli and her Mum had even bought locally-grown meat and fruit and Dad double-sided a report he had to print for work. The family was really looking forward to seeing how much money they had saved on their power bill, but fate had other plans.

Lesieli's Grandfather died and the funeral was held in the family home. Tongan funerals last at least a week and this one included quite a lot of family who flew in for the funeral (Lesieli, log book p21). Lesieli continued as best she could with her personal cost saving measures but it was difficult with so many extra family members staying. Additionally, Tongan funerals require that lights be left on all night so that the body is not in the dark (Lesieli, log book p21 and mentioned again in report p6).

Lesieli was not deterred, however, and took the opportunity to remind everyone to turn off lights elsewhere in the house and to ensure that all stereos were turned off at the wall, as no music may be played during the week of a funeral (Lesieli, report p6). She then came up with her last strategy. She sat her extended family down (Lesieli, log p21) and told them all about global warming and its consequences. She wanted to "energise my extended family on thinking and implementing some simple actions toward sustainability ...and taking action now for a new and healthier environment" (Lesieli, report p6).

Lesieli researched and wrote about global warming and climate change. She made links to recent extreme weather events (newspaper cuttings in log book p15-17). She then made links from the actions decided by the family to the outcomes and the reasons behind them (Lesieli, log book p13). Her reflection on what she had found revolved around the importance of land and how if that was being eroded, then culture would be eroded as well (Lesieli, report p3):

Culturally people whose lives are being affected by the natural disasters lose homes and family members which are things and people who've told them about their culture and who've taught them culturally based lifestyles. ...This loss of land relates to a lot of cultural values and therefore if they're being wiped out cultures will slowly change too.

For Lesieli her culture is as much part of her as breathing is, it is who she is. Her vision was for her family and she showed considerable initiative and courage in speaking to her extended family about sustainability. Her log, journal and report showed how even a large family can move towards being more sustainable if they all work together. Her commitment and her skill at making links meant that for all aspects apart from Experience she was either in Developing or Action competent. While some of her actions might not be sustainable in the long-term, others could be. If this student had not been able to work with her family and to choose a culturally relevant path, then it is unlikely she would have made so much progress. Lesieli and her family have moved some way toward becoming sustainable and Lesieli might well be able to lead them further.

4.8.5 Mereoni

Mereoni is of Fijian descent and lives with her parents and sibling in a southern suburb. She is able to describe global warming and its causes and consequences and to make the link to climate change, and from there she clearly identified climate change as damaging the Pacific Islands. She included melting ice caps and expansion of water as contributing factors to sea level rise (report p18). This clear sequence is typical of Mereoni's logical way of laying out what she understood and what she decided to do about it.

She decided to reduce her family's carbon footprint because she felt that carbon dioxide has a direct link to climate change and reducing carbon emissions is one way to tackle it (Mereoni, report p19). Her research included evidence from a number of businesses that had reduced their carbon footprint (Mereoni, log book attached to p13). She had also found research to indicate the energy usage of common household appliances.

Her plan was included in her journal entries. She had discovered the family home had insulation in the ceiling and it had carpet in all the rooms. Despite this the family felt the cold and had been using fan heaters in the winter. They stopped

using the fan heater and started using three oil filled heaters. Mereoni comments in her journal (p14)

They're easy to move around the place and they warm up the house just as fast as any other heater. However, the problem is the time limit of using these heaters because they still run on electricity. So because we have three, I've got the family to just use the heater where it needs to be used. This saves energy. ...We used to have the heaters running all night! This wasted a lot of energy because you get warm within a few minutes and the heat that is then given off the heater after you are warm is unwanted. So instead ... we've simply put more blankets in the bedrooms.

As well the family started drawing long curtains before the sun went down and using door stoppers (Journal p14). Then Mereoni moved onto compost. She didn't 'have a clue' and so she and her father went and bought a compost bin (Mereoni, log book, p. 9). Then she looked at transport. Both parents work and the two girls go to school. Dad works night shifts. She realised there was not much that could be done to improve their current system:

...Our daily routines go as follows: Dad goes to work at 2 am, so there is no other way for him to go to work other than in the car. Mum, my sister and I all go to school and work in the other car. Because Dad picks up my sister from school he waits in the city till she is finished instead of going home then back into the city [the family live about 20km from the city centre]. This saves money on fuel and also the environment because carbon dioxide doesn't get let out by a parked car! Also I go home with Mum or I'll take public transport home at the end of the day (Mereoni, Journal p15).

Mereoni then tackled recycling. Her Mum said they can reuse paper, so she set up a place to do this in the garage, along with cardboard. Then she decided to tackle electricity usage in general. She asked her family to start turning appliances off at the wall and her father went and bought energy efficient light bulbs. They

replaced 24 of the 34 light bulbs in the house and garage (receipt for bulbs and photos, log book, p. 9). Mereoni calculated how much energy the family would be saving and got excited (Journal p15). She then moved onto water conservation. The family spends almost three hours in the shower daily, with Mereoni admitting to being the main culprit. Some rules were set after she found out that our country uses fossil fuels to make some of our electricity. The rule became 10 minutes maximum in the shower, and although she realised this is still too long, she did not think the family could go any lower without practise first. A shower timer has been attached to the wall and it does time 4 minutes exactly (Mereoni, Journal p16). Other rules included turning shower off while shampooing your hair, buying shower gel instead of soap and no brushing your teeth in the shower. Next Mereoni moved onto washing clothes. She has made the loads bigger, so there are fewer per week (Mereoni, Journal p16). Then it was the dishes. The family does not have a dish washer and the family all wash their own dishes but now the water is saved for the next person (Mereoni, Journal p 16).

Mereoni mentioned that electricity bills have decreased but does not include any evidence of this (Mereoni, journal p20 report p21). In her evaluation she mentions that changing the little behaviours was hard and sometimes people would forget. She also found it hard to keep implementing things over a number of weeks. In her evaluation (Mereoni, report p21), she discusses how they were only one family:

My action was effective mostly environmentally and economically. However, environmentally it may have been a bit less effective because we are only one family and the change we make may not make the difference, but it has to start somewhere! Our familywill hopefully encourage other families to do so too if we tell them about the purpose of our change and the results!

Mereoni has a logical approach and shows a commitment to finish. Her conclusion to her report showed that she had indeed made all the connections and was moving towards becoming action competent (Mereoni, evaluation p22):

This assignment and having the opportunity to research and take action has:

definitely changed my understanding and attitude towards taking action. The lessons the class had to take to prepare ourselves definitely helped too, because it made me understand that although you may be but one person making change, it only takes one person to at least start the change, because it has to start somewhere. I was inspired hearing of the Greenpeace activist who stayed up a tree for over a year just to not get it cut down! She showed determination, courage and most of all she risked her own life to get her point out to the world! It made me question myself also, what am I doing to help the earth environmentally? Although I may not be as extreme as her, I think that what I start can encourage others to do so as well. In relation to global warming, it has also changed my perspective on things because I did not realise that changing your lifestyle could work towards a sustainable future. I chose my action because it related to the pacific islands, and researching about the effects of global warming took me back a bit because I realised how important and how necessary change is! I saw that at the hands of global warming and climate change caused mostly by the larger, industrialized countries, the pacific islands suffered the most consequences, and with it, traditional values and cultures is being lost too. It definitely inspired me to make change, and hopefully through the more practise of the actions that I take (regardless of the fact that the assignment is over) other families, my extended family, and friends can be inspired to do the same.

Mereoni was put in the Awareness category for Experience, and the Emerging category for Reflection and Visioning aspects. Her attention to detail and her systematic approach meant that she made clear connections and linked what she had researched with what she was doing and the expected outcomes were. Her action was able to determine where the family was already doing the best they could, for instance in transport and where they could improve. This she divided into achievable steps and then carried out each step. This meant that she was put

into the Developing category for Action, Knowledge and Connectedness. Given the methodical nature of her report and the progress she made then more experience with further situations would move her further towards action competence.

4.9 Chapter summary

From the six aspects used in this unit, there are some key points. Experience together as a class was important to help build some understanding of what might be involved in action. Previous experience did not appear to determine whether a subsequent action would be successful. Knowledge and reflection however, do seem to be related to success. Those with better skills at finding relevant information and reflecting on what they found were much more likely to complete an action.

Visioning is an area that could do with more work. It was poorly done but the reason for this was unclear. More support and more practise in class should be provided as a first step.

The more insightful students made more connections and put more detail into them. Another outcome was that some students showed real commitment to using a systematic approach and this also meant they made more connections. Both of these showed that students who were good at them were more likely to complete an action successfully. Students with a positive attitude or who chose an action that was important to them were also more likely to complete their action.

Chapter 5 Discussion, Conclusions and Implications

5.1 Overview

This chapter focuses on the main findings from my research. The first part of the discussion is about my conclusions and what the literature has to say. I address all aspects of action competence in the first part and then look at action competence as a whole. I then look at responses to my research questions. Finally, I consider implications and recommendations for future research.

5.2 Discussion of findings

5.2.1 Experience

The EfS literature refers to the value of environment or sustainability-related experience in two ways. The first way is through working on an issue, researching it, making connections, working with others to find a solution and taking action to change, in other words the same way the Danish researchers use the word (Jensen & Schnack, 1997).

Secondly, there are those who believe that exposure to the natural environment is important for students to develop an emotional attachment to it (Sandell & Ohman, 2010). Many current environmentalists cite this as an important facet of their backgrounds that led them to their current work. This exposure can happen through a range of possibilities, for example, childhood or teenage experiences, sport and travel (Chawla, 1998). One New Zealand example of sport having this effect is Sir Peter Blake (Sir Peter Blake Trust, 2011). Chawla (1998) went on to note that it is likely no *one* experience produces an environmentally active person. This opens up the possibility of a range of experiences coming together to produce this change.

The students in the course were city reared. To provide them with a common experience and to give them some idea of what was possible they were taken out into a forest reserve on three different occasions. Firstly, to see what unprotected areas were like for damage by introduced species, secondly, to an area of protected forest and thirdly, to help replant another area. In the first two instance students were following trap lines, but were not on an actual track. They followed little bits of pink tape attached to trees and went cross country through relatively dense undergrowth to check for rats and mice and retrieve trakka pads. These experiences within the course prior to starting their action do appear to have had an influence on their thinking and their understanding. These “Ark in the Park” trips were often referred back to by students in their log books and in the questionnaire. This indicates their importance to them. These experiences were provided to enable city-reared students to make contact with a New Zealand forest that is right on their doorstep. The literature claims that such experiences can start students towards becoming environmentally active (Sandell & Ohman, 2010) and that becoming environmentally active is made up of many small steps (Chawla, 1998).

The other intention of these experiences was to challenge the students personally in terms of what was expected of them on the trips and for them to meet the Rangers whose work is to protect the forest and to educate Aucklanders about it. The intended result was to challenge students emotionally as well as to challenge their thinking, so that they were better prepared to take action later in the year. From the comments in the students’ logs and journals this was achieved for many students. The ability to reflect on their experience and link to their feelings was important to this finding as it was made during my intervention and just prior to students starting their action.

The impact of prior experience on action-taking seems mixed. If students have had very little experience in a natural environment then I think that providing a common experience enables them to have something to discuss, and to reflect on. Jensen and Schnack (1997) mention that shared experience is important. They are referring to taking action together but it still works in the context I used it in as well.

Some students had taken more action for sustainability prior to the intervention but this seemed to give them an exaggerated idea of what they could accomplish or maybe they were trying to prove themselves. In both cases Reka and Mandy did not complete their action, although Reka came closer than Mandy. Their other commitments interfered.

More development of action competence was seen in those students whose attitude to taking action on a particular environmental/sustainability-related issue was positive, rather than being related to the amount of environmental/sustainability-related experiences they had had. What motivated them was the desire to improve their family's situation at home. This motivated quite a few students. There may be several aspects to this. Firstly, as many of the class were of Maori or Pasifika backgrounds their families are very important to them. The family or whanau is their centre and to be able to really help is a big step forward, and if it links to helping solve other issues then it is a win-win situation. It would be interesting to see if these students having carried out a successful action would be able to go on and carry out another and so on. This is the situation that Jensen and Schnack see experience fulfilling in their seminal paper (Jensen & Schnack, 1997).

5.2.2 Knowledge

Knowledge is often seen as the accumulation of facts or factual material, as if the bigger the store of facts the better. It is not the accumulation of facts that is important for students but the selection of relevant information to fulfill a number of different jobs. Jensen discusses four types of information that students need; causes, effects, vision for change, and change strategies (Jensen, 2008). This information will change for each issue so must be found afresh each time. This also fits in with learning as a process not a destination and experiential learning (Kolb, 1984).

Finding information is a relatively straight-forward skill to teach. Students that did not have this skill early in the year developed it if they were prepared to practise using the model provided. The aspect that students found harder is

realising what is appropriate information, whether their sources are reliable and how to connect it to what they are doing. Students were able to find a lot of help for setting up gardens, carbon footprints and recycling, the most common activities. If they continued and were working on other issues, then their selection skills would become more critical.

Continued practise in this area would improve these skills further. Research skills are the ones most likely to overlap with other subjects as well. Research in schools is usually to answer a question rather than to relate the information found to oneself. It is this reflection step that makes the difference in education for sustainability.

Those students who made links to themselves in some way developed the most. This provided the desire and commitment that Jensen and Schnack say is needed to move towards action competence (Jensen & Schnack, 1997). Some students had better linking skills at the start but it was those who followed a trail of information who found the most relevant research for their action. This persistence is something that needs to come from the student. Mereoni and Sovaia showed the most skills in this area.

Explicit teaching of the four areas listed by Jensen (2008) could be one way forward if students are already able to find and select relevant information and then comment on its bias and reliability. That was not done as part of this intervention as students were still learning the first steps.

5.2.3 Reflection

Kolb (1984) identified reflection as important as did Mogensen and Schnack (2010) when they discuss the critical process as being reflection and inquiry. Critical thinking requires reflection to understand what is going on in a particular situation and to ask questions to make clear underlying decisions (Breiting & Mogensen, 1999; Jensen & Schnack, 1997; Mogensen, 1997). Identification of this as a separate aspect is important in the New Zealand model of action competence. The New Zealand Curriculum (2007) mentions reflection in its

Principles under “Learning to Learn” and again in the Key Competencies under Thinking. Due to these reasons, this aspect was a key focus of the intervention.

This skill then is important to students making sense of their research and of their experiences in order to understand themselves further, and for them to identify what are the next steps they need to take to complete an action or plan further actions.

Reflection is definitely a skill that takes time to develop. Actually thinking about the process of learning allowed the students to admit values and beliefs, whether what they think now is the same as it was last month or last year, and these are new concepts to many students. The fact that people change their minds can be a new idea. The journal entries were able to help students to see the changes in their thinking and feeling. Ilisapesi was even able to admit she now really understood about pests in NZ forests. Having made one change she went on to make others based on her change in thinking as evidenced in her journal.

Enabling students to reflect on how their thinking has changed on other issues for example from when they were quite young till their current age might be a useful way to direct teaching to help develop this skill. Reflection is also linked to visioning.

5.2.4 Vision of a Sustainable Future

Visioning is a particularly difficult skill in any situation but a necessary one if any change to ‘business as usual’ is to happen. Critical theory is useful here as it discusses how the inability to imagine a different future is part of the colonisation of mind that occurs when a group is oppressed (Bishop & Glynn, 1999; Cohen et al., 2007; Friere, 1972; Schnack, 2000). Part of applying critical theory revolves around an individual or group being able to see how they are oppressed in order to develop a path out of oppression (Bishop & Glynn, 1999; Cohen et al., 2007; Jensen, 2004; Mogensen, 1997). Various authors note how what we do is always embedded in social, cultural and historical contexts. Part of my vision for a

sustainable future was to design an intervention that broke with standard practice in New Zealand secondary schools.

I did this by deliberately making the students' cultures and identities central to where we started, by allowing them to have a say in how the class progressed and in encouraging and supporting them to take action for sustainability.

The pathway to a sustainable future may be hidden from teenage students in New Zealand as they are often embedded in a commercialised culture, and while they may be from a different culture to the mainstream New Zealand culture, they do not necessarily easily see how living in a relatively large city can be any different from what they are experiencing. With help that can change. In this study, students made considerable progress in this area. It is likely that with more practice they might have made even more. Students who successfully completed their actions were able to see how they had made changes to their lives. Several families committed to continuing with these changes for instance the families of Aroha, Farrah, Telisa, Mereoni, Lesieli and Ilisapesi. This means they can now see that something different is possible. Once one step has been made others can follow especially if students continue to reflect on what they think and believe.

It could be argued that the students' ability to plan and complete an action with a group is in fact the start of their being able to develop a detailed personal vision of the future. Perhaps for some of those for whom the action was impossible to conceive of and complete, the difficult step was imagining an action they could carry out. If this is the case then not only more practice is needed, but also what Mogensen describes as a "language of possibility" (1997), students need to believe they can make a difference. Seeing others complete a successful action might go some way to starting this belief.

5.2.5 Connectedness

The ability to make connections is related to reflection and to knowledge and to the 'hearts' aspect of environmental education. Without these working together, meaningful connections are unlikely to be made. Students relate best to real

situations that have meaning for them. Part of this implies an emotional connection (Aikenhead, 2001; Bishop & Glynn, 1999; Cumming, 2009; Leopold, 1949).

At the start of the intervention, most students were poor at making connections, but by the end of it they were much better. Students were able to include details of the connections and make more links in the chain for example they might link using a car with releasing greenhouse gases, greenhouse gases cause global warming which causes climate change which cause sea levels to rise. Another type of example could be that students having found that their culture used to look after the environment can identify with that and now identify that today the way society is wasting resources and polluting the environment is because we live in a consumerist society and that they do not want to be as involved in that anymore. Reka is quite clear about these connections for instance she refuses to get her driver's license and either catches public transport or a lift with someone else. Mereoni and Sovaia were able to provide a series of links with the extent and detail they had in their research. For example, Sovaia values the environment and now sees littering as a form of abuse.

Students are often taught as part of the hidden curriculum that knowledge is unemotional, but passion and knowledge have often gone together. The activities and tasks involving culture were significant in enabling students to start to see the relationships that are important; individually, for their family and for their culture. Acknowledging these relationships allows students to own and use them (Bishop & Glynn, 1999). In addition, it sends a message that not only is social justice being talked about as part of education for sustainability but it is also being done in class.

The more action students take the more connections they make. This is what Jensen and Schnack (1997) refer to at the end of their paper where they state that:

Actions and experiences are closely linked. Experiences are formed in continuation of actions and actions are performed among other things on the basis of previous experiences. Action competence will thus probably be closely linked to a person's

structured world of experience (Jensen & Schnack, 2006, p. 485).

Without reflection and connectedness, this action experience cycle is less likely to move an individual towards action competence. Their use of the term experience then is different to how it has been used in the New Zealand context, where it is referring to just an experience or to participating in someone else's action, not one students have initiated. Once students had done one or two actions then they might be ready to tackle one as a class. This would require a lot of negotiated decisions and might take some time.

5.2.6 Action

Action taking with its criteria of being student initiated, and focused on solving a particular problem, can be daunting for students but it is a challenge that they get a lot out of. It can empower them; benefit the group who acts as well as helping to solve the identified problem. For three students to state after their action that it had now become a lifestyle change was significant in that it meant empowerment had occurred. Other students' families were also likely to continue their actions. Jensen and Schnack (1997) indicate that action should be taken as part of a group so that its educational significance is easier to identify. While they state that a class can take action together, and indeed they often do so in New Zealand in the Enviroschools programme, this is not always possible. My students demonstrated that it can be just as powerful to take action with your family, and if you have Maori or Pasifika background, this might be even more significant than taking action with a group.

The number of students who completed an action that had a profound effect on them and their family shows that the unit did produce change in some of the students. The question becomes how long lasting is that change. That will depend on all sorts of factors. If in fact the family benefited from the action, then this feedback may mean it is more likely to be continued.

If a year-long course in EfS was planned then it would be possible to get students to take action several times. Initially taking a personal action and being able to

explain it and reflect on it would be a good start. Then an action with family and /or friends such as my students took. Lastly getting students to take action as a group would be very powerful. This approach would certainly provide the repetition that Jensen and Schnack seem to be looking for (Jensen & Schnack, 2006).

5.3 Limitations

This research was carried out with one class of fifteen students who completed the course. In addition it was the first time the course had been taught using this approach. To confirm or modify the findings the approach should be repeated with more students.

5.4 Response to the Research Questions

To reiterate, my research questions were:

Can aspects of action competence be developed through delivery of a unit in Education for Sustainability in a New Zealand context?

Do the personal and cultural values/beliefs of students influence their action-taking in this unit?

Responses to these questions are now presented.

5.4.1 Student development of Action Competence

This is really an ideal to be continually worked towards (Mogensen & Schnack, 2010). The most that can be said of someone is that they are action competent in certain situations. This does not mean that someone cannot work towards action competence. Working towards it means making significant progress in the key aspects. Rather than seeing a sustainable future as requiring one or a few big changes, it is perhaps easier to see it as requiring lots of smaller ones. If each step is achievable, then the goal is more likely to be reached. Consequently individuals or groups may end up taking action on a similar issue many times.

Students then can be viewed as developing action competence in their chosen action areas. On the basis of the work directed by the intervention, more than half

of the participants were placed in the emerging, developing or action competent categories in five out of six aspects, experience being the exception. This indicates that these aspects of action competence can be developed by delivering a unit in Education for Sustainability in a New Zealand context. It is possible that because these students had almost no prior experiences either in the environment or taking action that this is why this aspect was an exception. This could be an area for further research.

5.4.2 Role of Culture in action-taking

Culture is part of identity. If students do not know who they are, then they are not going to be able to relate to anything else with consistency. They need a place to stand and to feel sure that this is where they belong. This is just one aspect that knowing their culture gives them (Bishop & Glynn, 1999). A number of researchers from overseas support this position (Agyeman, 2002, 2003; Aikenhead, 2001; Aikenhead & Jegede, 1999; Beckford, Jacobs, Williams, & Nahdee, 2010; Dillon, Kelsey, & Duque-Aristzabal, 1999; James, 2003). From a learning theory perspective, Vygotsky also saw culture as important (Cole & Gajdamaschko, 2007). This is because culture provides the lenses through which we see the world. Therefore it will also provide the words to describe, and the conceptual framework within which we will fit, any new understandings.

Students referred to their culture under a number of different aspects; reflection, visioning, action, and most of all connectedness. In my conversations with them they often spoke about their culture, even if they did not write about it specifically. It is significant that when students were making their peg dolls they made them to very clearly indicate their culture.

Those students who completed their action were those for whom culture was important. I do think that because students could be themselves and acknowledge their culture safely that they had more ownership of the process. The choice of working with their families is an indication of cultural influence, especially as five students chose to work with an extended family group covering a number of

households. These students were all of Pasifika backgrounds. This indicates an underlying relationship that is often not allowed for in secondary schools.

5.5 Researcher's Personal Response

This research has had a profound effect on me personally. It has confirmed for me the importance of establishing good working relationships with my students. The action competent approach is an important one for both teachers and students and I believe I moved closer to action competence as did my students. It is a way to make education real and relevant again. The element of culture is important as it is part of all of us. Ignoring it only makes it more important in that it is not dealt with. Acknowledging it means that it becomes a positive part of the relationships and makes the interactions deeper and more meaningful.

5.6 Implications and Recommendations

Overall the New Zealand Framework for action competence (Eames et al., 2010b) works well. This framework provides a way to approach sustainability issues that is consistent and with depth. This is important when designing a unit or a longer course. Students and teachers need to be able to see how aspects fit together and that the overall approach will be more holistic than is usual in subjects. Having a set of aspects means that not only can they provide a framework for design but also for assessment. I see these aspects as relevant in both primary and secondary schools. While writing it struck me that the analogy of a rainbow could be useful. Each aspect / colour can stand on its own but together they are more than the sum of their parts and yet both together and apart they can provide totally new ways of looking at the world.

New Zealand needs its own approach and in secondary schools some rigour is needed to help provide standing and acceptance. By naming these aspects a well rounded approach is ensured rather than a one sided one. These aspects also relate well to those chosen in other countries. This should ensure the acceptance of the model at an international level.

What is missing from the New Zealand framework for action competence is culture. The addition of culture, either as another aspect or woven through the

other aspects, would mean that young people who are not of Pakeha background are more likely to feel included and valued. Their participation in education for sustainability is just as vital as that of young people of Pakeha background. In particular it is important that young Maori, the tangatawhenua (people of the land) feel valued in their own country, this is a justice issue. These factors will become increasingly important as the percentage of young people coming through New Zealand schools from Maori and Pasifika backgrounds increases.

How has the issue of culture been handled elsewhere? Culture can be seen as interwoven through all the other aspects as the UN sees it underlying social, environmental and economic in the DESD or it can be seen as a separate aspect. What will work best is unclear at the moment. The crucial point is that it has to be there. We are told to start with where our students are and our students are all embedded in their birth cultures. Perhaps it would be prudent to ask people from the Maori and Pasifika cultures where they see it fitting in. After all so far most of the research has been done by people who are white and western, and who could be seen as part of the problem.

The pedagogical approaches used in this intervention could just as easily be applied to other subjects. In fact they might well improve the interest level and success rate of young Maori and Pasifika students if used more widely. Any teacher who believes in justice should be introducing ways to make their subject more relevant and more accessible to these students and addressing issues of culture would be a good way to start.

This research could serve as a starting point for work in at least three different areas:

- Research into the approach used by Kura and/or Wharekura into EfS
- Further research into EfS in secondary schools to see what is found elsewhere.
- Comparison of the work in secondary schools with EfS and primary schools with *Enviroschools*.

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Appendix 1: Action for sustainability questionnaire

Please answer the following questions as honestly as you can. The answers you give will not be assessed and they will be anonymous, so I will not know what answers any individual has given. You do not have to answer all questions.

1. Answer the following questions by circling the one response you want.

a. Recycling is an important part of learning to live within the Earth's limits.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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b. I recycle all the time.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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c. My family does not recycle.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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d. I have not thought about my own values and attitudes towards a sustainable future.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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e. I understand the values that people of my culture have towards the environment.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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f. I have a clear idea of my own values.

I strongly Agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

g. I think living in the city makes it hard to understand environmental issues.

I strongly Agree	I agree	Neutral on this question	I disagree	I strongly disagree
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h. Any action I take for a sustainable future will not make any difference.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

i. I think taking action is important for a sustainable future.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

j. I think that taking action for a sustainable future should be led by the government.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

k. I think a small group of people can make a difference.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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l. I think all students should learn about sustainable futures in school.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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m. I feel unsure about taking action for a sustainable future.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

n. I have learnt very little in this course so far.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

o. I have enjoyed this course so far.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

p. I feel more strongly about environmental issues now than I did before taking this course.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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q. I think the most important thing about an action for a sustainable future is it should be fun.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

r. I think you need to understand an issue well before you take action on it.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

s. I find it hard to decide what action to take on a sustainability issue.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
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t. I think an action should address the cause, and not the symptoms, of a sustainability issue.

I strongly agree	I agree	Neutral on this question	I disagree	I strongly disagree
------------------	---------	--------------------------	------------	---------------------

2. Describe the four aspects of sustainability?

3. Explain how at least one aspect of sustainability relates to an environmental issue that you know of.

4. Do you think that some aspects of sustainability are more important than others?

Yes No (circle one)

4a. If yes, which ones are more important and why? (If No, go to Q5).

5. Which of the previous environmental experiences outside the classroom from earlier in the year in this class did you enjoy the most? Please name it. Why did you enjoy it?

6. Did your thinking change as a result of this experience?

Yes No (circle one)

6a. If yes, how did it change? (If No, go to Q7).

7. Have you ever carried out an environmental action before?

Yes No (circle one)

7a. If yes, what action and why did you take it? (If No, go to Q8).

7b. Are you aware of any impact that action had?

8. What might a sustainable future look like to you?

9. What values do you think are important for a sustainable future?

Thank you for your help in my study!

Appendix 2 Action Competence Unit

<p><u>Principles:</u> High expectations Treaty of Waitangi Cultural diversity Learning to learn Community engagement Coherence Future focus</p>	<p><u>Values:</u> Excellence Innovation, inquiry, & curiosity Diversity Equity Community & participation Ecological sustainability Integrity</p>
<p><u>Key Competencies</u> Thinking Relating to others Understanding language symbols & text Managing Self Participating & contributing</p>	<p><u>Action competence</u> Experience Knowledge Interdependence Reflection Actions Vision for a Sustainable Future</p>
<p><u>AGGS Literacy & I-Lit</u> (Info Literacy) DR PCC Ropata Defining Retrieving Processing Creating Communicating Reflection</p>	<p><u>Pedagogy</u> Creating a supportive learning environment Encouraging reflective thought and action Enhancing the relevance of new teaching Facilitating shared learning Making connections to prior learning and experience Providing sufficient opportunities to learn Teaching as inquiry</p>
<p>Theoretical basis: Teachers need to use a flexible and effective pedagogy that is: student centered, interactive, cooperative, experiential, scaffolded,</p>	

linked to prior experience of students and situated in real world contexts.

Teachers need to offer support and opportunities to students from different cultures as they locate themselves with respect to EfS concepts, and work in real life EfS contexts.

Teachers need to create an environment where students can explore their place in an urban world and the knowledge and experience they can share from their own cultures.

Students will learn when taught using authentic learning situations that require participation and an integrated and holistic approach.

Students need a diverse range of critical thinking skills to analyse the complex situations that emerge in real life EfS contexts.

Students need to be able to reflect on their own thinking and learning

Taking action is a key component of EfS as embodied in the concept of action competence.

EfS = Education for Sustainability

	Lesson Outline	Assessment link	Effective Pedagogy	Curriculum links
Week 3 Term 3 Lesson 1/2 SCEE EfS concepts	Goal: To revisit SCEE & develop an understanding of PIE. Making peg dolls to represent ourselves Look at SCEE outline we previously made. Use PIE to get a deeper understanding. Use physical models	Required for assessment	Linking to prior learning by using student made resource & students help make another model	Thinking
Week 3 Term 3 Lesson 3 Values Students start to identify own values	Goal: For students to agree on meanings for common values & to start thinking about which ones are important to them. List of values. Students work in self selected groups to agree on a meaning and to match with an example. Then groups share with class and agree meanings of words. In pairs students to write answers to provided questions.	For students to understand what is going on in their selected action context they need to be able to identify values	Creating a supportive learning environment by using self selected groups. Facilitating shared learning by collating class results Making connections to prior learning and experience as students have talked about school values in other subjects	Valuing cultural diversity by allowing students to work in small self selected groups. Participating and contributing by having students work in small groups so all have to participate.

<p>Week 3/4 Term 3 Lesson 4/5 Cultural Values Students identify their cultural values</p>	<p>Goal: To enable students to identify common cultural values for their culture and to identify any changes over time. Teacher will model this with story and identification of values relating to her Irish heritage. Students in groups of 3 or 4. Using the list that follows to guide them students identify their cultural values. What does your culture do? ie what does it value around key events and aspects of culture (list provided). Student groups to share with whole class. Collate ideas by pulling out common threads under headings such as birth, death, language etc. HW: Find out the origin stories for your culture.</p>	<p>For students to understand what is going on in their selected action they need to be able to identify cultural values that are different to their own.</p>	<p>Creating a supportive learning environment by working in small groups. Facilitating shared learning by working in small groups. Making connections to prior learning and experience by asking students for information they already know.</p>	<p>Valuing cultural diversity by asking students to share their values. Participating and contributing by working in small groups and then whole class.</p>
<p>Week 4 Term 3 Lesson 6/7 Cultural Values with respect to environment Link current cultural values with Earth</p>	<p>Goal: To identify how many indigenous cultures have values of respect for the land & for future generations. Creation stories/myths; what they tell us about the land and the planet. All myths contain truths as understood by the people who developed them. These truths are expressed in ways that would be easily understood and remembered in what were frequently societies without writing ie they</p>	<p>Origin stories: these help us to understand where some of our values have come from. They can also help us to identify our own values with respect to the planet</p>	<p>Creating a supportive learning environment by allowing students to work in groups if desired. Facilitating shared learning by using small whiteboards to collect stories. Making connections to prior learning and experience by asking students to recall</p>	<p>Valuing cultural diversity, including Maori, by asking students to share their important stories. Participating and contributing by asking students to all share something.</p>

	<p>passed information on orally. You may work in cultural groups if you wish. Include story of Papatuanuku and Ranginui. Ask about the creation stories from other cultures and get students to share.</p> <p>Pull out common threads of respect for land, land as ancestor and provider, looking after land for future generations</p> <p>Talk about the story of Gaia.</p>		<p>stories important to them.</p>	
<p>Week 4/5 Term 3 Lesson 8/9 Linking Values to the Future What students want</p>	<p>Goal: To identify values behind actions & for students to then use their values to look at a sustainable future.</p> <p>Start in small groups. Who makes most of the decisions in NZ society? Are their values the same as yours? How do you tell what their values are? By looking at their actions. Identify a range of actions by the powers that be and infer the values behind them. Can we rely/depend on them to make the changes we want? What changes do we want ---what sort of a future do you want to live in? Brainstorm on small whiteboards & then collate as class</p>	<p>Power and decision making need to be taken into account to fully analyse what is going on in a context</p>	<p>Creating a supportive learning environment by starting in small groups and then moving to whole class discussion.</p>	<p>Participating and contributing in small groups and class discussion. Thinking about the future & how the values we want might help create that future</p>

<p>Week 5 Term 3 Lesson 10/11 Identifying Power & Decision Making</p>	<p>Goal: To look at power, decision making & what societal influences might impact these decisions. Look at decision making and use the SCEE compasses we made for Ark in the Park. These can be used to identify where the power lay and who the decision makers were and how they reacted to the influences they were under. HW: bring your experience sheets tomorrow</p>		<p>Facilitating shared learning by working as a whole class on the SCEE compasses. Making connections to prior learning and experience by using the analysis we made with respect to Ark in the Park using SCEE compasses earlier in year.</p>	<p>Thinking about who actually does make decisions and how we feel about that.</p>
<p>Week 5/6 Term 3 Lesson 12/13 Analysing our Previous Experiences What did we feel & what makes an action</p>	<p>Goal: To use prior experiences to identify our feelings & to relate this to our thinking and how it changes. Our experiences so far this year have been: Watching climate change videos, Speakers on possums, Ark in the Park and history of Waitakere Ranges. Outside classroom experiences have been: Sharp's Bush, Cascade Kauri, Planting at Cascade Kauri. In small groups answer these questions and then report back. How do you feel about these experiences? Consider before, during and after. Which ones did you get the most out of and why? Which ones were really action?</p>	<p>To become action competent students need to be able to reflect on their personal feelings and experiences in a particular context.</p>	<p>Creating a supportive learning environment by starting in small groups. Facilitating shared learning by allowing students to share answers if they have gaps. Making connections to prior learning and experience by referring back to sheets completed earlier in year.</p>	<p>Participating and contributing by sharing in small groups. Thinking about whether actions were direct or indirect and whether what students did was organising or participating.</p>

	<p>Note an action can be indirect where it is aimed at educating people or direct when it is aimed at the root cause of the issue.</p> <p>What is the difference between participating and organising?</p>			
<p>Week 6 Term 3 Lesson 14/15 Reflection techniques Critical evaluation</p>	<p>Goal: To examine how our experiences and thinking can help us analyse our activities and develop actions for a sustainable future.</p> <p>Let's look at our experience sheets and in small groups answer the following questions.</p> <p>How did I feel about these experiences; before during and after? What happened and how did I feel about that? Looking back How do I feel about them now?</p> <p>What did I learn?</p> <p>Did I learn anything about myself?</p> <p>Did I learn anything about the forest?</p> <p>Would I recommend the experience to someone else and why?</p> <p>How did my team work?</p> <p>Did I learn anything about any aspects of sustainability?</p> <p>How has my thinking changed?</p> <p>As we become more experienced (ie have more experiences) our ideas change.</p> <p>Use of analogies & role play</p>	<p>Reflection is a skill that students need to practice explicitly. It is required for the assessment to get good grades.</p>	<p>Creating a supportive learning environment by using small groups.</p> <p>Facilitating shared learning by sharing our answers.</p> <p>Making connections to prior learning and experience by linking to shared class experiences earlier in year.</p>	<p>Participating and contributing in small groups and in class discussion.</p> <p>Thinking about the analogies provided.</p>

<p>Week 6/7 Term 3 Lesson 16/17 Choosing an action that is important to you Ensuring consistency & making decisions</p>	<p>Goal: To brainstorm some possible actions & look at how to choose between them. What actions come out of what we have learnt this year? Let's brain storm as many as possible. Do any of these options strike a chord with the type of world you want to live in? What about our personal and/or cultural values? Are some actions short term as opposed to long term? Are some actions much more involved than others? In choosing between actions we can use a decision making matrix.</p>	<p>Realising there are in fact a large number of possible actions will give students ideas when they come to the actual assessment.</p>	<p>Creating a supportive learning environment by using brainstorming to collect ideas. Facilitating shared learning by everyone being able to share the brainstorming Making connections to prior learning and experience by relating possible action back to what has been learnt this year.</p>	<p>Participating and contributing by asking everyone to contribute a possible action, accepting any action that falls within SCEE ie including cultural ones. Thinking by starting to categorise actions using the questions posed at the end.</p>
<p>Week 7 Term 3 Lesson 18/19 Assessment task</p>	<p>Goal: To go over assessment task & clarify any questions arising. Hand out assessment task. Go over what is required with students. They can write on the sheets. They can ask questions about what is meant. What are our ground rules for our weekly discussion groups? What questions do we want to ask each other in our weekly discussion times?</p>	<p>Actual task is given out.</p>	<p>Creating a supportive learning environment Facilitating shared learning Making connections to prior learning and experience</p>	<p>Participating and contributing with being able to ask questions. Thinking about how we want to run our support sessions.</p>

<p>From now on</p>	<p>To occur in long period. Discussion group involving whole class, using ground rules established in Lesson 9. Possible round of whole group with everyone saying something. Able to pose questions to be answered later by anyone in group. Able to discuss &/or reflect on what they have learnt so far. Teacher to facilitate. These occurred once a week</p>	<p>To enable students to take their responses to another level.</p>	<p>Creating a supportive learning environment by using student decided ground rules Facilitating shared learning by using a round to get started. Making connections to prior learning and experience by having anyone in group answer questions.</p>	<p>Community engagement & participation ie some will work with another group ie class, family, church. Managing self to actually make some progress each week. Reflection involved in participating in class discussion.</p>
	<p>One off lessons on areas students felt they needed help with, usually about one per week. Students then had 2 periods per week in class time to work on their actions.</p>			

Appendix 3: Achievement standards

3.1 Achievement Standard AS90810

Subject Reference	Education for Sustainability AS90810				
Title	Plan, implement and evaluate a personal action that will contribute towards a sustainable future				
Level	2	Credits	6	Assessment	Internal
Subfield	Science				
Domain	Environmental Sustainability				
Status	Registered	Status date	18 December 2007		
Planned review date	28 February 2009	Date version published	18 December 2007		

This achievement standard involves the planning, implementation and evaluation of a personal action (individual or group) that will contribute towards a sustainable future.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Plan, implement and evaluate a personal action that will contribute towards a sustainable future.	Plan in detail, implement and comprehensively evaluate a personal action that will contribute towards a sustainable future.	Plan in detail, implement and critically evaluate a personal action that will contribute towards a sustainable future.

Explanatory notes

- 1 This achievement standard is derived from the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999.
- 2 This achievement standard is based on Level 7 of the *New Zealand Curriculum Framework* including learning outcomes from the Science, Social Science, Health & Physical Education, The Arts, and Technology curriculum objectives.
- 3 *A sustainable future* requires the development of ways of thinking and acting to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability includes, but is not limited to:
 - maintenance of biodiversity, ecological processes and life support systems
- 4 an economy relative to its ecological life support system
- 5a fair distribution of resources and opportunities

6 looking beyond direct consequences of activities to explore attitudes, values and moral issues that create particular views on the use of natural resources
7 personal and social responsibility.

- 4 *Implement* means undertake the planned action as far as possible, and modify and adjust if necessary.
In detail means that evidence of the current situation is supplied that is sufficiently qualitative and/or quantitative to support the planned action.
Comprehensively means with depth and breadth.
Evaluate requires the student to:
- apply an aspect of sustainability during the discussion to make a judgement on the effectiveness of the action taken. It is expected that statistical analysis will be used where appropriate
 - identify their own personal response to the action and discuss whether it has changed their attitudes or behaviours in relation to an aspect of sustainability.
- Critically evaluate* means the student is required to identify and discuss strengths, weaknesses, opportunities and threats associated with the action and establish criteria on which to make a judgement.
- 5 The *personal action* may be conducted as a group or individual activity. Evidence of individual work must, however, be provided. This action may be an extension of action begun in previous years by the student or by another group/organisation. This is done with teacher guidance and involves the student in reflective practice.
- 6 An *environment* refers to a definable area such as a stream, estuary, bush, urban community, national park, business, home or farm. Students will be expected to visit the environment that they are taking action for and/or work with appropriate stakeholders. On site experiences are important in order for students to engage with an issue of sustainability.
- 7 *Action* towards a sustainable future incorporates the dimension of 'Education for the Environment' as outlined in the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999 p.14, and acknowledges the reciprocal relationship of people with the environment. It reflects the notion of taking responsibility for our choices and decisions and in particular exploring positive actions that lessen our impact on environments. Action taken for a sustainable future could be preventative, mitigating or remedial.
- 8 Each student should evaluate the action taken in terms of at least one aspect of sustainability – environmental, social, economic and cultural; and/or Māori concepts. The expression of the Māori concepts will vary between hapū and between iwi. It is expected that the local Māori community be consulted on how these concepts will be expressed.
- 9 An action-oriented approach typically follows that suggested in the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999 (p. 74); or modified versions such as those from the EnviroSchools Toolkit or Regional Council resources that can be accessed from http://www.tki.org.nz/r/environ_ed/.

Quality Assurance

- 1 Providers and Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against achievement standards.
- 2 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan (AMAP) reference 0226

3.2 Achievement Standard AS90828

Subject Reference	Education for Sustainability AS90828				
Title	Evaluate a planned personal action that contributes toward a sustainable future				
Level	3	Credits	6	Assessment	Internal
Subfield	Science				
Domain	Environmental Sustainability				
Status	Registered	Status date	12 January 2009		
Planned review date	28 February 2011	Date version published	12 January 2009		

This achievement standard involves the evaluation of both the planning and the effectiveness of personal action (individual or group) that contributes towards a sustainable future.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Evaluate a planned personal action that contributes toward a sustainable future.	Evaluate a comprehensive planned personal action that contributes toward a sustainable future.	Critically evaluate and justify a comprehensive planned personal action that contributes toward a sustainable future.

Explanatory Notes

This achievement standard is derived from the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999.

This achievement standard is derived from Level 8 of *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007, including learning outcomes from the Science, Social Sciences, Health and Physical Education, The Arts, and Technology learning areas achievement objectives.

A sustainable future requires the development of ways of thinking and acting to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability includes, but is not limited to:

- maintenance of biodiversity, ecological processes and life support systems
- an economy relative to its ecological life support system
- a fair distribution of resources and opportunities
- looking beyond direct consequences of activities to explore attitudes, values and moral issues that create particular views on the use of natural resources
- personal and social responsibility.

A planned personal action requires the student to:

- carry out research and/or a practical investigation to develop and inform a plan of action that will contribute to a sustainable future
- implement their plan.

Comprehensive requires the student to use evidence that is sufficiently qualitative and/or quantitative to explain the development of the plan. It must include a detailed time-frame and several steps of action based on evidence.

Evaluate requires the student to:

- apply aspects of sustainability to make a judgement on the effectiveness of the action based on evidence taken in relation to a sustainable future.
- Where data is collected there should be appropriate processing
- use reflective practice throughout the planning to make a judgement on the plan in effecting the action
- identify their own personal response to the action and discuss whether it has changed their attitudes or behaviours in relation to aspects of sustainability.

Critically evaluate means the student is required to discuss the plan and the action taken and establish criteria on which to make an informed judgement. Students will *justify* decisions by making judgments, considering implications, projecting future impacts, evaluating options, comparing and contrasting, analysing or suggesting alternatives and next actions for personal and social responsibility.

The *personal action* may be conducted as part of a small group or as an individual activity. Evidence of individual work must be provided for all stages. This action may be a significant development of action (eg action has greater impact on sustainability) begun in previous years by the student or by another group/organisation. This is done in consultation with the teacher and involves the student in ongoing evaluation and reflective practice which should be written up in a logbook or milestone reports, with justification of changes to action.

Action towards a sustainable future incorporates the dimension of 'Education for the Environment' as outlined in the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999, p.14, and acknowledges the reciprocal relationship of people with the environment. It reflects the notion of taking responsibility for our choices and decisions and in particular taking positive actions that contribute to a sustainable future. Action taken for a sustainable future could be preventative, mitigating or remedial.

Each student should evaluate the action taken in terms of aspects of sustainability – environmental, social, economic and cultural and the interdependence between them. Māori concepts relating to these aspects will vary between hapū and between iwi. It is expected that the local Māori community will be consulted on how these concepts will be articulated.

Quality Assurance

- 3 Providers and Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against achievement standards.
- 4 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan 0226
(AMAP) reference

Appendix 4 Internal assessments

4.1 Internal Assessment Task 90810

Subject Reference: **Education for Sustainability 2.1**

Achievement Standard: 90810 Credits: 6

Plan, implement and evaluate a personal action that will contribute towards a sustainable future

Student Instructions Sheet

By the end of this assignment you will be able to show that you can:

- plan action for the environment in relation to a chosen sustainability issue
- implement plan of action
- evaluate the plan of action in relation to a sustainable future

INSTRUCTIONS

Conditions: This assignment must be handed in by end Wk 2 in Term 4.

You may work individually or in groups of 2 or 3. Everyone must keep their own log book and do their own online journal. The final assignment must be written up individually and handed in.

TIME: In order to complete this assignment you will be allocated in-class time but you will be expected to complete much of it during homework time and in the holidays.

You are required to complete a learning journal of the investigation you have done leading up to the development & implementation of your action plan and while you are carrying it out. You will be given dates when it is expected you will conference with your teacher to discuss progress and the relationships you have established with the organisation involved with the issue you have chosen to focus on.

You will be expected to get your record book signed **three times** by your teacher; **after you have written your plan, at the end of Term 3, and at start of Term 4.** If you are working with an outside group or your family they must sign your log book at regular intervals as well.

You will be assessed on how well you:

- formulate a logical and detailed plan of action to address an identified sustainable issue
- decide on the criteria you will use to determine the effectiveness of your action plan ie
- critically evaluate your action plan
- implement your plan
- evaluate your action taken in relation to a sustainable future

Task 1: CHOOSING & DEFINING THE SUSTAINABILITY ISSUE

- Brainstorm a number of possible sustainability issues
- choose and justify your choice using your personal values, your culture and/or interests.
- Identify individuals or organizations that are involved with this issue.
- Investigate the issue using a variety of sources. Make contact with, or work with an individual or organisation and If possible visit the environment which is involved with the sustainability issue you have chosen in order to gain an understanding of the issue. This will enable you to write an action plan to redress some of the issues you found.
- Explain this issue in relation to at least one aspect of sustainability (environmental, social, economic and/or cultural)
- Discuss how your action will work towards a sustainable future .(you may use SCEE or PIE)

POSSIBLE TOPIC CHOICES:

- Preserving natural ecosystems
- Sustainable business practices
- Use of pesticides & herbicides in NZ
- Ecotourism
- Housing for a sustainable future
- dolphin conservation
- The 'footprint' of our school
- reduction of junk food

If you think of one that is not listed check with your teacher first to get the okay!

Task 2: ACTION FOR SUSTAINABILITY

1. **PLAN.** Prepare a detailed action plan to address the issue you have chosen.

(Note suitable examples can be found in *Environmental Education Guidelines for New Zealand schools*, *Enviroschools Kit*, *City Issues Auckland Regional Council*.)

In your action plan you will:

- a) Explain logically and clearly your purpose. You could present this as goals or objectives.
- b) Brainstorm a range of actions that could be taken and likely consequences.
- c) Outline the reasons for selecting the action you will implement (e.g. cost benefit analysis). Consider actions already being done by other interest groups or stakeholders before making your final decision on the action you will implement.
- d) Write an action plan, which should include;
 - a series of small actions
 - a suitable time frame with dates
 - an outline of who will carry out the actions
 - the relationship of the action to your overall purpose.
 - any modifications to plan with reason.

Milestone 1; Your action plan needs to be approved by your teacher before it is implemented ***last day to be checked is Friday of Week 7 Term 3.***

2. IMPLEMENTATION.

Implement your plan either as a group or individually. Keep a record of the activities you involved yourself in – this is to be written up in the learning journal or log and can be supplemented by photos, newspaper articles, video clips etc that illustrate your action(s). Describe any barriers that you faced and include any modifications to your action plan with the reasons why.

Milestone 2; Your teacher or suitable adult will sign your log book at regular intervals. Dates to show evidence of start of implementation. **End of Term 3**

Remember to keep a learning journal of your action process – enter your reflections daily. Questions you may ask yourself are ‘What did I do this week? How did I feel about my progress? What have I learned? What people did I meet with? What do I plan to do next? How has my thinking changed? How do I feel about what I am doing? How has the way others have reacted to me affected my thinking? How does all of this relate back to my stated sustainability goal? How am I staying motivated to finish this action? How am I feeling about doing further actions?’

Task 3. EVALUATION. This evaluation is in two parts. You are expected to complete both parts in full to gain merit or excellence.

- a) Establish criteria on which to make a judgement on the effectiveness of your action
 - Identify and discuss the strengths, weaknesses, opportunities and threats of your action

discuss what impact your action had on environmental/ social/ cultural OR economic sustainability (NB: This is not an evaluation of the implementation)
use statistical analysis where appropriate
Include any evidence or feedback to back up your successes
Apply an aspect of sustainability to make a judgement on the effectiveness of your action in contributing towards a sustainable future.

b) Describe your personal response to the action or initiative in terms of an aspect of sustainability. Discuss whether it has changed your understanding, attitudes or behaviour in relation to this issue? This is where you can refer back to your Learning Journal to see if your ideas or thinking changed throughout the action and if so why.

Task 4: REPORT Communicate relevant information about the plan, action taken and evaluation.

You are to present your report in a written format. It may have side headings, and could include relevant pictures, graphs, tables, diagrams. You should have started writing your report over the October break.

Support statistics, timelines, diaries, interview tapes and/or transcripts, artifacts, maps, visuals, OHTs, radio excerpts, photos, newspaper articles, video clips, music etc.)

Your report should include;

- Action chosen and the reason relating to sustainability.
- Detailed plan with evidence of implementation.
- Evaluation and how the action will support a more sustainable future

From the Standard

A sustainable future requires the development of ways of thinking and acting to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability includes, but is not limited to:
maintenance of biodiversity, ecological processes and life support systems
an economy relative to its ecological life support system
a fair distribution of resources and opportunities
looking beyond direct consequences of activities to explore attitudes, values and moral issues that create particular views on the use of natural resources
personal and social responsibility.

Implement means undertake the planned action as far as possible, and modify and adjust if necessary.

In detail means that evidence of the current situation is supplied that is sufficiently qualitative and/or quantitative to support the planned action.

Comprehensively means with depth and breadth.

Evaluate requires the student to:

- apply an aspect of sustainability during the discussion to make a judgement on the effectiveness of the action taken. It is expected that statistical analysis will be used where appropriate
- identify their own personal response to the action and discuss whether it has changed their attitudes or behaviours in relation to an aspect of sustainability.

Critically evaluate means the student is required to identify and discuss strengths, weaknesses, opportunities and threats associated with the action and establish criteria on which to make a judgement.

The ***personal action*** may be conducted as a group or individual activity. Evidence of individual work must, however, be provided. This action may be an extension of action begun in previous years by the student or by another group/organisation. This is done with teacher guidance and involves the student in reflective practice.

An ***environment*** refers to a definable area such as a stream, estuary, bush, urban community, national park, business, home or farm. Students will be expected to visit the environment that they are taking action for and/or work with appropriate stakeholders. On site experiences are important in order for students to engage with an issue of sustainability.

Action towards a sustainable future incorporates the dimension of 'Education for the

Environment' as outlined in the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999 p.14, and acknowledges the reciprocal relationship of people with the environment. It reflects the notion of taking responsibility for our choices and decisions and in particular exploring positive actions that lessen our impact on environments. Action taken for a sustainable future could be preventative, mitigating or remedial.

4.2 Internal Assessment Resource 90828

Subject Reference: **Education for Sustainability – Nga Kaupapa Taiao 3.1**

Achievement Standard: 90828 Credits: 6

Evaluate a planned personal action that contributes toward a sustainable future

Student Instructions Sheet

By the end of this assignment you will be able to show that you can:

- plan action that will contribute towards a sustainable future
- implement the plan of action
- evaluate the effectiveness of the plan and action in relation to a sustainable future
- identify a personal response to the action

INSTRUCTIONS

Conditions: This assignment must be handed in by end Wk 2 in Term 4.

You may work individually or in groups of 2 or 3. Everyone must keep their own log book and do their own online journal. The final assignment must be written up individually and handed in.

TIME: In order to complete this assignment you will be allocated in-class time but you will be expected to complete much of it during homework time and in the holidays.

You are required to complete a learning journal of the research you have done leading up to the development of your action plan and while you are carrying it out. You will be given dates when it is expected you will conference with your teacher to discuss progress and the relationships you have established during the research and/or investigation you undertake for this assessment.

You will be expected to get your log book signed by Ms Arthur after you have written your plan, at the end of Term 3, and at start of Term 4. **If you are working with an outside group or your family they must sign your log book at regular intervals as well.**

You will be assessed on how well you:

- formulate a logical plan of action to address an identified sustainability issue, based on evidence that you have gathered
- decide on the criteria you will use to determine the effectiveness of your action plan ie critically evaluate your action plan.
- implement your plan with modifications as required
- critically evaluate your action(s) taken in relation to a sustainable future

Task 1: CHOOSING & DEFINING THE SUSTAINABILITY ISSUE

Brainstorm a number of possible sustainability issues.

Choose and justify your choice using your personal values, your culture and/or interests.

Identify individuals or organizations that are involved with this issue

Investigate the issue using a variety of sources to collect evidence and/or data. You may need to make contact with, or work with an individual or organisation and If possible visit the environment which is involved with the sustainability issue you have chosen in order to gain an understanding so that you may write an action plan to redress some of the your findings.

Explain why this is an issue in relation to aspects of sustainability, (environmental, social, economic and cultural). These terms are defined below.

Discuss how your action will contribute towards a sustainable future (you may use SCEE or PIE).

POSSIBLE TOPIC CHOICES:

- Preserving natural ecosystems
- Sustainable business practices
- Use of pesticides & herbicides in NZ
- Ecotourism
- Housing for a sustainable future
- Dolphin conservation
- The 'carbon footprint' of our school
- The 'carbon footprint' of my family
- Reduction of junk food in a local school
- Maintaining our cultural heritage with the environment
- Use of Harakeke
- Helping my family to become more eco-friendly
- Getting a vege garden going at my local church

If you think of one that is not listed check with your teacher first to get the okay!

Task 2: ACTION FOR SUSTAINABILITY

PLAN. Prepare an action plan to address the issue you have chosen. (Note suitable examples and templates for action planning can be found in *Environmental Education Guidelines for New Zealand Schools*, *Enviroschools Kit*, *City Issues*, *Auckland Regional Council*.)

In your action plan you will:

Explain logically and clearly your purpose. You could present this as goals or objectives.

Brainstorm a range of actions that could be taken and likely consequences.

Detail the evidence you have used to select the action you will implement (e.g. cost benefit analysis). Consider actions already being done by other interest groups or stakeholders before making your final decision on the action you will implement.

Write a detailed action plan, which should include a series of small actions within a suitable time frame. Outline who will carry out the actions and relate the action to your overall purpose.

Milestone 1; Your action plan needs to be approved by your teacher before it is implemented ***last day to be checked is Friday of Week 7 Term 3.***

IMPLEMENTATION. Implement your plan. Keep a record of the activities you involved yourself in – this is to be written up in the learning journal and log and can be supplemented by photos, newspaper articles, video clips etc that illustrate your action(s). Describe any barriers or obstacles you faced and include any modifications to your action plan with the reasons why changes were made.

Milestone 2; Your teacher or suitable adult will sign your log book at regular intervals. Dates to show evidence of the start of implementation; ***End of Term 3.***

Remember to keep a learning journal of your action process – enter your reflections daily. Questions you may ask yourself are ‘What did I do this week? How did I feel about my progress? What have I learned? What people did I meet with? What do I plan to do next? How has my thinking changed? How do I feel about what I am doing? How has the way others have reacted to me affected my thinking? How does all of this relate back to my stated sustainability goal? How am I staying motivated to finish this action? How am I feeling about doing further actions?’

Task 3; EVALUATION. This evaluation is in two parts. You are expected to complete both parts in full to gain merit or excellence.

Critically evaluate and justify the action taken in relation to the aspects of sustainability.

Identify and discuss the strengths, weaknesses, opportunities and threats of your action (both the plan and the effects of the action).

Establish the criteria you have used to make a judgment on the effectiveness of the action taken as well as the planning process that was undertaken for your action.

Justify decisions by making judgments, considering implications, projecting future impacts, evaluating options, comparing and contrasting, analysing or suggesting alternatives and next actions for personal and social responsibility

Include any evidence or feedback to back up your statements.

Explain why some actions didn't go as well as planned. Include recommendations for a sustainable future.

b) Describe your personal response to the action or initiative in terms of aspects of sustainability. Discuss whether it has changed your understanding, attitudes or behaviour in relation to this issue? This is where you can refer back to your Learning Journal to see if your ideas or thinking changed throughout the action and if so why.

Task 4: REPORT Communicate relevant information about the plan, action taken and evaluation.

You are to present your report in a written format. It may have side headings, and could include relevant pictures, graphs, tables, diagrams. You should have started writing your report over the October break.

Support your presentation with evidence which could be in the form of graphs, statistics, timelines, diaries, interview tapes and/or transcripts, artifacts, maps, visuals, OHTs, radio excerpts, photos, newspaper articles, video clips, music etc.)

Your report should include;

Action chosen and the reason relating to sustainability.

Detailed plan with evidence of implementation.

Evaluation and how the action will support a more sustainable future

From the Standard:

A sustainable future requires the development of ways of thinking and acting to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainability includes, but is not limited to:

maintenance of biodiversity, ecological processes and life support systems

an economy relative to its ecological life support system

a fair distribution of resources and opportunities

looking beyond direct consequences of activities to explore attitudes, values and moral issues that create particular views on the use of natural resources

personal and social responsibility.

A planned personal action requires the student to:

carry out research and/or a practical investigation to develop and inform a plan of action that will contribute to a sustainable future

implement their plan.

Comprehensive requires the student to use evidence that is sufficiently qualitative and/or quantitative to explain the development of the plan. It must include a detailed time-frame and several steps of action based on evidence.

Evaluate requires the student to:

apply aspects of sustainability to make a judgement on the effectiveness of the action based on evidence taken in relation to a sustainable future. Where data is collected there should be appropriate processing

use reflective practice throughout the planning to make a judgement on the plan in effecting the action

identify their own personal response to the action and discuss whether it has changed their attitudes or behaviours in relation to aspects of sustainability.

Critically evaluate means the student is required to discuss the plan and the action taken and establish criteria on which to make an informed judgement. Students will *justify* decisions by

making judgments, considering implications, projecting future impacts, evaluating options, comparing and contrasting, analysing

or suggesting alternatives and next actions for personal and social responsibility.

The **personal action** may be conducted as part of a small group or as an individual activity. Evidence of individual work must be provided for all stages. This action may be a significant development of action (eg action has greater impact on sustainability) begun in previous years by the student or by another group/organisation. This is done in consultation with the teacher and involves the student in ongoing evaluation and reflective practice which should be written up in a logbook or milestone reports, with justification of changes to action.

Action towards a sustainable future incorporates the dimension of 'Education for the Environment' as outlined in the *Guidelines for Environmental Education in New Zealand Schools*, Learning Media, Ministry of Education, 1999, p.14, and acknowledges the reciprocal relationship of people with the environment. It reflects the notion of taking responsibility for our choices and decisions and in particular taking positive actions that contribute to a sustainable future. Action taken for a sustainable future could be preventative, mitigating or remedial.

Appendix 5 Assessment Schedules

5.1 Assessment Schedule: EfS AS90810_2009

Task	Evidence/Judgements for achievement	Evidence/Judgements for achievement with Merit	Evidence/Judgements for achievement with Excellence
Task 1	<p>Plan, implement and evaluate a personal action that will contribute towards a sustainable future.</p> <p><u>Action plan</u> Action goal or vision stated statement somewhere Sustainability issue and environment affected by issue described link to bigger sustainability issue made A range of possible actions and consequences outlined evidence of some sort of brainstorming One action recommended with reason 1 action clearly chosen Contribution to an aspect of sustainability identified at least 1 aspect of SCEE People/groups/organizations affected identified could be family or other gp like Church Resources and skills required to implement action plan identified these might be in one or more places & could include plants, tools, watering system, family members say for a garden</p>	<p>Plan in detail, implement and comprehensively evaluate a personal action that will contribute towards a sustainable future.</p> <p><u>Action plan</u> As for A plus</p> <p>One action recommended and justified using quantitative or qualitative evidence reasoning for action is clear Contribution to aspects of sustainability identified and linked to issue links must be made between the consequences of the action & the big issue IDed</p> <p>Detail of clear steps to be taken Steps need to include some detail eg size of</p>	<p>Plan in detail, implement and critically evaluate a personal action that will contribute towards a sustainable future.</p> <p><u>Action plan</u> As for M</p>

	<p>Outline of clear steps to be taken somewhere there needs to be a list of steps to be taken</p> <p>me frame shows a sequence these might be attached to list above</p>	<p>garden, no. of plants etc</p> <p>Detailed time frame shows a clear sequence has correct order ie plants are put in Tiafter garden is dug</p>	
Task 2	<p><u>Action</u> is implemented</p> <p>Evidence of action being taken is available eg photos of it in process or at end of action</p>	<p><u>Action</u> is implemented</p> <p>As for A</p>	<p><u>Action</u> is implemented</p> <p>As for A</p>
Task 3	<p><u>Evaluation</u></p> <p>Written evaluation submitted, including any modifications to the original plan some sort of written evaluation submitted which has any alterations included</p> <p>At least one aspect of sustainability is used to make a judgement on the effectiveness of the action taken in contributing to a sustainable future 1 aspect of SCEE is included in the evaluation which then rates the effectiveness of the action wrt a sustainable future</p> <p>Statistical analysis is used if appropriate this is not required for all reports</p> <p>Personal response to the action described, whether attitudes or behaviours have changed in relation to an aspect of sustainability these can be based on entries in the journal, & relate to the students perception of themselves. They may be supported by evidence in log. Must include at least 1 aspect of SCEE</p>	<p><u>Evaluation</u></p> <p>Aspects of sustainability are used to make a judgement on the effectiveness of the action taken in contributing to a sustainable future At least 2 aspects of sustainability are used in the evaluation which then rates the effectiveness of the action wrt a sustainable future</p>	<p><u>Evaluation</u></p> <p>Criteria for making judgements on the effectiveness of the action are established rather than just giving an arbitrary rating criteria are included & used</p> <p>Strengths and weaknesses of the action taken are Opportunities and threats resulting from the action discussed which may include a recommendation for further action discussed comments on all 4 aspects are found in the report & come from a SWOT graphic organizer in log book</p>

5.2 Assessment Schedule: EfS AS90828_2009

Task	Evidence/Judgements for achievement	Evidence/Judgements for achievement with Merit	Evidence/Judgements for achievement with Excellence
Task 1	<p>Plan, implement and evaluate a personal action that will contribute towards a sustainable future. Identify a personal response to the action.</p> <p><u>Action plan</u> Action goal or vision stated statement somewhere Sustainability issue and environment affected by issue described link to bigger sustainability issue made A range of possible actions and consequences outlined evidence of some sort of brainstorming One action recommended with reason 1 action clearly chosen & justified using evidence. Contribution to aspects of sustainability identified more than 1 aspect of SCEE People/groups/organizations affected identified could be family or other gp like Church Carry out research into your issue some evidence of research evident in log book Resources and skills required to implement action plan identified these might be in one or more places & could include plants, tools, watering system, family members say for a garden</p>	<p>Plan in detail, implement and comprehensively evaluate a personal action that will contribute towards a sustainable future.</p> <p><u>Action plan</u> As for A plus</p> <p>One action recommended and justified using quantitative or qualitative evidence reasoning for action is clear Contribution to aspects of sustainability identified and linked to issue links must be made between the consequences of the action & the big issue IDed</p> <p>Detail of clear steps to be taken Steps need to include some detail eg size of garden, no. of plants etc Detailed time frame shows a clear sequence</p>	<p>Plan in detail, implement and critically evaluate a personal action that will contribute towards a sustainable future.</p> <p><u>Action plan</u> As for M</p>

	<p>Outline of clear steps to be taken somewhere there needs to be a list of steps to be taken</p> <p>Time frame shows a sequence these might be attached to list above</p>	<p>sequence has correct order ie plants are put in after garden is dug & any reasons for change are included</p>	
Task 2	<p><u>Action</u> is implemented</p> <p>Evidence of action being taken is available eg photos of it in process or at end of action</p> <p>Teacher consultation evidence signed off</p>	<p><u>Action</u> is implemented</p> <p>As for A</p>	<p><u>Action</u> is implemented</p> <p>As for A</p>
Task 3	<p><u>Evaluation</u></p> <p>Written evaluation submitted, including any modifications to the original plan some sort of written evaluation submitted which has any alterations included. This should include a SWOT analysis of both the plan & the effects of the action.</p> <p>More than one aspect of sustainability is used to make a judgement on the effectiveness of the action taken in contributing to a sustainable future > 1 aspect of SCEE is included in the evaluation which then rates the effectiveness of the action wrt a sustainable future & looks at alternatives, & next actions for personal & social responsibility</p> <p>Include any evidence & feedback to back up your statements This may be in log book or in report & could take form of surveys, photos, other written comments etc</p>	<p><u>Evaluation</u></p> <p>Aspects of sustainability are used to make a judgement on the effectiveness of the action taken in contributing to a sustainable future At least 3 aspects of sustainability are used in the evaluation which then rates the effectiveness of the action wrt a sustainable future. May not have 3 if not applicable just a comprehensive step up</p> <p>Explain why some actions didn't go as well as planned. Include recommendations for a sustainable future. Some reflection on why eg planning not detailed enough, people pulled out, cost too much etc. Recommendations would include solutions to issues raised</p>	<p><u>Evaluation</u></p> <p>Criteria based on sustainability for making judgements on the effectiveness of the action are established rather than just giving an arbitrary rating criteria are included & used</p> <p>Strengths and weaknesses of the action taken and Opportunities and threats resulting from the action discussed which may include a recommendation for further action discussed comments on more than 1 aspects are found in the report & come from a SWOT graphic organiser in log book may include recommendations.</p>

	<p>Personal response to the action described, whether attitudes or behaviours have changed in relation to an aspect of sustainability these can be based on entries in the journal, & relate to the students perception of themselves. They may be supported by evidence in log. Must include more than one aspect of SCEE</p>		<p>And may look at alternatives & next actions for personal & social responsibility</p> <p>Discuss whether taking action has changed your, or your group's understanding, attitudes or behaviour to this issue.</p> <p>This can be based on entries in the journal, surveys, or any other evidence.</p>
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Appendix 6 Spreadsheet used to place students

Aspect	Absent =1	Awareness =2	Emerging=3	Developing =4	Action competent =5
Experience: Participation in things others have organised. Engages "head, heart and hands". In and about environment.	Has had little or no experience that they connect to environment/sustainability issues. Resists participating in anything related to the environment/sustainability. Usual activities/actions centered round self.	Has had a few experiences that they connect to environment/sustainability issues. Understands that participation in environment/sustainability related events is a good thing but does not understand why it is good. Is not proactive in choosing such experiences.	Has had some experiences that they connect to environment/sustainability issues. Willingly participates in environmental/sustainability related events organised by someone else. Sees such participation as a good thing and understands that there are good reasons for doing it but unable to share reasons with anyone else	Has had regular, self or other initiated experiences that they connect to environmental/sustainability issues. Enjoys participating and understands the issues behind the experience. Tries to involve others to share the experience.	Actively looks for new experiences that they connect to environmental/sustainability issues. Understands the issues related to these and actively shares this knowledge and experience with others.
Reflection: How when and why to reflect. Reflect on own thinking and actions. Is essential to make links between thinking, feeling and acting; i.e. able to link attitudes and values to SCEE and to actions	Has little skill in reflecting on who they are, what they do or why they do it.	Has some ability to identify who they are. Has some skill in reflecting on own actions but unlikely to do it spontaneously. Has some ability to identify to own thoughts on an issue.	Has some ability to make links between who they are and their values and thinking. Has skill of reflecting on own behaviour, thinking and learning. Has skill to make links between thinking, attitudes and actions/behaviours of others.	Has skill to use reflection to help self understand own responses to situations. Has skill to give feedback to others on perceived links in situations.	Has skill to continually reflect on own actions, values and responses. Has skill to perceive when inconsistencies exist in own actions, values and responses. Has skill to give and receive feedback on actions, responses and understandings.
Knowledge: Need knowledge and understanding of stuff/issues, of links between issues and impact. Finding information. Link to social, cultural and historical dimensions. Understanding SCEE and applying it Skill in finding & identifying relevant information on an issue & its impact Skill in linking and analysing social, cultural and historical dimensions to the aspects, such as social, cultural, environmental and economic, for an issue & its impact. skill in using knowledge to inform action.	Has little or no background knowledge on any environmental/sustainability issues or impacts Is unable to identify relevant information on an issue Is unable to link information between any dimension or aspect of an issue.	Has some basic knowledge of a specified environmental/sustainability issue or impact. Has skill to find and identify some relevant information on an issue or its impact Has skill to identify simple links between dimensions and/or aspects of an issue.	Has reasonable knowledge and understanding of an issue & its impact. Has skill to find and identify relevant information on an issue & its impact. Has skill to identify links between dimensions and aspects of an issue. Can explain some of these links Has skill to adapt an action found by researching.	Has good knowledge and understanding of an issue & its impact. Has skill to find, identify & select relevant information on an issue & its impact. Has skill to identify and analyse links between dimensions and/or aspects of an issue. Is able to explain most links. Is able to use their knowledge to develop an action of their own.	Has detailed knowledge and understanding of an issue & its impact. Has skill to identify missing information and know where to find it. Has skill to analyse and evaluate links between dimensions and aspects of an issue. Can transfer these skills to other issues Able to use knowledge to plan a wide range of actions

Aspect	Absent =1	Awareness =2	Emerging=3	Developing =4	Action competent =5
Vision of sustainable future: Can visualise a sustainable future and identify why it is better. Can identify aspects of SCEE in it. Can see own role in making it happen.	Has little skill in thinking of future as anything different to present.	Has skill of imagining future as different to present but likely to think of it as an extreme ie all good or all bad, without detail. May well be paralysed by this if view is negative.	Has skill of imagining future as more sustainable than now and sees this as better. Has skill to identify specific changes that are required. Has skill to see how some actions under SCEE contribute to this future and to take some of these actions	Has skill of visualising a detailed sustainable future. Has ability to explain why it is better. Has skill to see how actions under SCEE contribute to this future. Has skill to explain how changes they have made contribute to a sustainable future	Has visualised own personal view of a sustainable future. Has skill to realise that own vision will need merging with others. Has commitment to work with others to bring about a shared vision of a sustainable future. Has skill to participate in society in range of groups to bring about changes.
Action taking: Carries out carefully considered acts/ behaviours that support a sustainable future. Can make a relevant decision and carry it out. Can carry out an action over a period of time. Can carry out direct and indirect action.	Has little or no motivation to do anything for others. Only action might be to protect own lifestyle.	Most likely to participate in actions organised by others. Might encourage others to participate, particularly if time frame required for action is short.	Able to see their own actions as important and making a difference. May not have appropriate understanding of perspective of own action. Carries out an action for a short period of time but may not be committed to a long term action.	Has made or is prepared to make long term lifestyle changes when understands reasons for change. Is able to explain these changes to self and others. Prepared to talk to others about action taking.	Has embedded some changes in their lifestyle and has plans to continue making other changes. Acts with others to ensure actions required for a sustainable future happen e.g. social justice issues and at regional/national and global levels. Is proactive about encouraging others to take action.
Connectedness: Able to make connections between people and all aspects of environment. Able to identify relevant attitudes and values. Able to link these to their actions. Able to see that need solutions at different scales e.g. local, regional/national and global	Unable or unwilling to make connections between self and others. Attitudes and values are egocentric	Does not see connections between own or others attitudes and values and what happens to planet. Does perceive some sort of connection between people and planet but unable to clearly articulate it	Is able to make connections between their actions and the planet. May lack appreciation of scale of changes needed. Can relate these connections to attitudes and values. May not see need for "snowball effect" to make big changes.	Is able to link their attitudes and values to the way they treat the planet. Is able to apply SCEE in a range of situations. Sees importance of action at a range of scales i.e. local, regional/national and global i.e. need for "snowball effect".	Able to connect people and planet at all levels and for all issues. Able to apply an analysis to these connections Able to appreciate scale of problem appropriately